The Impact of Educational Games on the Academic Achievement of Fifth Grade Students in Science.
(An Experimental Study on the Elementary Level, Afif Province)

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Abstract:
The objective of this study is to identify the effect of the educational games on academic achievement in the subject of science, for the students of the fifth class in the girls' primary schools in the Province of Afif. The study population consisted of all fifth-class regular students in girls' primary schools in the province of Afif for the academic year 2013/2014, and the study sample consisted of 60 students, which were intentionally selected from The Fifth School. The sample has been divided into two groups, the controlled group studied using the educational games and experimental group studied in the traditional way. For the purposes of the study, the researcher prepares achievement test to measure academic achievement, and for the validity, the test parts had been reviewed by a number of arbitrators and the final test has been formed based on their notes, suggestions and recommendations.
The results of the study showed:
- Statistically, no significant difference in the prior test attributes to the teaching method. The sample analysis of the prior test, showed that the significance level equals to 0.079, therefore, statistically there is no significant difference in the prior test for the two groups, due to the close level of achievement.

- Statistically, there is a significant difference in the subsequent test, and the level of the significance, equals to 0.000 on favor of the trial group. The researcher referred this to the effect of the educational games on academic achievement.

The important recommendations reached by the researcher:
1. Establish training courses in using educational games for science teaching.
2. The schools administration and educational agencies shall give importance to the use of educational games.
3. Generalization of the use of the educational games as a part of the contents of the educational curriculum.

Introduction:
Modern education calls for the utilization of a teacher's preferences and as it turns out, games are vastly preferred above everything else among teachers in their early educational stages. Therefore, Education stands to recruit games as one of the activities used in learning, for its regarded as a main activity, that enhances learning experience. (Caliph and Wrought: 2015, p. 142). Playing games is regarded as one of the tributaries that pass on knowledge to the students since they are able to discover more about themselves, their surrounding environment and the world they live in simply by playing. The students' desire to participate in life also increases due to game playing (Sawalha, 2007, p. 27). Educational psychologists also supported such activities by saying that playing contributes effectively on the development of students' personality in its various aspects. Piaget further mentioned that playing is a mean of learning and the surrounding environment is considered as a source for student learning. (Anani, 2002: 129).

It is known that playing games positively affect various growth, intellectual, social, emotional, motion and language aspects. (Khatib, 2010: 19). It also helps in building students' character through the effective participation of the student in the activities that are both fun and humorous. Playing also develops intercommunication and enhances pre-reading skills like application, and visual differentiation as well as encouraging the cooperation and participation among the students. (Khattab & Arafat, 1993: 49). Through this research, the searcher has sought to find out the effect of educational games on academic achievement in science.

Study problem:
Considering science as a dynamic subject, the strategy that will be used at hand must be in accordance with the researcher's observation of reality since the researcher needs to keep pace of modern methods in education. The strategy that the researcher used is about the use of educational games in the learning process. The problem of the study can be formulated in the following main question: What effect do educational games have on the achievement of fifth grade female students in science?

Study Objectives:

The current study aimed at achieving the following objectives:

- To identify the extent of using a strategy of educational games at the elementary level.
- To determine the effect of educational games on academic achievement in science.

Study Hypotheses:

- There ar no statistically significant differences between the scores of the experimental group and control group in the pre-test before teaching the strategy.
- There are significant differences between the scores of the experimental group and control group in the post-test differences in favor of the experimental group.

Study Significance:

- This research is expected to benefit curriculum designers, in terms of the importance of such approaches, which include educational games.
- Drawing attention on the importance of educational games in curriculums to those who are in charge of the educational process.
- Due to the lack of Arabic studies on the effectiveness of active learning strategies in science, it was limited to the researcher.

Study Methodology:

The researcher used the experimental curriculum that contains a pre-test and post-test.

Study Population:

The study was conducted in a primary school located in Afif province during the first semester of the academic year 2013/2014.

Study Limitations:

Spatial Limitation:

The study was conducted during a field education program in the fifth elementary school, inside science lessons.

Time Limitation:

The first semester of the academic year 2013/2014.

Topical Limitation:

Due to the objective limits of this study, its main goal was to discover the effect of educational games on academic achievements of fifth grade students in science.

Study Terms:

- **Educational Games:**

They can be identified as a form games based on the plans and supplies that are available. Teachers then prepare and test them before letting students play them in an effort to achieve its wanted goals. (Al-khfaq, 2010.289).

