

The impact of using Electronic Learning Lab (Maxitronix) in Academic Achievement for General Education Student

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Abstract—The world is witnessing today scientifically advanced technologically in various spheres of life, the education is one of these areas that have been affected in this technical progress. the modern technology contribute to provide the tools for the development of teaching and learning methods, it provided an opportunity to innovate methods of education that helps to raise students' interest and motivation.

The study aimed to measure the impact of the using electronic Learning Lab (Maxitronix), which provided for the gifted students within the program outside working hours to find solutions to the problems of scientific topics in electronics and related projects with general students in schools. However the researchers would proof that No significant differences were statistically significant in academic achievement in teaching the electronics between the performance of the experimental group and the controller group when using Electronic Learning Lab (Maxitronix). To achieve the objectives of the study sample was selected at random from among students in general. The researchers made a pre- test to the students according to this then 50 students were divided into two groups (25 as controller and 25 as experimental).

The researchers presented electronics topics that were scientific relevant content material to physics in general education curriculum. students of the experimental group using the Electronic Learning Lab (Maxitronix), while the controller group was submitted the same content to the students that using the traditional method of education. After that the researchers made a post-test to the both groups.

The study results showed that there were statistically and significant differences between the average score for the achievement of the members of the experimental group that studied topics electronics using Electronic Learning Lab (Maxitronix) and average degrees of achievement among members of the controller group, who studied topics electronics in the traditional way in the post-test, and this was the difference in favor of the experimental group, and thus provide electronics lab using Electronic Learning Lab (Maxitronix) more effective than traditional methods.

Based on the results the researcher recommends the following:

- 1) The importance of the use of modern teaching aids (like Electronic Learning Lab) in teaching and inserted inside the halls process to reach students to the highest level in performance.
- 2) Taking care the modern methods of teaching that would give the leaner effective role in sake of the modernization and educational development.

3) Provided the sciences teachers with the modernist tools and technical machines that would upgrading the educational process

Keywords—About four key words or phrases in alphabetical order, separated by commas.

I. THE METHODOLOGY OF THE STUDY

Introduction

THE received processes of education reform with great interest in most countries of the world and has received high quality education beside much of this attention to the extent that intellectuals call this era the era of quality as one of the main pillars of the model of the new administration, which generate to keep pace with changes in the international and domestic, and try to adapt to them, bringing the global community perceived quality and educational reform as two sides of the same coin, so that it can be said that in providing quality programs is the real challenge that will face United in the coming decades (Ahmed 0.2003: 9)[2].

According to TQM (Total Quality) in the educational field to a set of standards and procedures aimed to implementing a continuous improvement in the educational product, and indicate to the specifications and characteristics expected in the educational product in the processes and activities that materialized from specifications and overall quality provides tools and integrated approaches to help educational institutions to achieve satisfactory results (Taylor and Bogdan, 1997:10) [30].

Traditional education alone can not do everything and achieve all hope, therefore, the efforts of support communities that have all means and capabilities towards this new formulas turning it into well raised environments that enriching her life, like a living old times doubling (Cumber, 1995: 29-30 and Khatib 1986 :35-63).[3]

There was consensus that the high school is responsible for the preparation of students for life as a citizen in the community primarily and this requires the science curriculum in general and in particular physics curriculum that provides cognitive content is functional so that the student can employ that knowledge to solve problems of life. (Mohsen Farraj 0.2001: 1)[13]

The aim of physics to develop the students' ability to solve what are faced with problems, also aims to help students

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understand the phenomena of physical and interpretation, and the development of awareness of the affairs of production and consumption, as well as equip them with some hands-on skills and academic are functional, such as the trend towards accuracy and experimental verification of the validity of laws and prudence in sentencing. (Adel Abu Ezz 0 .2002)[10]

The Many studies have shown a lack of strategies for teaching physics, where cares teacher to provide a large amount of information ,rules, and the facts to the students and ask them to take look at this dry science as no avail in them on studying, so the resulted reluctance many students progress to study physics after high school.

The urgent use of the strategies of teaching can deal with the explosion of knowledge in the science of physics in terms of its ability to regulate how information and concepts and relationships, theories and rules received by the student during his studies to achieve the status of integration , interdependence , and functional . However the student can use that knowledge in solving problems.

