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The Impact of Learning Stations Strategy on Developing Technology Concepts among Sixth Grade Female Students

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Abstract:
This study aimed to investigate the effect of learning stations strategy in developing technology concepts among sixth grade female students, researchers used the experimental approach, which used the conceptual test for measuring the effectiveness of the learning stations strategy developing technology concepts, a random sample of (63) students divided into two groups was used, the experimental group was (33) and the control was (30).
Researchers used independent "T- test", and the result showed that there are differences at the level (α = 0.05) between the average group degrees of control and the average scores of the experimental group in the conceptual test favor for the experimental group. Therefore, researchers recommended to employ learning stations strategy in teaching technology by the teachers and supervisors.
Keywords: (Active learning, Learning stations Strategy - Technology Concepts).

Introduction and Literature Review

Developing the educational strategies is important for the modern learning which focus on the learner as well as the educator. Many educators have discussed the importance of the educational strategies in learning management and identifying the roles of both leaner and educator which motivate the learner to learn. Therefore, the modern curricula are designed to support the active learning. It guarantees the interaction of the student, and it has various strategies depending on the academic level and the nature of the school syllabus.
Ali (2011) sees that active learning is an educational environment that copes up with the international changes and the huge amounts of information. Its philosophy is taken from the international and local changes as it meets the requirements based on the learners as well as the educators needs. It also asks for shedding light more on the learner as he/she is going the one who identify the educational process. The active learning philosophy emphasizes that

learning must be related with the student life, reality, needs, concerns, and interest, for they will learn through the interaction between the student and his/her peers and colleagues.

Silberman (2006) indicates that with the active learning, students will use their skills efficiently, and they will study their ideas well and work on solving the problems while they enjoy the process of learning. That is because they have exercises that matches various and new issues about what is going around them from daily events that motivate them to take the responsibility of their intellectual choices when they have discussion or dialogues. (page 35).

One of the most important strategies that depend on the active learning is Learning Station Strategy which was described by Jonse (1997) as one of the recent teaching methods which represent the diversity and distinction in teaching methods as well as the different teaching strategies where the traditional class turns to some tables that the educators rotate around according to specific system. Every station is provided with educational materials and tools to practice the education as profession as well as educational activity. Soliman (2015: 3)

Aallon and Mchaon quoting from Ayesh (2012) that the learning stations strategy emerges from constructivist theory, which depends on the philosophy that if a plant makes its own food, human beings (learner) are worthwhile to build their knowledge themselves. Constructivist curriculum encourages students to face real-world problems that occur in their daily lives, provides them opportunities for developing new knowledge based on their past knowledge which is the new goal to teach the learners who are familiar with how and where to implement knowledge. (page:71).

Constructivist curriculum has played an important role in achieving this goal, it is one of important learning theories which are used to guide towards the development of modern teaching methods in education. Learning stations is one of the new teaching methods, which are appropriate ways for the social and intellectual level of the construction of knowledge. Ocak (2010 :146)

Learning stations strategy emphasizes the active role of the students in learning through distributing them into groups roaming on a number of stations in order to conduct an experiment on the subject or read the topic in another station or watch the images of the subject matter or resolve an issue, or a meeting with an expert. Zinati (2014: 4).

This is what confirmed by Jarrett (2010) in which students should be engaged in learning as they have great benefit to teachers. That's correct, in particular, if the classroom material are limited in quantity in which it is possible for students to work in small groups roaming through the stations, which requires as little as possible of same materials. (p.51)

Lahibi (2015) said that roaming process from one station to another could be in the form of the following: Roaming on all stations, or roaming half of the stations, or fragmented learning. Researchers chose, the in this study, roaming on half the stations in which that two stations of each type would be used and so the total number of stations per share would be (8). (p. 211).