Academic Achievement:

Is the knowledge, experience and skills acquired by the student through gradual learning and the student's degree is then obtained after the post-test, which takes place after the experiment.

Fifth Grade Female Students:

Female students aged between 10-12 years.

Theoretical Framework:

In this chapter, the researcher will present the most important theoretical topics related to the research.

Educational games

The point of using educational in the learning process is to increase the excitement and thrill of the students when learning which will as a result contribute to the students' desire of the learning process. This will be achieved by integrating academic achievement with educational games that are a type of entertainment.

Games can be defined as that type of play that is associated with its form content. Definitions of games by scientists differed from one to another. Some of the definitions are as follows:

- Gypsum believes games are " are an activity between collaborating or rival members in an effort to reach their goals within the framework of the rules ". (Anani, 2002: 18).

- Balqis defined games as " an organized activity between a group of people or individuals which aims to reach a certain purpose" (Balkis and Merhi, 1987.17).

Educational Games has a set of conditions which are:-

- To be played according to specific rules which have been understood and agreed upon by those who exercise it.
- To provide for those who exercise it a certain sense of interest and pleasure harming others.
- Need to be an organized activity based on the spirit of friendly competition between each other.
- Need to include cooperation or competition with oneself and others.
- Need to be performed in a designated time and place. (Anani, 2002: 19)

Standards of Educational Games:

In order for educational games to become a contributing factor in the learning process, the researcher believes that it's necessary to include a number of criteria as stated by (Al-Calipha and Wrought 0.2015, 142)

The following criteria should be available in educational games:

- The games need to have clear goals linked to the school curriculum.

- Game instructions need to be brief, clear, specific and easy.

- The games must include functional training skills.

- Games must include elements of excitement and thrill to ensure the continuity of learning.

- Must include different levels of difficulty suitable for the students.

- Must be simplified by the teacher in the light of the available resources.

- Preparation of the games mustn't take a long time.

- They must be simple and stimulus to the students' intelligence

- Must conform with the abilities of the students.

- They need to be easy for the teacher to discuss and replay them later.

The number of games in this study are nine which are skillful activities logically organized. The students together put in efforts to achieve specific and clear objectives in light of certain rules already in place. These games are played in a form of individual or group contests which revolve around the theme of the lesson.

Preparing for the Educational Games: -

Educational games must include a wide range of elements necessary for their preparation and application elements in order to identify the purpose for which the researcher has designated.

First: Preparation Process:

The game is set up by developing set of goals, and it has several steps:

- Testing the theme of the game as well as making sure it includes the different mental, emotional and skillful fields. Determining the behavioral goals of the game is also required.
- Collecting data on the games characteristics and arranging them.
- Designing the game model. When designing the following needs to be taken into account.
- Determining the characteristics of students, such as age, mental and physical aspects.
- Identifying the roles of the students in the game.
- Determining the rules and instructions of the game.

Second: Implementation Process:

The implementation process means the application of the game which can be done as follows:

- Reviewing the components of the game.
- Reviewing the steps of the game.
- Directing instructions.
- Playing the games (Anani 2002: 136).

Third: Evaluation of the Game:

Evaluation is intended to identify the strengths and weaknesses of the educational version of the game and judging it in terms of: -

- The game components.
- Steps of the game.
- The game's goals.
- Providing feedback.
- Designing the game based on the evaluation process.

Fourth: Making a Decision:

After checking the validity of the game after its new design a decision is made on the game through several aspects:

- The cost of the game.
- The time needed for the game.
- The extent of the games' contribution to the development of the students'.
- Easy to be used and applied. (Anani 2002: 137).

Educational games used in school at the elementary level are useful to students as they are backed up by different studies conducted by researchers around the importance of educational games in the learning process.

We will present a number of educational games that are used in the education process which the teacher can choose based on his experience.

Educational Games in Teaching Science:

There are a lot of educational games that are used in the teaching of science. The researcher is going to explain the details of these games: -

Playing the Role of Acting: -

It aims to train the students on real life roles which will help them to communicate with others, and encourage proactivity as well as making students develop a variety of scientific facts and skills. An example of role acting is "the game of profession. The teacher here prepares a variety of cloths associated to those of a doctor, salesman, baker and so on. The students are then asked to wear whatever they want then should stand in front of a mirror with the clothes on. They then need to reenact their particular roles. Once the acting is done,

the teacher asks them about their opinions, the profession they chose and the relevance of each profession's' tools.