Solving problem has become a prerequisite for learning, where the individual faces in daily life. A lot of problems which require the use of methods educated to face it, so when the person solving the problem of what it is prescribed in the application of scientific principles and concepts are determined and interrelated concepts to form the basic principle which in turn is used to solve the problem.

The use of problem-solving have many advantages, because they are in the first place as a practical training and preparing mentally for the student on how to deal with life's problems in a positive way, which also raises self-contained thinking, and increase the activity of the mind, it is also compatible with the nature of philosophical thinking that is going on, in essence, about the problems of mental variety . (Ibrahim Abdel-Rahman, 1993: 48).

The direction of information processing one entrances cognitive learning, which helps students to operate, receive information , encrypted ,and stored then processed through the classification and derivation relations with similar information in the construction of knowledge, and therefore the learner such operations would give functional recipe for such information and therefore uses in it solving the problems that it faces. The researchers tried to provide the scientific content of the electronics is a branch of physics that are taught at the secondary level by adopting a strategy to solve the problems through electronic lab (Maxitronix) for high school students.

The percentage of low grades for physics is very high, as scientific studies proven that the traditional method of teaching electronics caused the low level of scientific because it depends on the first level of the pyramid, and given the importance of this specialization in the leadership of the future scientifically and intellectually and industrial societies developed their special attention. the researcher saw the importance of the title of this research:

"The Effectiveness of Electronic Learning Lab " Maxitronix "to teach electronics for high school students"

This research aims the need to develop innovative and creative skills using lab-mail and the impact on the academic achievement of students of the third grade of high school students.

The importance of the research being touched for an important aspect of learning physics which is the practical side of practical, and The most significant results that there needs to be achieved to reach the high quality in the teaching of separate electronics in physics, as there are some obstacles that have impact adversely and must be eliminated gradually so as not to adversely affect on the achievement of the desired goals of those programs.

The importance of research

The importance of this research lies in the role that technology of modern education played, and including transferring laboratory that would increase the efficiency of teaching and learning by raising the level of absorption and understanding of the student .Teacher depend on old and traditional methods in education that does not meet the requirements of the education efficient in the world of information and technology where getting knowledge and accumulate information has become enormously time allotted for study the units subject, and therefore there is a need to use a large educational technology to help the teacher and the student in reducing the time and effort to give, understand and absorb scientific article.

Problem of the study

The researchers observing lowness in educational attainment of students at the secondary level , the researchers decided that they should improve the level of student achievement in the field of science in general and physics in particular, by using the latest educational media and developments in the modern era , moreover students would graduate and will be able to deal with the technologies of this era with higher levels of thinking such as analysis and synthesis, and evaluation to create a spirit of creativity and innovation in the student , the problem of the current study revolves around : The impact of the using Electronic Learning Lab lessons in teaching electronics for students in secondary, after proving its effectiveness on students gifted to the same stage.

Objectives of the study

Researchers seek to achieve the following objectives:

1. Identify the components of Electronic Learning Lab.
2. Identify the impact of the Electronic Learning Lab (Maxitronix) on the academic achievement of students in teaching the content of electronics in physics.
3. Train students on the method of solving problems.
4. Develop, innovative and creative skills to high school students.

The problem can be summarized in the following question:

Are there differences were statistically significant in academic achievement for the education of electronics between the performance of students of the experimental

group and control group students?

The study hypotheses

To answer the questions of the study was formulated the following hypothesis

There is no significant differences were statistically significant in academic achievement for the education of electronics between the performance of the experimental group and the control group when using Electronic Learning Lab (Maxitronix).

Methodology of the study : researchers pursued the experimental method in the analysis of the phenomenon under study .

The limits of the study

The limits of objectivity:

Limited research on the theoretical and practical application of the lessons of electronics to the third grade secondary .

Spatial limits:

The study was limited to a sample of students in the third grade secondary.

Time limits:

Second semester of the academic year 2012-2013.

II. THE THEORETICAL FRAMEWORK FOR THE STUDY AND PREVIOUS STUDIES

Terms

Methods: As (Mohammed, 1991) defined it the tool or way to transfer education , knowledge and skill for learner as long as this tools or ways is more suitable for the position of education and consistent with the age of the learner and his intelligence and its ability where objectives were achieved deeper and more useful (Mohammed, 1991, p 38).[15]

(Jamel , 2000) define it as " the link between the student and the curriculum and the success of the method depends on the decision or take out the curriculum into implement (Jamel, 2000,p 17).[1]

And I knew (Kitami and others 2001) as "the process of providing information and activities that make it easier for learners to achieve the goals of learning, a management activities that focus on the learners to achieve the goals of special education" (Kitami and others 2001, p 15).[14].