There are many types of learning stations, such as exploratory station, reading station, visual station, audio / visual station, electronic station, the advisory station, acting Station, and Station of (yes) and (no) (Soliman, 2015, p.8). It is worth mentioning that the design of these stations depends on each lesson where it can combine these different types of a model design consisting with learners, concepts, and necessary skills for students to master. Designing the lessons depends on the lesson time and the number of allocated stations. For example, if the teacher chooses six stations in Forty-five minutes' class, they can customize (5-10) minutes per

station, while if the teacher chooses three or four stations, they can increase the duration of the visit for these stations; teacher can also increase or decrease the stations time whenever he/she sees its appropriate for the activities, the lesson, the students and their academic achievement.

In addition to the advantages of learning stations strategy, there are flaws have mentioned by Heckendorn (2007) as they require more advance planning by teachers, materials and numerous possibilities for the implementation of activities which may not be available in all schools. In addition to that, the possibility of chaos and the inability to manage the class.

Many studies refer the effectiveness of the learning stations strategy in teaching, such as the Soliman (2015) that showed the effectiveness of a program of activities based on learning stations to give kindergartners some scientific concepts, in addition to Zinati (2014), which demonstrated the effectiveness of learning stations strategy in developing processes of learning and reflective thinking skills in science among ninth grade students. The study of Hassan (2013) confirmed the effectiveness of the strategy in solving mathematical problems and a tendency toward the subjects to fifth grade pupils. (Jarret & Bulunuz, 2010) revealed the impact of the use of scientific stations strategy in enhancing the understanding of teachers in American primary schools for four scientific concepts in Space and Earth Science. Chamber (2013) revealed the effective use of learning stations on hands-on training to correct wrong concepts, in addition to raising the level of achievement they have, while Ocack (2010) showed the effect of the use of learning stations in academic achievement and students memorizing of the information during the teaching of science and technology.

Among the most important parts of curriculum, teachers should focus on the concepts, through providing an active learning environment suitable for the development of concepts by following different methods of teaching in which the student can be a participant in order to keep pace with global variables and informational blowouts in the world. Researchers sees that use of learning stations strategy while teaching concepts helps to develop concepts as it lends an air of being fun, and change and movement in the classroom.

Concepts, as Saheb Al Jassim (2012: 33) mentioned, is a collection of objects or symbols or specific objectives that are grouped together on the basis of common characteristics that can be named or given a particular symbol. It is a word or expression refers to a collection of facts or ideas converged so that the individuals can make a mental image to imagine the subject, even if he did not have direct contact with it.

Concepts cannot be classified according to the specific category as there are a variety of different opinions in the classification of concepts, depending on the way in which the classification done, Peter (2008: p59_66) classified concepts according to the Vygotsky viewpoint, who classified the concepts to spontaneous and scientific concepts.

Prunier Usti classified the concepts on the basis of the relations between the components of this concept which are: the link concept, the concept of the separation, and relational concept. There is another classification basis of the function of the concept, such as descriptive concepts, concepts based on rules and concepts based on assumptions and hypothesis formations. Classification based on the source which has two classifications: specific and abstract concepts is adopted by the researchers.

Researchers believe that the concepts may come intertwined with each other, in which that the concept meaning in a particular category differs in the second classification without

intersection. The concepts of the fundamentals of knowledge occupies a prominent place on the ladder of science, therefore it is important to focus on them as they are the first knowledge of patterns derived by the child and comes as a result of direct experience and acquired through the senses.

The current education leads most often to teach concepts or themes separating from each other, so that eventually lead to a huge scrappy rubble of knowledge. All with the aim to prepare students to pass the most exams stands at a minimum of learning. (Al Saheb & Al Jasim 2010: 10:00Am).

Many studies have noted the importance of the development of concepts in various fields of science, such as Abu Al-Salam study (2015), which highlighted the importance of the heads numbered strategy in the development of scientific concepts in science at the fifth-grade students in Gaza. Abdel Moneim (2015), demonstrated the effectiveness of mental maps strategy e-instill in educational technology concepts among trainee's teachers in the Faculty of Education at Al-Aqsa University. Al-Rubaie, et al. (2015), demonstrated the effectiveness of systemic approach to acquire ecological concepts for the students of fourth-grade science in Iraq. Agha (2013 m), emphasized the importance of employing fish bone strategy in the development of scientific concepts in health and environmental sciences at the tenth-grade students.