Painted Images and Pictures:
One of the games used is "snakes and ladders". A maximum of 6 students can partake in this game and who finishes first wins. Each participant takes a stone and moves according to the number that has appeared. If that number leads him to the head of the snake, the player then moves to the square where the snakes tail ends. If the topic of the game is keeping a good hygiene such as washing hands, the advices leading to a good hygiene are placed on each square of the ladder. Bad hygienic behaviors are placed on top of the snakes' heads.

Brainstorming Game:
 Brainstorming is one of the most important means of influencing sharing throughout school. It helps to find a creative solution in an atmosphere that helps to build confidence and generate ideas among the participants.

Topic "Preserving the Environment" Game:
The teacher prepares a group of six students and informs them of the concept of brainstorming. He then invites them to think about preserving the environment through application and observing. After hearing the word "brainstorming", the teacher divides the students into two groups; a group brainstorming while the other observes and vice-versa.

Previous Studies:

The researcher will present a number of studies conducted about educational games and their relevance to academic achievement.

- Bottinelli (1980) carried out a study which aimed to identify the level of effectiveness in applying games in the education process compared to the traditional way of teaching on the students' academic achievement and their ability to retain information for longer periods of time. The study sample consisted of (720) science students in 1980. They were divided randomly into three experimental groups that used educational games and a control group which used the traditional way of teaching in an effort to measure the degree of information preserving between the groups. The results showed that the control group accumulated higher results in preserving information in the short-term retention test, while the results were even after another test was conducted later on.
- Alter (1991) conducted a study which aimed to develop creative thinking in children by using (100) small plastic toys. He asked the children to build shapes other than the ones on the cardboard. Results showed growth in the creative thinking of the children through the different shapes the children had made.
- Buqahoos and Obeid (1997) carried out a study which aimed at measuring the effectiveness of the use of educational games in the academic achievement of second and third graders. The study was tested on the subject of the magnet material in

science lessons in the Kingdom of Bahrain. The study sample was divided into four groups, two experimental and the two control groups. The researchers used five different educational games which can be played individually or collectively, and the results revealed a lack of statistically significant differences between the experimental groups and control groups.

- Ahmed and al-Morsi (1998) targeted the level of effectiveness of educational games in the increase of academic achievement in science among a sample of low-achieving fifth grade students. The students were divided into two groups, experimental and control group, and the results showed an increase in the level of achievement in favor of the experimental group. An appreciation of science also increased among students in the experimental group.

- Motawi (1999) conducted a study which aimed at verifying the effectiveness of computer games in the academic achievement of science among a sample of Dyslexic Pupils from the first grade in Saudi Arabia. The researcher used five computer games on the experimental sample, and the results showed the superiority of the experimental group over the control group in the academic achievement of science.

- Al-Sayed (2001) aimed to identify the impact of the use of different kinds of games" cooperative multiplayer and individual competitive games" in an effort to modify certain behavior disorders among kindergarten children. The sample consisted of (30) students 18 of those males and (12) females. The children whose ages ranged from (5-6) years were divided into three equal groups experimental method was used by the researcher. The method was applied using 30 cooperative games and (30) competitive games every day for four weeks, and the results indicated that playing leads to the modification of the behavioral disorders among kindergarten children. The results also indicated that the free play is more effective in modifying behavior while group play and single play trails behind.

- Al-Nijm (2001) conducted a study which aimed at investigating the effect of educational games on seventh grade students on both of their achievement in mathematics and attitudes towards it. The study sampled contained 94 seventh grade students in the academic year of (1999- 2000) from UNRWA schools located south of Oman. The results of the study showed the superiority of the experimental group in the immediate and long-term academic achievement and attitudes.

- Al-Heila and Ghoneim (2002) conducted a study which aimed to recognize the impact of normal and computerized linguistic in an effort to address literacy difficulties for fourth-grade primary students compared to the traditional teaching methods. The study was carried out in Amman in the school year (2001/2002)which included a sample of 48 students. The results showed superiority of educational games on the temporary and long-term academic achievements.

- Dweidy (2006) carried out a study to find out the impact of the use of computer games and programs on educational attainment and growth of creative thinking among first graders in reading and writing courses. The study sample consisted of (59) students who were distributed into three groups. The first experimental group used educational computer games and the second group used tutorial computer

games. The researcher personally studied the control group. In order to measure the impact of the use of educational computer games in academic achievement, an attainment test was applied. The Torrance test of creative thinking (forms b) was used and the results showed a statistically significant difference in the level of achievement of the three groups. The results also showed differences in the growth creative thinking abilities separately associated with fluency and flexibility.