The researchers see that the way is the best path that suited to deliver the skill and knowledge from diverse sources to the student, therefore to achieve the goal of the educational process well.

Electronic Learning Lab (Maxitronix) : A Complete Guide to model lab experiments were implemented electronical experiments step by step Includes a number of tools and testing electronic circuits and clear graphics for nearly 500 electronic circuit.

The theoretical framework

The teaching method

The important thing that should be noted is that way whether in private or public is not rigid molds observed by the teacher in all circumstances relating to the nature of the

material or student environment , the teacher not required commitment to a certain way or rigid in teaching , but the teacher has to be the creator and flexible in taking appropriate method which convinced as the teacher had achieving educational goals required , and they should award in old and modern methods of teaching ,and the great impact of teacher's personality may effect in teaching process ,so students' interest and attention due to the ability of teaching and skill than it is due to the lesson material.

(Maree , 2002, p 24)[23]

Electronics (Forsyth 1985)[17]

Electronics are looking at the behavior of the elements that launches a stream of electrons in a vacuum or in a gas or in a pipe or valve or flow of electrons used in the semiconductor that looking at applications. The electronic devices work without the need for mechanical movement , which is accomplished so many tasks quickly and the economy is greater than in the mechanical devices.

The development of the electronics industry (Forsyth 1985)

In the seventies of the twentieth century and early eighties were electronics was one of the largest industries in America, and it was main industry in other countries, including Japan and the West German , British and Russian . At the end of 1990 occupied the head position of the industry in the balance of trade between major countries such as Japan and America.

Electronics Learning Lab

The Electronic Science Lab will teach us about electronics from A to Z. You will learn about electronic parts, how to read schematics, and wiring diagrams. All this, while building up to 500 different projects. This kit uses two quick and easy hook-up methods:

Spring Method: Simply slip pre-cut wires and components into special springs for a safe, secure connection.

Breadboard Method: Featured in this advanced kit, this system is used by professionals and engineers. Just plug the components and wires into the special breadboard socket holes.

Soldering is not required. Everything uses battery power - no dangerous AC is required, so it's safe for all ages. Labs come with all components and wires needed to build each project. No tools are required. No prior knowledge is needed to assemble and build these exciting projects. Easy-to-read, illustrated, lab-style manuals take you through each electronic experiment step-by-step. All are designed for ages 10 & up, so these are ideal for middle schools and high schools.

MX909 Electronics Lab Features

- Everything you need to build 500 Exciting Electronic Projects.
- Learn the basics of electronics and put your knowledge to work creating 500 different electronic experiments, special lighting effects, radio transmitter and receivers, amazing electronic sound effects, cool games and MORE!

- Includes built-in breadboard for easy wiring and connection of components, and an LCD (Liquid Crystal Display) indicates the information during the experiments in process!
- Build your knowledge by exploring amplifiers, analog and digital circuits plus how to read schematic diagrams.
- Includes transistors, transformers, diodes, resistors, capacitors, phototransistors, CDs, integrated circuits, speaker, earphone, LEDS, LED digit display!
- Fact-filled, illustrated, lab-style manual included.[32]

Previous studies

The study Odobunmi Ballakom 1991 Odubunmi & Balogum (1991): entitled "The impact of the way of lab and lecture on the achievement in science ."

This study aimed to compare the impact of the way the lab and lecture on cognitive achievement among students in the eighth grade in science.

The study results showed the superiority of the experimental group who have studied the way the lab to the control group members who have studied the way the lecture to the students with low capacity only in the achievement test does not appear, while teams with outstanding students .[29]

Ghabayen study (1992) entitled "The Impact of detection method in the collection of scientific concepts and keep them at the middle school students in UNRWA schools in Jordan.

The study aimed to measure the impact detection method in the collection of scientific concepts and retention of students at the middle school in UNRWA schools.

The study was conducted on a sample of 340 male and 228 female students of seventh graders.

The study results showed the superiority of the experimental group who have studied the way the discovery on members of the control group who studied ways incidental to test concepts and delayed posttest.[12]

Study Friedman Freedman (1997 m): entitled " employment relationship experiences direct activities to increase scientific knowledge and develop attitudes of students towards science

Relationship among Laboratory Instruction Attitude Toward science and Achievement in science Knowledge"

The study aimed at measuring the impact of the activities of the use of direct experience in the development of scientific knowledge to increase students' attitudes toward science..