The problem of the Study

According to sixth grade technology teachers, there is a problem facing students in recognizing technology concepts. This has been confirmed by reconnaissance sample indicated students' misunderstanding in the concepts of technology. Due to many research recommendations and previous studies, which addressed the necessity to develop the basic concepts in a modern way such as active learning, the research found that there is a need to study the impact of learning stations strategy on developing technology concepts among sixth grade students.

Study questions are determined by in the following main question:

What's the impact of learning stations strategy on developing technology concepts among sixth grade students?

The following sub-questions emerges from the main question:

i. What are the concepts that sixth grade students should develop in Technology course?
ii. What are the steps of the learning stages strategy used for developing Technology concepts?
iii. Are there differences at the level (α = 0.05) between the average degrees of the control group and the average scores of the experimental group in posttest for technology concepts??

The imposition of the study

There are no differences at the level (α = 0.05) between the average group degrees of control and the average scores of the experimental group in Posttest for technology concepts**.**

The purpose of the study

The study aims at achieving the following objectives

i. To identify the concepts that need to be developed for the sixth-grade students in technology.
ii. To learn steps of the learning stages strategy.
iii. To know the impact of learning stations strategy on developing technology concepts among sixth grade students.

The importance of the study:

i. Increase interest in active learning strategies.
ii. Help teachers to employ learning stages to develop the concepts to sixth grade students.
iii. Provide Competent authorities for curriculum development to employ learning stations in teaching technology for sixth grade students.
iv. Considered as one of the leading Palestinian studies that employ learning stations strategy in the development of concepts in technology course.

Definition of Terms:

Learning stations: a strategy based on a group of sixth grade female students do diverse scientific activities organized and planned in advance by the teacher inside the classroom to allow them pass four stations of the five following stations (Electronic Station - Acting Station - Reading station - Visual station - Exploratory station) to develop the scientific concepts of the students in technology course.

Technology Concepts: a mental perception for sixth grade female students through the common features of scientific phenomena involved in medical technology unit for sixth grade including the concept and significance of verbal, such as artificial limbs; the devices can be added to compensate for the missing part of the body to help the patient to stand and walk through scientific stations strategy.

Sixth grade female students: female students who are 9 or 10 years old studying in governmental school.

Methodology

The study aimed to identify the impact of learning stations strategy on developing technology concepts among sixth female grade students to achieve the goal of the study. The researchers depend in their study on the following approaches: First, experimental method as being a method which allows studying the current phenomenon with adding changes to one factor or more, and monitor the results of this change (Agha, Al-Aostaz, 2004, P.83). Second, descriptive approach which describe and analyze the literature and previous studies on the field of study, and interpretation of results.

The Study Sample

The researchers chose Um Al Qora school in the west of Gaza City to apply study there in the second semester of the academic year 2015/2016. The study sample consisted of two classes

were selected randomly by lottery from the sixth-grade female classes. The number of students were (63) divided into two groups: One representing the experimental group in which they were (33) students and the other representing the control group represented by (30).

The study variables:

Independent variable: It's a way of teaching and organizing content according to the strategy of learning stations**.**

The dependent variable: It's the concepts in the technology which measured by concepts test prepared by the researchers.