Al-Awn (2012) carried out a study intending to identify the impact of computerized educational games in imagination skill developments among kindergarten students in northern east Badia province. The study was applied in the first semester on (31) students who represented the experimental group and (25) other students who represented the control group. The study showed that there were no statistically significant differences between the groups according to their gender. However, there was statistically significant differences between the experimental and control groups in favor of the experimental which used educational computerized games.

Commentary on the previous studies

Studies varied from modern to traditional. Modern studies were those of Dweidy (2007), Al-Awn (2012) , Al-Heila and Ghoneim (2002), Al-Nijm (2001) , al-Sayed (2001). Studies in between modern and traditional were Motawi (1999), Ahmed and al-Mousa (1998), Buqahoos, and Obeid (1997). Traditional studies were those of Alter (1991) and the study of Bottinelli (1980).

- The current study agreed with the studies of, Buqahoos, and Obeid (1997) Ahmed and al-Mousa (1998) , al-Nijm (2001), al-Heila and Ghoneim (2002) and Dweidy 2007) in terms of the study community which was aimed at elementary school students, while other studies targeted high school students, middle stage and kindergarten children.
- Previous studies disagreed with the current study, and with each other in terms of the sample type in this study (only female students). The sample consisted of studies related to male students and others were composed of both male and female.
- The previous studies conformed with this study in terms of the tools that were used which were the use of different types of test.
- The current study differed from previous studies by using the strategy of educational games science on fifth-grade students. In this study the fifth-grade students textbook was used for the first time in this province.

Methodological Procedures of the Study:

The procedures included a description of the measures used by the researcher in the research:

Study Method

The researcher used the experimental method which was labeled as the most appropriate to the nature and goals of the research in an effort to explain the variables study's variables. The experimental curriculum consists of an (experimental group and control group). The current experiment was applied on the experimental group where the researcher compared between the two groups by a pre and post test.

Study Community and its Sample:

The study community consist of all female students of the fifth grade in the Office of Education, Afif area. The study sample consisted of 60 students from the fifth elementary school. This particular school was chosen in an intended sample because of the availability of many of study requirements at the school, like having more than one class of fifth grade students.

The research sample consisted of students from the fifth grade and the number of students reached 30 in both experimental and control groups.

Equivalence of the study groups

After choosing the study groups (experimental and control) the researcher ensured the study groups' equivalence in academic achievement. The researcher then applied the pre-achievement test in an effort to find any statistically significant differences on the study groups on the level of (0.05) and an equivalence of the two groups was confirmed. This step is necessary to verify the equivalence of the study groups in achievements before proceeding with the study. The table (1) show the achievements of pre-test for the two groups:

Discussion of both the experimental and control groups' performance in the pre-test.

According to the research assumptions, the researcher concluded the following:

Result	Interpretation	Potential value	Fre e val ue	The calcu lated value .of T	stand ard devia tion	Arit hmet ic mea n	Num ber of mem bers in the grou p	The groups

No statistically significant differences between the mean scores of both groups	Not significant	0.079	29	-1.819	1.332	1.87	30	Experimental
					2.033	2.73	30	Control

Table (1) depicts the degrees between the experimental and control groups in pre-test.

The table above shows that there are no statistically significant differences between the averages of the experimental group and the control group because the potential value was equal to (0.079) which is greater than (0.05) and this explains that the differences between the averages of the two groups was not statistically significant. This confirms the similarity of the two groups at the educational level.

Educational Material:

The educational material which was used in this study involved the unit of (variety of life) from the fifth-grade science textbook of the academic year (2014/2015). In addition, the researcher prepared and designed educational games on the themes of unity which are related to the study.

Study instrument:

To achieve the objectives of the study, the researcher prepared an achievement test in the unit (life variety) for fifth grade students in order to measure the impact of educational games on post academic achievement. The test was then formed according to, appendix (1), the specification table appendix (2) after the researcher analyzed its contents related to the principles and generalizations of scientific theories as well as identifying the behavioral objectives which are necessary to be achieved from studying the content.

Reliability and Validity of the Test:

In order to check the test validity, its paragraphs were presented to a number of arbitrators from the teaching staff at al-Shaqra University and a number of teachers who taught the curriculum. They were asked to give their feedbacks on the test in terms of the clarity and quality of the questions, content and suitability for fifth grade primary school students. According to their observations, recommendations and suggestions some paragraphs were

re-written and others deleted. The paragraphs which were re-written were recommended by three or more arbitrators. The appendix (1) shows the test in its final form.

