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DESIGNING AN EDUCATIONAL ANDROID APPLICATION TO IMPROVE LEARNING QUALITY AND STUDENTS' ATTITUDES TOWARDS IT

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ABSTRACT

This study aims to Designing Android application in education to improve learning quality and simulate logic gates in the computer, and overcoming traditional education problem, Explains the possibility of using educational mobile in understanding and understanding issues related to logical gates with the least time and less effort, Encourage students to overcome the state of negative reception of information to start to participate actively in learning logic gates, Create an atmosphere of pleasure, excitement, thrill, and is an attractive element in learning logical gates, To overcome the difficulties in solving the problems related to logical gates, and reduce the percentage of error and Keeping pace with technological developments in educational mobile applications so that the educational environment for content can be developed at any time and from anywhere by linking the application update. the study results showed that there are difference between the mean of control and experimental group and for the experimental group since the mean is 21.775, which is greater than the mean of the control group, which is 19.75, and the value of the statistical function at the level of significance is 0.000, which means rejecting the zero hypothesis and accepting the alternative hypothesis, that is, there are statistically significant differences at level 0.05 between the control group and the experimental group in the skill of knowledge of the fundamental of logic gates skills.

Keywords- Android application , mobile education , simulation , logical gates.

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1. INTRODUCTION

The circumstances of the age impose on us the search for new and varied ways and means to open the way for our students to acquire the knowledge and skills necessary to advance us. , And the technological revolution that was launched in the world and at high speed was the product of the progress of science in our modern world unprecedented progress, every day comes into existence a flood of knowledge as a result of the start of scientific research and the explosion of knowledge, is no secret that the characteristic of the era in which we live speed Change and development, which means that there are new problems and challenges facing humanity in the new millennium.

Mobile learning especially educational Android application is a philosophy of distance learning that expands learning opportunities for learners because it achieves flexibility in teaching and interacting with the teacher at any time based on providing learners' learning content using interactive communication techniques, meaning learning the learner according to their ability and speed of learning. It also represents a pattern of e-learning methods (1)

As The abstract nature of many mathematical concepts and ideas makes learning and learning a process that requires great, honest and purposeful effort, and a course in computational mathematics as an intellectual activity that contributes to the development of the learner's ability to infer, abstract and exact. To express his knowledge and skills. The problems faced by the learner in the study of computer mathematics, one of the main problems that concern the interest of teachers and researchers in the field of education at present, and methods of teaching computer mathematics is an integral part of the educational system in the computer program for computer teachers (2).

In addition, there are no labs that enable students to carry out experiments and develop innovative thinking. Sometimes, the laws in their applications need the possibilities that are not available within the educational environment, especially at the university level, for several reasons, most importantly the reliability of the students themselves, Lack of sufficient time for lecturers to provide adequate explanation and repetition if necessary with examples to enhance understanding, students need to find adequate answers to many questions about the subject matter, in addition to the lack of exercises and examinations on those lessons with Providing retroactive nutrition, and their need to obtain regressive nutrition (3).

The use of technology in general and educational Android application in particular in teaching students logical gates, and the use of simulation in the classroom will encourage students to overcome the case of receiving negative information to start to participate effectively in education, which may prompt them to continue their education in programming courses during Study stages. This technology is characterized by high capabilities in stimulating students and the possibility of conducting laboratory experiments that are difficult to implement in the real labs and performance of the skills required as if performed in the real laboratories, which increases the understanding and understanding of the logical gates of the use of traditional programs that do not merely constitute demonstrations and the role of the student Where there is a negative component, and the appropriate interaction component is not available to the student, as well as insufficient tools and equipment to conduct laboratory experiments.

2. RELATED WORK

Norman et al, (4), studied android based Indonesian information culture education game, in this study the games were used in the educational process. The methodology used for development is Waterfall methodology which consists of analysis method for information gathering, system design, implementation, and testing or testing of information on Indonesian Culture presented in this educational game. Test results obtained are a lot of information provided in this set can be accepted or captured by players and considered useful for the learning of players. Besides, overall can be stated that the level of satisfaction of players against educational game "Merah Putih" is considered quite high.

Stamatios Papadakis et al, (5),studied educational apps from the android google play for greek preschoolers: A systematic review, the purpose of this study was to examine whether self-proclaimed educational apps for Greek preschoolers have been designed in accordance with developmentally appropriate standards to contribute to the social, emotional and cognitive development of children in formal and informal learning environments. The study results were discouraging. The majority of the apps aimed to teach children the basics about numbers and letters. Overall, they were drill-and-practice-style, based on a low level of thinking skills, thereby promoting rote learning, and were unable to contribute to a deeper conceptual understanding of certain concepts.

Behrag parhizkar and zahra mohana (6) studied "Android mobile Augmented Reality application Based on different learning theories for primary school chirdren" The aim of this research is to design and develop a mobile phone augmented reality application and multimedia application on android OS platform for general science studies of primary school syllabus. In addition, the objective of the research is also, to develop the prototype using Tangible User Interface as well as Natural User Interface (natural element of human finger and hand), to control the virtual 3D objects in the real environment. The research methodology is discussed in two parts: development methodology and the simple usability testing methodology.