Procedure:

The researchers depended on ADDIE instructional design model when implementing learning stations lesson, the steps were:

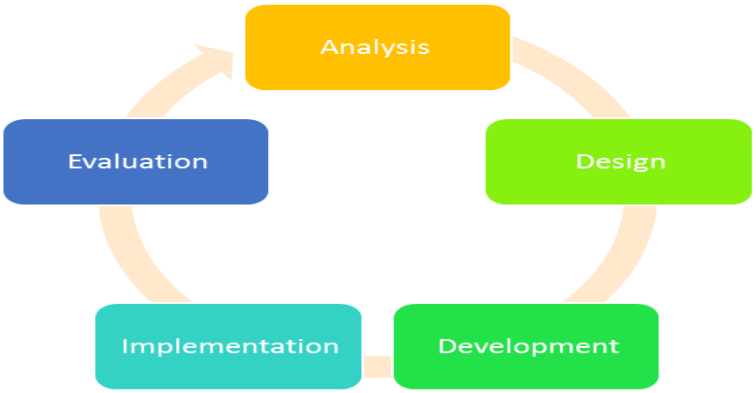

Diagram1, The used instructional design model

ADDIE steps were divided into 5 stages:

First: Analyze

This stage consisted of the following steps:

i. **Analyzing the characteristics of students**: the researchers analyzed the characteristics of the students of the sixth grade, aged from 10-12, in addition to the homogeneity of their levels.
ii. **Identifying overall goal**: to identify the overall goal from teaching by learning stations strategy which is giving sixth grade technology course to reveal its impact on developing technology courses.
iii. **Analyzing teaching environment requirements**: to identify the requirements of the teaching environment, such as classrooms, seats, and two computers for electronic stations.
iv. **Analyzing the educational content:** to use the content analysis tool to identify list of concepts included in the unit four "Medical Devices" from Sixth grade technology book.

Second: Design

The researchers adopt steps for setting up learning stations strategy referred to by Soliman (2015 :11) as follows:

i. Identify the goals of the subject that is intended to build learning stations.
ii. Identify the concepts intended to be taught, especially those which need higher thinking skills.
iii. Prepare the needed tools and equipment to carry out activities, such as presentations, books, equipment and other means validated for use to ensure use them well.
iv. Report of the quality of activities can be implemented within the stations, in which the teacher should study the options well for each concept from more than one angle. In this regard, the teacher should realize, during the design of stations, that some stations will require his presence on an ongoing basis while the others can involve learners to complete independently with a minimum of instructions. All learners should finish all stations at the same time almost.
v. Prepare the educational content stations to be simple and clear as possible to reduce the amount of paper used taking into account the gradient in the level of activities to suit the abilities and interests of learners and learning styles.
vi. Divide the learners randomly depending on pre-test, the size of the group depends on the facilities in the class.

The researchers used the following stations in teaching unit four for the sixth grade in which the four should be implanted within one class:

i. E-Station
ii. acting Station
iii. Reading station
iv. visual station
v. Exploratory station

Third: development:

It is the actual production stage where the researchers designed the five stations and processed for implementation in accordance to the teacher guide, which the researchers also designed. This included the required educational objectives, the roles of students and executive steps in the light of the learning stations strategy.

In addition to the five previous stations, the researches added a new one to be done at the beginning of the lesson which is Waiting Station in which students read the lesson before going to the stations.

Forth: Implementing

1: the experimental group:

i. Dividing students into two groups: researchers followed these steps in dividing the students and tasks:
ii. Dividing students into 8 groups, each group consists of 5 students.
iii. Call each group with a nickname identified by the researcher from unit 4 such as (Al Esrqarboot, medical technology…etc.).
iv. Sort of students within each group with clarifying the role of each student in the group, as shown in the table**.**

Table1, student role in the group		
N	**Rank**	**Task**
1.	Leader	Lead the group in each station
2.	Observer	Making sure everyone is on his/her job, watching time and sound of the group members, overseeing the cleaning stations before going to the next, and acting as the group's leader in the absence of the commander.
3.	Information bank	Get works sheet, and ask teacher for more explanations.
4.	Blogger	Making sure that works sheets are done, summarizing the decisions and conclusions they have reached.
5.	Supplying	Getting the needed tools, and asks teacher for unavailable materials.