Study Procedures

The study was accomplished in accordance of the following steps:

- It took the approval from the Educational Supervision office for studying in Afif area.

- It took the approval from the head teacher of the school which the study was applied on after explaining and clarifiying the study idea to him.

- The unit (life variety) was used from the fifth-grade textbook.

- The student groups were randomly divided into one experimental group and another control group and a pre-test was applied to make sure of the equivalence of the two groups.

- The educational games were prepared and their rules were laid out. The experiment was conducted first on an exploratory sample in an effort to seek out problems that could arise during the application process.

- The study was applied during the first semester of the year (2014/2015). Educational games that were both individually and competitively played were applied on the experimental group while a traditional method was used upon the control group. The two groups undertook the experiments inside the classes and a total of 18 lessons which were planned according to a timetable by the school's administration were used. The researcher involved herself in the study by supervising the games.

- After finishing the application stage, a post-test was carried out to measure the impact of educational games on achievement.

Preparation and Application of Games:

Designing of Educational Games:

The researcher designed nine educational games for the study which were associated with curriculum of fifth grade students. The following steps were followed:

- Viewing studies that dealt with the use of educational games in science teaching in addition to the references which are related to the subject.
- Looking at the science curriculum for fifth-grade students and analyzing the unit (life variety) found in the science textbook for fifth-grade students.
- The educational games were handed to assessors to express their point of views as well as identifying the strengths, weaknesses, and suitability of teaching them to fifth-grade students. Their feedbacks were taken into consideration when re-designing the games. The educational games were conducted on an exploratory sample consisting of 20 fifth-grade students

Statistical processing

The researcher used the descriptive, analytical and statistical methods which are represented in arithmetic averages and standard deviations. (Paired Samples T - Test)

Discussing the performance of the experimental and control groups in the post-test. Appendix (3).

The result	Interpretation	Potential value	Free Value	The calculated value .of T	Standard deviation	Arithmetic mean	Number of group members	Group comparison
There are significant differences between the averages of the two groups	Significant	0.000	29	8.894	4.706	21.17	30	Experimental
					1.112	28.93	30	Control

Table (2) illustrates the degrees between experimental and control groups in the pre-test.

The table above shows that there are significant differences between the average of the experimental and control groups in favor of the experimental group which means that the achievement of experimental group has risen after conducting the experiment. This excellence in academic achievement in science came as a result of the application of educational games

Results Summary

- According to the data presented in table (1), the researcher found that the level of significance after analyzing the sample of the pre-test is equal to (0.079) which is greater than (0.05) . Therefore there are no statistically significant differences in the pre-test of the two groups which this is due to the equivalence of the achievement level between the two groups.
- According to the data presented in table (2), the researcher found that the level of significance after analyzing the post-test is equal to (0.000) which is less than (0.05). Therefore, there are statistically significant differences in the post-test in favor of the experimental group which is a result of the use of educational games that helped with academic achievement.

Study Results:

- The strategy of educational games the motivations and desires of the students in the experimental group which helped to achieve the goals of the lesson.
- The strategy was effective and led to the development of academic achievement among students of the experimental group.

Recommendations of the Study:

Based on these results the researcher recommends the following:

- Holding training courses for teachers to be able to use educational games in teaching science.
- Making the school administration and educational authorities recognize the importance of the use of educational games and encouraging teachers to use this method in teaching.
- Generalizing the use of educational games in some aspects of the curriculum.
- Giving the active learning strategies more attention by planning and applying it on school levels.
- Curriculum producers should take into consideration that textbooks should contain a large variety of educational games and teachers must be committed implementing and modifying them in order to suit different environments.
- Giving great importance to the teacher's guide book which should include models of educational games and guidance for teachers on how to use and distribute them in sufficient numbers.
- Intended authorities have to increase their support for educational games and put their focus on it as well as ensuring these games in the long-run.
- Educational supervisors must evaluate female teacher on the use of educational games in their lessons.

Suggestions of the Study:

In order to complete the topic which the study handled, the following proposal needs to be taken into account in the future:

- Making Further studies to identify the impact of educational games and its effectiveness as well as in other school subjects.
- Proposing other events that develop the academic achievement which are taught in the modern curriculum.
- Studying the possibility of diversity in styles in order to increase the academic achievement.

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