Kidi et al, (7), reported that the development of the mobile gaming industry is increasing rapidly, the game today not only serves as entertainment alone. Then by increasingly the need for the sector and education purposes then motivates the development of an educational game "Merah Putih" on the Android platform that provides information on Indonesian Culture. The methodology used for development isWaterfall methodology which consists of analysis method for information gathering, system design, implementation, and testing or testing of information on Indonesian Culture presented in this educational game. Test results obtained are a lot of information provided in this set can be accepted or captured by players and considered useful for the learning of players. Besides, overall can be stated that the level of satisfaction of players against educational game "Merah Putih" is considered quite high (7).

Roxani Skiada et al, (8), studied easy lexia: a Mobile application for children with learning difficulties, in this research it was attempt to design mobile program for children with special learning needs "Easy Lexia" they focused on designing a program which is directed to improve children's fundamental learning skills, such as language and mathematical abilities , using M-learning .the mobile application aims at exercising and improving the students reading and writing skills in an educational and entertaining process using multiple-choice items. The results showed the promising prospects mobile learning holds in such educational goals. Additionally, the students showed progress in their overall game performance over a short period of time usage (8).

kogilathah segaran et al, (9), studied usability and user satisfaction of 3D talking-head Mobile Assisted language learning (MALL) App for Non-native speakers, the study aimed to Developed mobile assisted language learning (MALL) application for using animation , specifically 3D talking-head to learn English as second language effectively among non-native speakers . The results of this application show the success of this app. There are effects of 3D talking-head mobile devices programs in improve English pronunciation skills among non-native speakers (9).
Muazzan Binsaleh, (10), studied mobile learning: the case study of the four southernmost provinces of Thailand in transforming critical to opportunity, the results showed that one of the solutions to beat the problems which resulting from the conflicts located in different states can be achieved through m-learning. The initial findings showed that with the combination of some learning theories and mobile learning technologies, they can be applied well in this problematic situation; we can overcome the problems faced by learners from those conflicts (10).
Kruse and Gibson, (11), explained theoretical aspects of simschool as very complex and based in research. Kruse and Gibson stated that the simulator is a synthesis model using theories from psychology, cognitive science, and learning theories (11).
Deale and pastore, (12), conducted a study to evaluate the effectiveness of an instructional simulation, simschool. They reported that when combined with user testing, results indicated that simschool provides a valid model of a simulated environment for preservice teachers to practice instructional activities (12).
Stavroulia et al, (13), summarized that the sim school simulation helped the participants learn and analyze the characteristics and the different needs of their students and adjust their instruction in order to motivate and improve student performance (13).

It is evident from the broad range of simulation projects presented in this section that this is an accepted practice in many business and industrial sectors. The benefits and research opportunities are shared by all disciplines and it is fair to assume they benefit this study as well.

Elsaied balda ,(14),studied building a proposed virtual laboratory for the development of the concepts and skills of electronic circuits for deaf students ” The study aims to shed light on the need for virtual reality technology in general and virtual laboratories in particular to overcome various problems in the field of education in general and deaf students in particular, to identify quality indicators for designing and building virtual laboratories for deaf students and to design a suitable educational model for the deaf. Constructing the proposed virtual lab in addition to constructing a virtual laboratory for the development of the concepts and skills of electronic circuits among deaf students. Examining the effectiveness of the proposed virtual lab in developing the concepts of electronic circuits among deaf students. And also to study the effectiveness of the proposed virtual laboratory in developing the skills of the electronic circuits of deaf students (14).
Gargi Roy et al, (15), studied " COLDVL: a virtual laboratory tool with features to support learning in logic design and computer organization". The study comprises ahierarchical logic module level editor and logic simulator at the back end, the purpose of the tool is to support the implementation of logical design experiments and computer organization. The tool contains circuit building components such as logic gates, features of the tool design of hierarchical modules and automatic encapsulated control unit generation in user circuit. This tool has been used to support curricular laboratory courses for computer organization for several years. The benefits of the techniques and

features incorporated in COLDVL to support learning of these courses. Evaluation of student performance from these aspects using statistical methods indicates favorable support of this tool to aid learning is presented. The COLDVL tool can be further augmented by incorporating automated evaluation techniques using equivalence checking of submitted student designs against golden models available with the instructor (15).

3. THEORETICAL FRAME WORK

3.1 E-Learning:

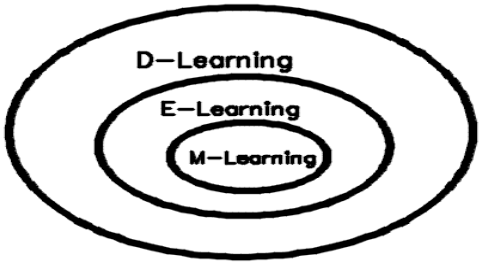
The E-learning which enable the educators to learn in different locations at any time refers to the use of technology in different learning activities and to help people to learn remotely. The E-learning concept covers different models such as web-based learning, computer-assisted learning, virtual classrooms and digital communication (16).