Preparing learning stations:
The researcher followed these steps to design the stations:

i. E-Station: The researchers prepare presentations for each lesson to be displayed in the station on the computer. After that, the group answer the work sheet for that station.
ii. Acting Station: In this station, a student is assigned to act a character of a scientist or inventors and talks about his/her works, in addition to the conduct experiments by the actor in front of passers-by groups such as the making thermometer. After which the group answer worksheet for the station.
iii. Reading station: In which groups, should read an article that help in explaining the lesson. After that, the group answer the work sheet for that station.
iv. visual station: Groups watch some pictures that help in explaining the lesson. After that, the group answer the work sheet for that station.
v. Exploratory station: The researchers prepare necessary materials to conduct experiments. After that, the group answer the work sheet for that station.

2: The Control Group:
One of the researchers explains the lesson by traditional way in which he used discussion with students.
Fifth: Evaluation
At this stage, the researchers prepared test concepts for measuring the concepts which need to be developed for female students in the sixth grade in the fourth unit (Medical technology). Before designing the study tool, the researchers analyzed the fourth unit (Medical technology) for the sixth grade.
Designing concepts test:
The researchers made an objective test in the form of multiple-choice with four alternatives. It consisted of 42 questions in which each one has one mark. It was used to measure the parity between the two groups before applying the experience and to find out the differences between the two groups (control and experimental) after completion of the trial period.

i. The formulation of the test items: researchers used a list of concepts for the formulation initial image of (42) items multiple choice test. Researchers dedicated first page of the test as a set of instructions to answer the test in which the student read it well before the start. In addition to the initial data for the student, researchers took in consideration, when drafting the vocabulary, linguistic and scientific integrity which was specific, clear, and belong to the content of the article, a representative of the goals, and appropriate to the level of students.

ii. Grading system: test scores were identified by giving one mark when choosing the correct answer, and zero when choosing the wrong answer.

iii. Exploratory experimentation to test concepts: After the initial preparation of the test, it was applied upon (30) students from the seventh grade from outside the study sample in order to: Account ease transactions and discrimination test's paragraphs, account validity and reliability of the test, determine the average testing time, which is calculated by the following equation:

$$\text{Time average} = \frac{\text{first student} + \text{last student}}{٢}$$

In addition to (5) minutes to read the page instructions, and respond to queries from students and thereby select the test time as (40) minutes .

A. **Test validity**: That's was done through:

i. Sincerity of arbitrators: The test was presented to a group of specialists from the university professors, and a group of supervisors. In order to ensure the validity of the formulation and the level of basic vocabulary for students sixth grade taking into account the amendments**.**

ii. Internal coherence in paragraphs of the test:

Internal coherence was achieved by applying a prepared test on reconnaissance sample consisting of 30 female students from the seventh grade, Pearson correlation coefficient was calculated between the scores of each paragraph of the test, and the total score of the field to which they belong using statistical software (SPSS). The following table shows the correlation coefficient for each area of the test concepts with the total score of the test.

correlation coefficient for each area of the test concepts with the total score of the test.

Table5: correlation coefficient for each area of the test concepts with the total score of the test

skill	Correlation coefficient	Level of significance
remember	884.0**	Significance 0.01
understand	804.0**	Significance 0.01
apply	767.0**	Significance 0.01
Higher skills	746.0**	Significance 0.01

It is clear from Table (5) There are significant correlation at 0.01 between sub-areas for concepts test and the total score for the test, which confirms the test's internal consistency, in which the items reflect of the concepts contained in the unit fourth assessed on sixth grade female students and this reassures the researchers before the test application.

The final image of technological concepts test: through arbitration and exploratory experiment, analyzing the data, and making the necessary adjustments, the test has become in its final form consisting of (34) items of multiple choice questions.

Results of the Study:

The first question states that **"what are concepts should be develop in the sixth-grade female students in the technology?"**

During searching in previous studies, researchers determine basic concepts should developed, through analyzing medical technology unit for sixth grade students in technology course. After collecting that concepts, researchers discussed them with a group of arbitrators for authenticity, comprehensiveness, modification and deletion or addition. Researchers has taken amendments approved, they reached to a set of concepts which was (22). By that, the first question of the study was answered.