The study was conducted on a sample of twenty- six of which experimental group and the other officer. Where they were taught the experimental group, according to the program of direct experience and traditional control program.

The study results showed that there was a positive correlation between the programs of direct experience and academic achievement as well as the attitudes of students towards science.[24]

The study Fabry (Fabry, 1998) to investigate the effectiveness of an interactive multimedia program and is based on the representation of phenomena, in academic achievement among a sample of primary school students strong 25 pupils and the program included a number of media such as animation , and video clips , and texts , and voice and images , and the results revealed the study on the effectiveness

of the program in increasing academic achievement for members of the sample.[22]

Study Watkin, (1996:13), which aimed to investigate the effectiveness of teaching using multimedia stored on a CD in the collection of a sample of students from the University of Arizona (59 students) and their attitudes towards science and the results showed the superiority of the experimental group to a control group that studied the way followed in the collection, and the lack of statistically significant differences between the two groups in the directions.[31]

Nofalh study (2005) entitled "The impact of the program is based on teaching activities in science skills in scientific thinking and scientific concepts and tendencies at the kindergarten."

The study aimed at measuring the impact of the program is based on teaching activities in science skills in scientific thinking and scientific concepts and tendencies.

The study sample consisted of 88 children from kindergarten in Irbid (Jordan), divided into experimental and control groups.

The study results showed that there was a statistically significant difference between the average scores of the experimental group and the control group mean scores for the experimental group that studied the scientific activities .[19]

Commentary

The researchers see the similarities between the current study with some previous studies, including the following:

- 1) The use of non-traditional way in teaching and compared it with conventional methods.
- 2) The use of the experimental method as a method to study.

Characterized the current study from previous studies, including the following:

- 3) Use practical way in teaching to incorporate non-traditional program Enrichment topics electronics material physics.

III. PRACTICAL FRAMEWORK (RESEARCH METHODOLOGY AND PROCEDURES)

Search procedures:

Study population: 50 female students from the third grade of secondary Saudi Arabia

The method of selecting the sample

The sample was selected in a way the two groups , Control group and Experimental group to Monitor the variables, Must be that the two groups are similar in characteristics and enter the variable on one of the two groups and then measure the results.

To determine the study sample the researchers made a pre-test to the students according to this then 50 students were divided into two groups(25 as controller and 25 as experimental) According to the following table.

TABLE I
THE RESULTS OF THE PRETEST

n	Test score	Number of students
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1	90-100	6
2	80-90	14
3	70-80	16
4	60-70	8
5	50-60	6
-	-	50

6 students got grades between (90-100) and 14 female students between grades (80-90) 16 student grades between (70-80) and 8 students between grades (60-70) and 6 students between grades (50 - 60) as in table (1).

Half number of students has been selected from each estimate randomly as a the controller and the other half as experimental where the number of students in per set the controller or experimental (25) students.

The researchers began teaching electronics content in physics for the third grade secondary students of the experimental group using the Electronics Lab rate of two meetings a day for two consecutive weeks in the school .

The researchers taught the control group using the traditional method, that using the book and discussion only, at a rate of two meetings a day for two consecutive weeks.

Variables of the study

This study included the following variables:

Independent variable:

Teaching method: It has two categories

A.Category I: the traditional method of teaching.

B.Category II: teaching method using Electronic Learning Lab (Maxitronix)

Dependent variable:

As a result of the study sample answer on the test prepared.

Study Design:

Experimental design used in this research, A pretest of the two groups and then using Electronic Learning Lab (Maxitronix) for the experimental group and using of the traditional method of teaching the control group and then test to measure the post-test achievement at the two groups.

Building tools and measurement study

A.scientific content

Reorganization of educational content private lessons in physics Electronics in Saudi Arabia, It has been prepared content through the experience of researchers in the course and note the difficulty in acquisition the skills of connect electronic circuits. And the importance of this content to raise the motivation of students to creativity and invention by earning these practical skills, has been analyzing the content and the development of the basic concepts necessary for the development of these practical skills.

B. Achievement test

Achievement test was designed based on the goals and curriculum topics .Test in its first phase consisted on (5) vertebrae were classified in two parts the first part contains questions true and false on (10) vertebrae, and the second part of the questions are multiple choice on (10) vertebrae.