Mostly it depends on the financial support the universities have, nevertheless it depends on the professors themselves if they are ready to use all latest devices and to change their usual teaching process. For example, create online courses, answer student's e-mails, moderating forum that was created specifically for their course, etc. From the teaching standpoint we should be open to these technologies that surround us (17).

3.2 M-Learning

M-Learning is a sub-set of E-learning and both of them part of distance learning, their relationship is diagrammatically given in figure 2.1. The concept of M-learning combines the advantage of network wireless technologies, mobility to be used in the education and learning processes Considering the learning availability anywhere and anytime lead to M-learning as a new model of learning technology (16).

Figure 1: *M-learning as a subset of E-learning (16)*



3.3 The Benefits and Advantages of M-learning

Mobile learning (M-learning) has become an attractive trend such that many researchers are willing to investigate its features and to examine its acceptance by learners and educators (18), M-learning have a lot of benefits which are listed below (3):

- Interaction: the student may have an interaction with professors.
- Portability: mobile devices are lighter than books and permit students to take notes, type text or record sound.
- Attractive students: new generations like to use mobile devices.
- Practicality: Students can study whenever they have time.

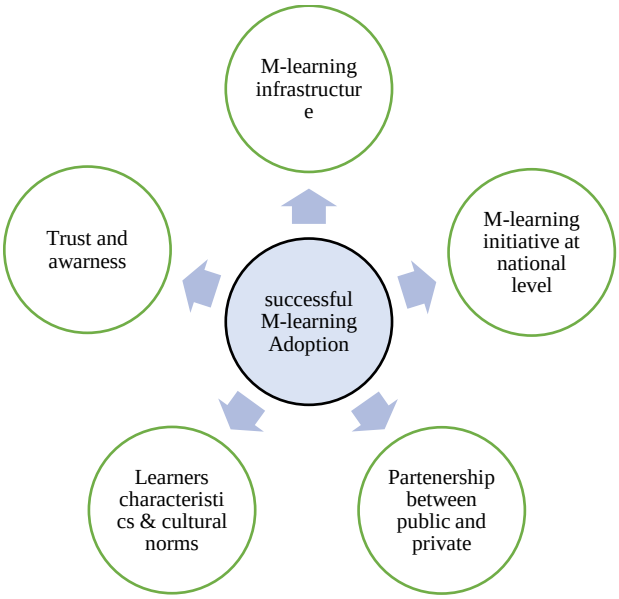
- Cooperation: enables easier cooperation between students, students can cooperate even in remote locations, students can cooperate even in remote locations.
- Speed: the conventional learning materials and training take a lot of time in order to be set, materials for mobile learning can be prepared and be available relatively quickly.
- Retention of knowledge: mobile learning is a powerful learning tool that supplies quick reminding and adding materials to already learned.
- It can support students with disabilities.
- Reduces the cost of printing literature.
- Enables easier data management.

Dahshan and yoniss, (19), provided the advantages of m-learning:

- A form of e-learning, based on the principle of learning spread and wandering freely, breaking the limits of time and place.
- Save time and problem of travel and movement of the learner.
- The possibility of delivery of information written, video and audio from a distance.
- Operating and storage efficiency speed.
- Provide chances of social, interactive and participatory learning from a distance.
- The purity of sound, image, tables and graphs.

Asharul and hafedh, (20), summarize the factors that have influenced successful m- Learning adoption in educationally advanced countries is shown in the figure 2

Figure 2: *M-learning adoption: Lessons learned from educationally advanced countries (20)*



3.4 Android Application

Android applications can be written by any developer and do not require any certification or validation before being made available on the store. As a result, poor, malicious or simply abusive applications coexist with benign android

applications on google Play. Google Bouncer (antivirus system proposed by google) now checks applications for malicious code, but no other validation process takes place for applications arriving to the store (21).

Android application (app) market is expanding rapidly. This expansion is mainly driven by the development of mobile apps, which provide users with more interesting and diverse functionalities. However, one of the most frustrating things is that these applications often require a large amount of battery power, which drains the battery quickly and brings a lot of complaints from users. Besides, millions of apps were often developed in an energy-oblivious manner, so optimizing the energy consumption of apps is of critical importance (22).

3.5 Android GUI exploration

Most Android apps come with GUI interfaces. In order to reveal more behaviors of Android apps, they must use automatic tools to control the GUI, and make them generate variant traces. Many researchers have explored the topic of Android GUI exploration. The methods include random testing, heuristic guided, and symbolic execution based . the most basic random method for Android GUI testing. It is a generic built-in Android instrumentation. It randomly sends emulated events to the Android runtime, and does not need to worry about the state transition of GUI models. It also does not require any code knowledge and does not require any control over a specific app (22).

3.6 Logical Gate

The main purpose of this research is to develop a method for designing a logical gate system using mobile simulation.