Third: The results of the second question:

The second question states, " **What are the steps of the learning stages strategy used for developing Technology concepts**?"

To answer the third question, the researchers looked at educational literature and previous studies, which focused on learning stations, and determined learning stations strategy steps to identify the key features through applying study procedures and theoretical background of the in the current research in which it was formed by following stations: Electronic Station - Acting Station - Reading station - Visual station - Exploratory station.

The results of the third question:

The third question states, **Are there differences at the level (α = 0.05) between the average degrees of the control group and the average scores of the experimental group in posttest for technology concepts?**

To answer the question, we think of this hypothesis:

There are no differences at the level (α = 0.05) between the average group degrees of control and the average scores of the experimental group in posttest for technology concepts.

To validate this hypothesis, standard deviation and average scores of students have been calculated in technological concepts test for each of the experimental and control groups, and then using a t-test for two independent samples (T. Test in Dependent Sample) These differences have been identified between both groups, Table (8) shows the results of this hypothesis**.**

Table (8), results of T-test, differences between control and experimental groups in concepts test

skill	Group	N	Average	standard deviation	T level	significance value	η^2
Remember	**control**	30	5.13	1.78	5.137	0.01	0.30
	experimental	33	7.21	1.43			
Understand	**control**	30	3.33	1.45	2.061	0.044	0.07
	experimental	33	4.03	1.24			
Apply	**control**	30	4.67	1.54	2.076	0.042	0.07
	experimental	33	5.48	1.58			
High skills	**control**	30	3.93	1.64	2.864	0.006	0.12
	experimental	33	5.09	1.57			
Technology concept test	**control**	30	17.57	4.93	3.798	0.000	0.19
	experimental	33	21.82	3.82			

It's evident from Table (8) that:

The value calculated (t) is greater than the value of tabulated (T) at level (0.05), in the area of understanding and application, with an arithmetic average of (4.03) in the experimental group which is greater than the arithmetic average of the control group, which was (3.33), and the value of calculated "T" in (2.061) which is greater than the value of Tabulated "T" in understanding, but in the field of application, the arithmetic average of experimental group was larger than the arithmetic average of the control group where the arithmetic average of the experimental (5.48), a larger than average the arithmetic of the control sample, which was (4.67), and the value of "T" calculated (2.076) which is greater than the value of the Tabulated " T" in concepts test.

The value of calculated (t) is greater than the value of Tabulated (T) at the level of (0.01) in the field of remembering and higher skills, the arithmetic average of the experimental group reached (7.21), which is greater than the arithmetic average of the control group, which was (5.13), and the value of calculated "T" in (5.137) which is greater than the value of the Tabulated "T" in the field of remembering. In the realm of higher skills, the arithmetic average of experimental group (5.09) was greater than the arithmetic average of the control group which wad (3.93). it was also greater than the value of calculated "T" (2.864), which is larger than the value of Tabulated "T". - The arithmetic average for concepts test of the experimental group was (21.82), which was bigger than the arithmetic mean of the control group (17.57), and the value of calculated "T" (3.798) which is greater than the value of the Tabulated "T".

Thus, we reject the hypothesis that there are no statistically significant differences between the mean scores of students in the experimental and control groups in technological concepts test, and accept the alternative hypothesis that there are statistically significant differences between the mean scores of students in the experimental and control groups in technological concepts test for the experimental group which studied the use of learning stations.