Experimenting been with the test on the sample (10) students only from the basic sample for the study for reasons related to the possibilities available and the calculations used and the objective of this experiment was to make sure:

- 1) Reliability coefficient test
- 2) Sincerity test
- 3) Coefficient of ease and difficulty of each question
- 4) Discrimination coefficient between each question.

IV. STATISTICAL TREATMENT AND TESTING HYPOTHESES STATISTICAL METHODS

After collecting the data, have been entered into the computer memory using software (SPSS)statistical analysis, Then extract the arithmetic means and standard deviations using a t-test to reach the post-test results, to find out the extent of the differences between the averages of the results of the study sample attributable to the method of teaching by using Electronic Learning Lab (Maxitronix).

Test the hypothesis

Table 2 below shows the average scores of students, the standard deviation, the test "T" and the level of significance for the two experimental and control groups in the achievement test.

TABLE II
STATISTICAL TREATMENT

Level of significance	Calculated T Value	Grade	Standard deviation	Average	Number	Group
0.00015	15.78	48	1.00	23.44	25	Experimental
			3.06	13.28	25	Control

V. RESULTS AND RECOMMENDATIONS

Study results:

It is demonstrated from the above table that the grade average of achievement for individuals of the experimental group which studied the electronic subjects through using the electronic Learning Laboratory (Maxitronix) is larger than the grade average of achievement for individuals of control group which studied the electronic subjects using the traditional method in the achievement test, with a difference of statistical; significance, which means the rejection of study hypothesis.

Discussion of results associated with study hypothesis:

Analysis results associated with the study hypothesis test demonstrated the existence of difference of statistical significance between the grades averages of study both groups in the post-achievement test; this difference was in favor of the experimental group, which studies the electronic subjects through using electronic lab (Maxitronix) thus, the teaching of physics especially subjects of electronic using the movable electronic laboratory (Maxitronix), is more effective than the traditional methods in achievement by the third second female

student, this result can be attribute to the fact that the movable electronic laboratory (Maxitronix) makes the experimental group student as a basis of educational process , it provides educational process which is rich in internal boosters when she was searching for scientific knowledge and discovered it by Themselves in lieu as it receives ready, Increased motivation to education in addition that this process includes educational activities and direct experiences, the matter which helps her to understand this knowledge on one hand, additionally, applying what is taught cements and consolidate knowledge, it develops talent and the Teachers can discover talents which are not discovered yet, to that end, knowledge achievement of experimental group students was more than achievement of the control group with Statistically significant difference.

This is consistent with International Quality Standards in teachings sciences which confirmed using discovery as required by Bruner as it achieves a learning based on understanding and makes the learner as a basis of the educational process, it grants him/her a chance to practice science process, it traces the scholar's endeavor on research and question, it determines the problem, assumption, collects information and attempts and reach results , this achieves self-confidence, sense of success, it develops positive trends toward sciences, achieves joy, suspension and continuity (AlNagdy and others 2005:94)[18]. Nashwan confirmed (2001:105) that this is conformed to nature of sciences which mainly based on observation and trial whether in laboratory or in the field. Al-Khalil and others (1996) pointed out when they make science teaching by means of discovery which increase degree of internal suspension of classroom learning for the students, the matter which improves their knowledge with the content of the course as well as their understanding, and increases their ability to link what they are taught to their daily life.[8]

After reviewing previous studies, the two researchers found that this finding is conformed to what some studies concluded which showed the efficiency if science teaching by means of discovery or laboratory experiment in the academic achievement of student such as study of (Al-Shayeea1427 AH) and (Hegazein 2006).[9], [6].

Recommendations

Based on findings of the current research, the following can be recommended:

1- Applying teaching using t (Maxitronix) to teach physics especially in subjects of electronics as a modern teaching method in teaching sciences.

2- Concentrating on using modern educational methods and to be listed inside scientific halls to make the student reaching the highest level of performance.

3- Paying due regard to teaching methods which give an active role to the learner in line with educational update and development of educational process.

4- It is necessary that those teaching physics should provide technological devices and equipment in the departments, so

that it contributes to upgrade educational process in Physics.

Suggestions:

1- Conducting researches in the field of laboratories related to other sciences' branches.

2- Conducting studies to diagnosis the reality in teaching sciences in general education schools and determining procedures required to improve & create methods of how to achieve quality in schools.

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