3.6.1 Logic

Formal logic is a branch of mathematics that deals with true and false values instead of numbers. In the mid-19th century, George Bool developed many Logic ideas .Boolean logic deals with equations where the operators are “AND” or “OR” instead of “add” and “multiply”. Logical values can easily be expressed by an electrical circuit “True” or “1” can be defined as voltage on a wire while “False” or “0” can be defined as no voltage. We will use positive logic. Analog values can be anything while digital only has discrete values, 0 or 1 Electrical devices called “gates” can implement the logical. Logical design is still an indispensable step in designing a computer system and requires skill and manpower (23).

3.6.2 Logical Variable

The logical variable is any variable that can take only one value from two values, for example (24):

True OR False

On OR OFF

0 Volts OR +5Volts

Low OR High

Female OR Male

One of the two values denotes 1 and the other value is 0. Any logical variable can only take one of these two values, there is no third possibility. If X is a logical variable it would either be x=0 OR x=1.

3.6.3 Logical Operations

Logical operations are operations that can be performed on logical variables, some of these processes are basic processes, which AND ‘OR and NOT operations, and some not basic like NAND, NOR and XOR operations these processes can be expressed using basic processes (24).

3.6.4 Logical Expression

Logical expression is a set of logical variables that are associated with each other by logical operations like x=A+B'.C' .The logical expression here consists of four variables A,B,C and X Linking them to operations OR , AND, NOT and Parity process (=) (25).

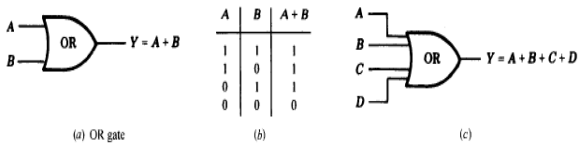
3.6.5 Logic Gates

In electronics, a logic gate is an idealized or physical device implementing a Boolean function (26), A large number of electronic circuits (in computers, control units, and so on) are made up of logic gates, these process signals which represent true or false. There are three basic logic gates which are described below. We adopt the convention that the lines entering the gate symbol from the left are input lines and the single line on the right is the output line (27).

OR Gate:

The OR gate is an electronic circuit that gives a true output (1) if one or more of its inputs are true. A plus (+) is used to show the OR operation. Figure 3 (a) shows an OR gate with inputs A and B and output Y = A + B where “addition” is defined by the “truth table” in Figure 3 (b). Thus the output Y = 0 only when inputs A = 0 and B = 0. Such an OR gate may, have more than two inputs. Figure 3 (c) shows an OR gate with four inputs A, B,C, D, and output Y = A + B + C + D. The output Y = 0 if and only if all the inputs are 0(28).

Figures 3 (a, b, and c): *Show an OR gate*



(a) OR gate (b) (c)

(28)

Suppose, for instance, the input data for the OR gate in Figure 3 (c) are the following 8-bit sequences (28):

A = 10000101, B= 10100001, C= 00100100, D= 10010101

The OR gate only yields 0 when all input bits are 0. This occurs only in the 2nd, 5th, and 7th positions (reading from left to right). Thus the output is the sequence Y = 10110101.

AND Gate:

The AND gate is an electronic circuit that gives a true output (1) only if all its inputs are true. A dot (·) is used to show the AND operation i.e. A·B. Note that the dot is sometimes omitted i.e. AB. Figure 4 (a) shows an AND gate

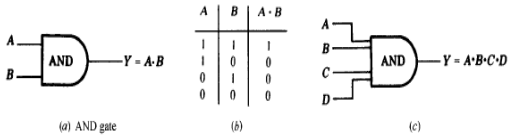
with inputs A and B and output Y = A.B (or simply Y = AB) where "multiplication" is defined by the "truth table" in Figure 4 (b). Thus the output Y = 1 when inputs A = 1 and B = 1; otherwise Y = 0. Such an AND gate may have more than two inputs. Figure 4 (c) shows an AND gate with four inputs, A, B, C, D, and output Y = A.B .C .D. The output Y = 1 if and only if all the inputs are 1 (29)

Suppose, for instance, the input data for the AND gate in Figure 4 (c) are the following 8-bit sequences (29):

A = 11100111, B= 01111011, C= 01110011, D= 11101110

The AND gate only yields 1 when all input bits are 1. This occurs only in the 2nd, 3rd, and 7th positions. Thus the output is the sequence Y = 01100010.

Figures 4(a, b, and c): *Show an AND gate (29)*

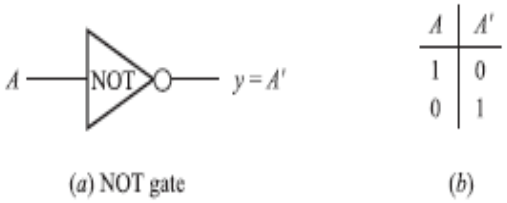


(a) AND gate (b) (c)

NOT Gate:

The NOT gate is an electronic circuit that produces an inverted version of the input at its output. It is also known as an inverter. If the input variable is A, the inverted output is known as NOT A. This is also shown as A', or $\bar{A}$ with a bar over the top. Figure 5 (a) shows a NOT gate, also called an inverter, with input A and output Y = A' where "inversion," denoted by the prime, is defined by the "truth table" in Figure 5 (b). The value of the output Y =A' is the opposite of the input A; that is, A'=1 when A =0 and A' =0 when A =1. It emphasize that a NOT gate can have only one input, whereas the OR and AND gates may have two or more inputs (30).