The Researchers Attribute This To:

- Learning stations strategy provides students a chance to interact with the content that they are learning, they are not getting the concepts ready, as in the traditional way.
- Learning stations Provides students an opportunity to move between various Learning stations, which provide them an opportunity to ask, discuss, debate and exchange ideas.
- Learning stations Considered as a learning strategy for the students have never identified with which led to great enthusiasm among them to study this strategy.
- Learning stations provide an opportunity to interactive thinking and organizing information, so that the students know what they learn and how? This is in contrast to the traditional method that allows the learner to get knowledge of the teacher or through reading and memorizing.
- Learning stations strategy with its various types were attractive factor to students, as it generates the desire to BI, discussion, and generating new ideas, which reflected positively on their knowledge of technological concepts contained in medical technology unit.
- Studying Medical Technology Unit using learning stations strategy has led to raise students' achievement levels in the experimental group. Using this strategy make the lessons non-traditional as students get used to; therefore, they represent for them a kind of enjoyment in learning.
- Students experiences' in using several learning stations during educational activities lead them to discover information, and associate them with their knowledge, leading to integration of information in their minds which increases the improvement in the collection of knowledge to acquire the technological concepts.

The results of this hypothesis agree with the results of several studies that have shown the effectiveness of the use of learning stations and prove effectiveness on differ from dependent variables to this study such as Soliman (2015), which confirmed the effectiveness of the learning stations strategy in the development of teaching. Zinati (2014), which showed the effectiveness of learning stations strategy in the development of reflective thinking skills. Hassan (2013) stressed the need to employ a strategy of learning stations in solving mathematical problems and a tendency towards the subject, in addition to the study of chamber (2013), which demonstrated the effectiveness of learning stations strategy to correct misconceptions and raise the academic achievement level of the students.

Recommendations:

Based on the results of research, the researchers recommend the following:

i. Training technology teachers in pre-service and in-service on how to use learning station strategy in teaching technology for various grades.
ii. Provide teachers with training courses on how to employ the learning station strategy; especially in schools with limited resources.
iii. The need for attention to the development of scientific concepts as a basis for knowledge-based for students.

iv. Reconsider methods of teaching strategies used in teaching technology in primary education, and the use of modern methods, techniques and strategies for teaching to encourages practicing educational activities and raise the motivation to learn about technology.

v. Shed light on the use of modern learning station as a strategy in the teaching methods in general and technology in particular in the colleges of education, and in the field of preparing technology teacher.

References:

Abdel Moneim, R. (2015). *The effectiveness of using E-mind maps strategy in providing educational technology concepts for the students in the Faculty of Education at Al-Aqsa University in Gaza*, Journal of Educational Sciences, King Saud University, 0.27 (6) 0.1 to 20, the date of benefit: in April 2016 20 https: // jes. ksu.edu.sa/sites/jes.ksu.edu.sa/files/attach/mjl_llwm_ltrbwy_27-1.pdf

Abu Salmiya, M. (2015). *The Effect of Employing numbered heads strategy in the development of scientific concepts and scientific thinking skills in science for fifth grade students in Gaza*, Master Thesis unpublished, the Islamic University, Gaza, Palestine.

Abuallam, R. (2010). *Research methods in psychology and educational science*, publisher for universities, the sixth edition, Cairo: Egypt.

Afaneh, I. (1999). *The effect of using three strategies for scheme concepts in teaching mathematics on the eighth-grade student's grades and their attitudes towards both mathematics and strategies*, Journal of Curriculum and Instruction Studies, Ain Shams University, No. 31, pages 61-96.

Afaneh, I. (2000). *Effect size and its use in the detection of the credibility of the results in educational and psychological research*. Journal of Educational Research and Studies 0.4 (3) 0.42 to 65. http://resportal.iugaza.edu.ps/spaper.aspx?id=277#

Aga, I. & Alaustaz, M. (2004). *Introduction to the design of educational research*, Third Edition, Rantisi printing press for printing and publishing, Gaza: Palestine.

Agha, Z. (2013). *The effect of using fish bone strategy in the development of scientific concepts and critical thinking skills in health and environmental science at the tenth-grade students*. Unpublished MA Thesis, Islamic University, Gaza: Palestine.

Aissan, S., Attari, T. & al-Ani, W. (2007). *New trends in education*, i 1, Dar El-masira for publishing, distribution and printing, Amman, Jordan.