Figures 5 (a and b): *Show an NOT gate (30)*



(a) NOT gate (b)

Suppose, for instance, a NOT gate is asked to process the following three sequences (30):

A1 = 110001, A2 = 10001111, A3 = 101100111000. The NOT gate changes 0 to 1 and 1 to 0. Thus A'1= 001110, A'2= 01110000, A'3= 010011000111 are the three corresponding outputs.

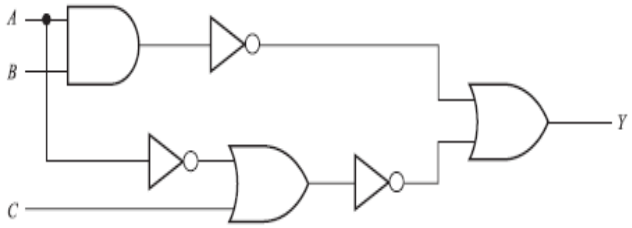
3.6.6 Logic Circuits

Logic circuits (also called logic networks) are structures which are built up from certain elementary circuits called logic gates. Logic gates can be combined together to produce more complex logic circuits (networks) (31).

Each logic circuit may be viewed as a machine L which contains one or more input devices and exactly one output device. Each input device in L sends a signal, specifically, a bit (binary digit), 0 or 1 to the circuit L, and L processes the set of bits to yield an output bit. Accordingly, an n-bit sequence may be assigned to each input device, and L processes the input sequences one bit at a time to produce an n-bit output sequence (32)

A logic circuit L is a well-formed structure whose elementary components OR, AND, and NOT gates (33). Figure 6 is an example of a logic circuit with inputs A, B, C and output Y. A dot indicates a place where the input line splits so that its bit signal is sent in more than one direction [ ]. (Frequently, for notational convenience, we may omit the word from the interior of the gate symbol.)Working from left to right, we express Y in terms of the inputs A, B, C as follows. The output of the AND gate is A. B, which is then negated to yield (A.B) '. The output of the lower OR gate is A' + C, which is then negated to yield (A'+ C) '. The output of the OR gate on the right, with inputs (A.B) ' and (A' + C'), gives us our desired representation, that is, Y = (A ・ B) ' + (A' + C) ' (28).

Figure 6: *Shows an example of a logic circuit (28)*



There are two different types of problem are considered here (28):

- Drawing the truth table from a given logic circuit (network).
- Designing a logic circuit (network) from a given problem and testing it by also drawing a truth table.

4. RESEARCH OBJECTIVES

- The main objective of this research is to design an educational android application to help students develop logic gate and Boolean algebra skills. emerge from this main objectives other targets are :

1- Provide vision of the proposed application to develop the skills and problem solving in logic gate .

2- Measure the effectiveness of educational android application to develop the skills and problem solving in logic gate .

5. RESEARCH PROBLEM AND QUESTIONS

The problem of research is not to employ modern technology in the teaching of computer mathematics course in general, and the subject of logic gates in particular, and thus can formulate the problem of research in the following main question

How to design an educational android application to develop skills and problem solving in logic gate for university student And their impact on the development of students' ability to understand logical gates "?

The answer of this question yields to the answers of the following sub questions :

1. What are the skills in computer mathematics which need to develop?
2. How can develop the computer mathematics skills and problem solving to each skill?
3. What is the efficiency of the educational android application on the development of the skills and problem solving in computer mathematics in general and logic gates in particular .

6. THE PROPOSED SYSTEM

Design the application's logon icon

The researcher designed the application's login icon where students can access the application when pressed like any application on the mobile Figures 7 and 8 show the application Icon.

Figure 7: *Screenshot of Application Icon*

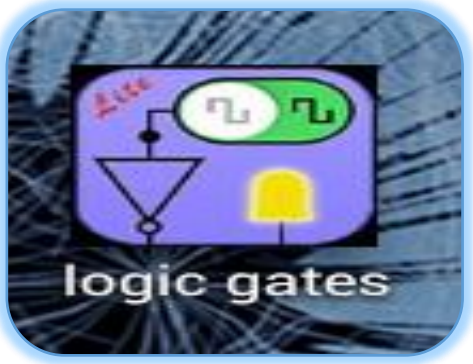


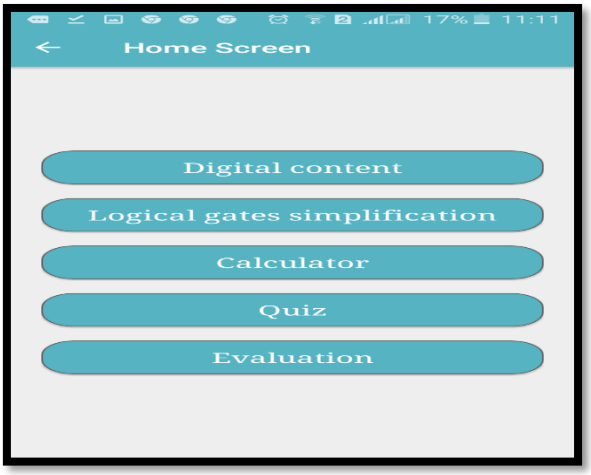
Figure 8: *Screenshot of Application Icon from device.*

Design modules

Educational module

The educational module is the module which organizes the learning resource, it presents educational material as shown in figure 9

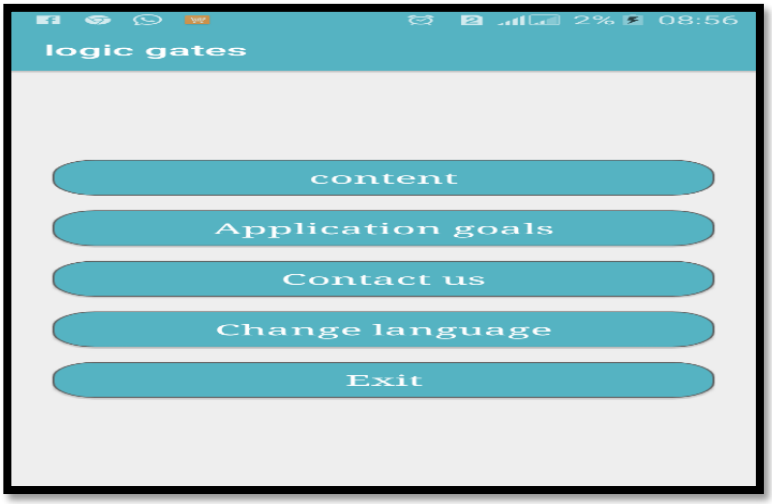
Figure 9: *screenshot of Educational Module.*



Interaction module

The interaction module provides to the student user interfaces and communication tools. User interfaces are the user manual with the program and all tools that exit on the screen such as buttons and menus to facilitate using the application. The main objectives when designing the user interface is simple so as not lose its educational goals. The student can interact with the application throw the main menu as shown in figure 10

Figure 10: *Screenshot of Main Menu*



Calculator module

It is considered the most important module in educational application, it enables the students to build truth table by inserting the different variables in a logical equation and seeing the output in the image of the truth table as shown in figure 11.(a and b)

Figure 11(a): *Screenshot of Calculator*

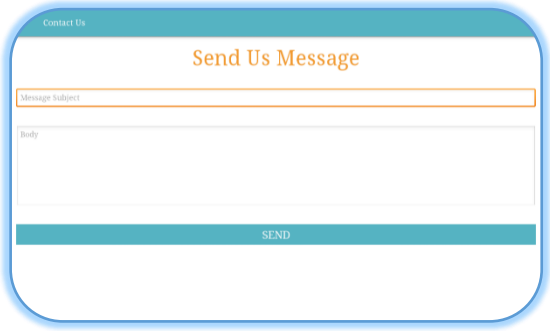
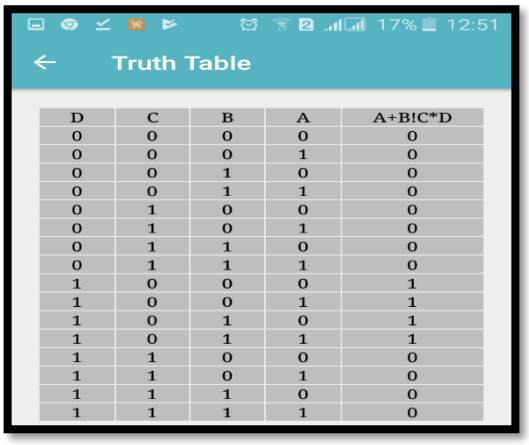


Figure 11(b): *Screenshot of Calculator*



D	C	B	A	A+B!C*D
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

Questions module :

Questions that are resolved by students after the teaching process directly affect the development of students' thinking skills and the purpose of the unit of questions In the educational application to enable students to solve questions and see if they are true or false, which will eventually lead to the number of questions they have solved and the length of the solution, making it each time solving questions to challenge such a game to achieve a higher degree than before. It appears in Figure12,13,14.