Ali, M. (2011). *Modern trends and applications in the curriculum and teaching methods*, the first edition, Dar Almasira, Amman, Jordan. Mr

Anbaki, W. (2014). *The effect of teaching by using scientific station strategy on the collection and retention of public material science to the pupils the fifth grade*, Journal of College of Basic Education, the University of Babylon, No. 15, Iraq.

Bawi, M. & al-Shammari, T. (2010). *The effect of using scientific station strategy in the development of science processes for students at teacher training institutes*, Kirkuk University for Humanistic Studies Journal, Vol. 7, No. 3, Iraq: Kirkuk.

Bedier, C. (2012). *Active Learning*, Second Edition, Almasira for publication and distribution, Jordan: Amman.

Boutros, B. (2008). *The development of scientific concepts and scientific skills*, Almasira publisher for publication and distribution, Second Edition, Jordan: Amman.

Bulunuz, N. & Jarret, O.(2010). *The Effect of Hands- on Learning Stations on Building American Elementary Teacher's understanding about Earth and Space Science Concepts, Eurasia Journal of Mathematics*, since& Technology Education,2010 6(2),85-99. Retrieved may 6,2016 From:http://www.ejmste.org/v6n2/EURASIA_v6n2_Bulunuz.pdf

Chambers, D. (2013). *station Learning: dose it clarify misconceptions on climate change and Increase Academic Achievement through Motivation in Science Education,* Unpublished Master's Thesis. The Faculty of the Patton college of Education and human Services Ohio University. Retrieved may 6,2016 From: https://www.ohio.edu/education/academic-programs/upload/Chambers-MRP.pdf

Hassan, A. (2013). The *effectiveness of using scientific station strategy in solving mathematical problems and developing a tendency toward the material for the pupils in the fifth grade,* (Master unpublished), Al-Mustansiriya University, Iraq.

Heckendorn, R. (2007). *Using a "station approach" to Evaluate student- created lessons in teacher education*, manhattanville
https://jes.ksu.edu.sa/sites/jes.ksu.edu.sa/files/attach/mjl_llwm_ltrbwy_27-1.pdf

Jamie, H. (2010). *Design education*, Dar-Elfikr for publication and distribution, the first edition, Amman, Jordan.

Lahibi, A. (2015). *The effect of using scientific station strategy in the collection of second grade students and their attitude toward physics*, Alfateh magazine of Diyala University, 11.62 0.202 to 236 the date of benefit 5-7-2016 http: // www .iasj.net / iasj? func = fulltext & aId = 102748

Nabhan, M. (2004). *Measurement Fundamentals in the Behavioral Sciences*, Dar El Shorouk for publication and distribution, the first edition, Amman, Jordan.

Najdi, A. (2004). *Modern methods and techniques and strategies in teaching science*, i 1, Dar El-Fikr, Cairo.

Ocak , G.(2010). *The Effect of Learning Stations on the Level of Academic Success and Retention of Elementary School Students*, The New Educational Review, 21(2):146-156, Retrieved May 20, 2016, from: https://www.researchgate.net/publication/289807814_The_Effect_of_Learning_Stations_on_the_Level_of_Academic_Success_and_Retention_of_Elementary_School_Students

Olive, A. (2007). Constructivist theory and strategies for teaching science, Dar El Shorouk for publication and distribution, the first edition, Jordan: Amman

Rubaie, A., Morshedi, I. & Hassan, E. (2015). *Effective use of systemic approach to acquire biogenic concepts for fourth-grade scientific students and develop tendency towards the material*, Journal of College of Basic Education for Educational Sciences humanitarian Babylon University, No. 24.159-210 Date of advantage, April 3: http://www.becm-iq.org/ news / index.php? readmore = 35

Saheb, M. (2009). *developing scientific and mathematical concepts in early childhood*, Dar El-Fikr for publication and distribution, the first edition, Jordan: Amman

Zinati, F. (2014). *The effect of using scientific station strategy in the development of science processes and skills of reflective thinking in science among students in ninth grade in Khan Younis* (MA Thesis), Islamic University of Gaza, Palestine.