Figure 12: *Screenshot of questions module*

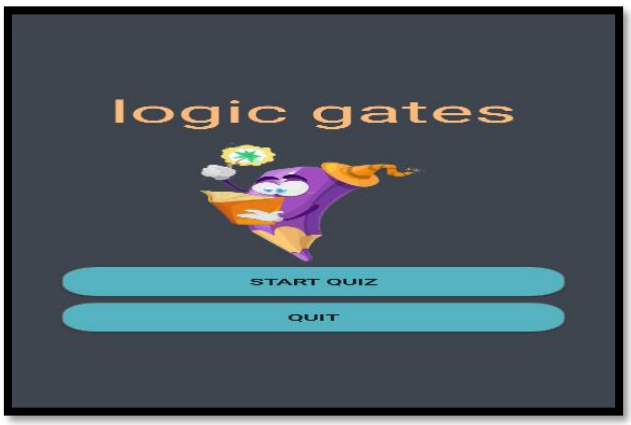


Figure 13: *Screenshot of questions module*

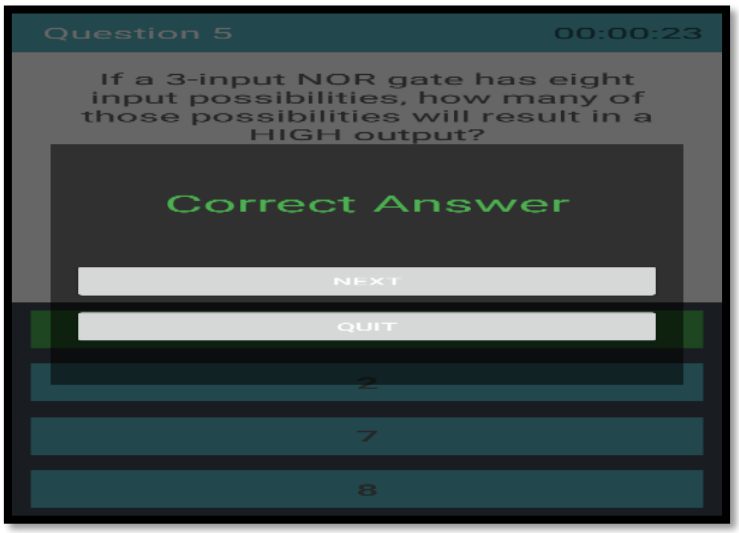


Figure 14: *Screenshot of questions modul*

Evaluation module :

From her name, it is clear to us that the performance of students is assessed on the cognitive achievement aspect while using the educational application. The question structure is also similar to the questions on the Questions tab .

7. PROPOSED EDUCATIONAL ANDROID APPLICATION IMPLEMENTATION

The educational android Application was implemented by using some tools as survey, observation sheet and the achievement test. It was implemented in the following steps:

7.1 Students' Aptitude for Using Mobile Devices in the Educational Process Survey

There is a survey was made to measure the students' aptitude for using mobile in the educational process. Its results shown in table 1

TABLE 1: *STUDENTS' APTITUDE FOR USING MOBILE DEVICES IN THE EDUCATIONAL PROCESS*.

Student action	percentage
Use mobile devices in his/her daily life	100%

Cant forego his/her mobile device	97%
Participates in SMS services	43%
connects to the internet from his/her mobile device	74%
Has readiness's to use his/her mobile device in the educational process	90%
Find what prevents him/her from using mobile device in the educational process	16%
Has problem in logic gate learning	67%
Find that the traditional way is the main reason of logic gate learning problems	57%
Doesn't find from the lecturers enough to develop his/her logic gate skills and solving problems	63%

7.2 Content Analysis

It has been identified skills contained in the three tabs; Digital content, Calculator and logical gates simplification, which scheduled to students' grade one, Computer Teacher Preparation Department, faculty of specific education, the three tabs included the following sub-skills:

- Logical gates' skills.
- Logical gates simplifications' skills.
- Truth table calculate' skill.
- Knowledge of the fundamentals of Boolean algebra
- Dealing with theories of Boolean algebra and its use in simplifying logical expressions

7.3 Experiment preparation

The experiment was prepared and implemented according to the following steps:

7.3.1 The sample Research Selection

The sample research was selected from the grade one, Computer Teacher Preparation Department, faculty of specific education, new Damietta University during the first semester section one, two and three. This sample was

divided into two groups randomly the control group studying the curriculum through the traditional way, and the experimental group studying through the proposed educational android application.

7.3.2 the pre test

The pre-test was applied on the students of the research sample , In the beginning, a pre-test was conducted to determine the cognitive level of both the experimental group and the control group .

7.3.3 Applying the proposed educational android application on the experimental group

The researcher checked out portable student devices and confirmed that they all had an Android operating system. Then install the program in the final form after the exploratory experiment has been performed and verified. At the same time, the control group began to study the curriculum using the traditional method (lecture method) .

7.3.4 the post -test

After completion of curriculum teaching in both directions (lecture - application of the proposed education), students passed after the test. The experimental group and the control group were collected and prepared .

8. RESULTS

Pre-Test Results

The pre-test was applied to students of control and experimental group, the SPSS program was used to measure the significant differences between the control and experimental groups using paired-samples T test, the results are described in detail as shown in table 2 The results show that there are no significant differences between control and experimental group for all skills in the pre-test.

TABLE 2: *PAIRED SAMPLES STATISTICS OF PRE-TEST RESULTS FOR CONTROL AND EXPERIMENTAL GROUP*

Control & Experimental	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				lower	upper			
Knowledge of the fundamental of Boolean algebra	0.167	1.472	0.601	-1.378-	1.711	0.277	5	0.793

Understanding of sub-concepts related to logical processes and logical variable	-0.200-	1.304	0.583	-1.819-	1.419	-0.343-	4	0.749
Configuring logical expression and dealing with logical gates	0.000	1.069	0.378	-0.893-	0.893	0.000	7	1.000
Resolve the truth table with high accuracy and super speed	-0.500-	1.871	0.763	-2.463-	1.463	-0.655-	5	0.542
Understanding simple logic gates	-0.600-	1.140	0.510	-2.016-	0.816	-1.177-	4	0.305
Dealing with theories of Boolean algebra and its use in simplifying logical expressions	-0.200-	1.304	0.583	-1.819-	1.419	-0.343-	4	0.749
Dealing with electrical circuits	-0.200-	0.839	0.374	-1.239-	0.839	-0.535-	4	0.621

Post-Test Results

the skills are as follow:

1- Knowledge of the fundamentals of Boolean algebra.

2-Understanding of sub-concepts related to logical processes and logical variable.

3-Configuring logical expression and dealing with logical gates.

4-Resolve the truth table with high accuracy and super speed.

5-Understanding simple logic gates.

6-Dealing with theories of Boolean algebra and its use in simplifying logical expressions.

7-Dealing with electrical circuits.

TABLE 3: *PAIRED SAMPLES STATISTICS FOR TOTAL SKILLS.*

	Mean	N	Std. Deviation	Std. Error Mean
Control	19.7500	40	2.38317	0.37681
Experimental	21.7750	40	2.33686	0.36949

TABLE 4: *PAIRED SAMPLES TEST FOR TOTAL SKILLS.*

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Control – Experimental	-2.025-	1.775	0.280	-2.592-	-1.457-	-7.212-	39	0.00

opinions of both students and learning

The opinions of both students and learning experts are positive towards the proposed Android application "chi^2" was calculated to calculate the significance of the frequency differences between the acceptance or rejection of students and learning experts for each phrase of the questionnaire of their opinions towards the proposed Android application, and the following tables illustrates this.

TABLE 5: *IT SHOWS THE FREQUENCIES, PERCENTAGES AND THE VALUE OF "CHI^2" ABOUT THE STUDENTS' OPINIONS ABOUT THE PROPOSED APPLICATION.*

N	phrases	agree		Not agree		Chi	level
		k	%	k	%		
1	The program	24	96	1	4	21	functi

N	phrases	agree		Not agree		Cu	level
		k	%	k	%		
	achieves its objectives					.16	on at 0.05
2	Allows the learner to self-learn	25	100	0	0	25	function at 0.05
3	It provides the learner with the opportunity to self-assess	20	80	5	20	9	function at 0.05
4	Attractive introduction to the program	25	100	0	0	25	function at 0.05
5	Texts are easy to read	23	92	2	8	176.4	function at 0.05
6	The font size is clear	23	92	2	8	176.4	function at 0.05
7	Ease of dealing with the program	24	96	1	4	211.6	function at 0.05
8	simple background	25	100	0	0	25	function at 0.05
9	Alignment of the program objectives with the characteristics of the learners	22	88	3	12	144.4	function at 0.05
10	There is a logical sequence and	22	88	3	12	144.4	function at 0.05

N	phrases	agree		Not agree		Chi-	level
		k	%	k	%		
	sequence of the contents of the program						

TABLE 6: *IT SHOWS THE FREQUENCIES, PERCENTAGES AND THE VALUE OF "CHI^2" ABOUT THE LEARNING EXPERTS OPINIONS ABOUT THE PROPOSED APPLICATION.*

N	phrases	agree		Not agree		Chi-	level
		k	%	k	%		
1	The program achieves its objectives	11	73 3. 3	4	26 6. 6	3.2 66	functi on at 0.05
2	Allows the learner to self-learn	15	10 0	0	0	15	functi on at 0.05
3	It provides the learner with the opportunity to self-assess	10	66 6. 7	5	33 3. 3	1.6 66	functi on at 0.05
4	Attractive introduction to the program	14	93 3. 3	1	6. 66	11. 26 6	functi on at 0.05
5	Texts are easy to read	14	93 3. 3	1	6. 66	11. 26 6	functi on at 0.05
6	The font size is	15	10	0	0	15	functi

N	phrases	agree		Not agree		Chi-square	level
		k	%	k	%		
	clear		0				on at 0.05
7	Ease of dealing with the program	15	100	0	0	15	function at 0.05
8	simple background	14	933.3	1	6.66	11.266	function at 0.05
9	Alignment of the program objectives with the characteristics of the learners	14	933.3	1	6.66	11.266	function at 0.05
10	There is a logical sequence and sequence of the contents of the program	13	866.7	2	133.3	8.066	function at 0.05

It is clear from the tables5,6 that the students and learning experts agreed with the proposed Android application, as it achieves the desired goals and that it is a clear and easy application to deal with and can be greatly benefited from in education.

CONCLUSION

1. The educational android Application is designed to improve students' ability to understand logical gates.
2. In general the study result showed that there are statistically significant differences at 0.05% between the mean of control and experimental group and for the experimental group, which means the effectiveness of the proposed educational android Application.

3. The proposed application allows the student to use it at anytime and anywhere because it depends on the m-learning concept. Therefore, the student does not restrict the time or place to study.

4. Multiple services can be provided by mobile devices in teaching and learning, such as Internet access, less time, and less time. In addition, SMS, SMS and services that help students communicate with each other and contact the teacher. Where they can exchange files and e-book among learners, where this can be done via Bluetooth .

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