

The effectiveness of a proposed strategy in light of anchored instruction learning on achievement among middle school students

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Abstract: The research aims to identify the effectiveness of a proposed strategy in light of Anchored instruction Learning in achieving achievement among middle school students. To achieve the aim of the research, the two researchers adopted an experimental research approach with two groups (experimental and control) with a post-test, and the null hypothesis was developed: There is no statistically significant difference at the level of significance (0.05) between the average scores of the experimental group students who studied according to the proposed strategy and the scores of the control group students who studied according to the normal method in the achievement test. The research sample consisted of (60) fifth-grade science students at Al-Suyuti Preparatory School affiliated with the General Directorate of Education of Baghdad Al-Karkh II. The sample was distributed into two groups:

1. The experimental group consisted of (30) students who studied according to the proposed strategy.
2. The control group consisted of (30) students who studied in the usual way. The two research groups were rewarded on the variables (previous achievement, chronological age, previous knowledge, intelligence, and mathematical culture). After that, an achievement test was constructed, consisting of (30) objective, multiple-choice items. Appropriate statistical analyzes were conducted, and the psychometric properties of the test were verified. The results resulted The students in the experimental group who studied with the proposed strategy outperformed the students in the control group who studied in the usual way. In light of the results, a set of conclusions, recommendations and proposals were reached.

Keywords: Achievement, Middle school students, Proposed strategy,

1. Introduction

1.1. Research Problem

The methods used in teaching mathematics do not give importance to consolidating knowledge in the learner (student), and the purpose of the Anchored instruction Learning strategy is to overcome dormant knowledge that lies in the difficulty of learning facts and solving mathematical problems. This is done by creating environments that allow continuous exploration by Students and enable them to understand the kind of problems they face in different subjects and knowledge and help students in exploring the same topics from multiple perspectives

It has also become necessary to focus on employing technology in the educational process in order to keep pace with progress and raise the capabilities of the educational system, which reflects positively on the educational process as a whole, and those who examine the educational reality in the various educational levels will notice that there is a weakness in achievement because mathematics is an abstract science. It needs to teach knowledge using specific tools and means to approximate the image of this knowledge, and this was indicated by the study (Hasan, I. F. & Faris, E. J. 2019). And the study (Al-

Azami & Jassim, 2019) and the study (Hasan, I. F & Faris, E. J. (2020)) and the study (Al-Aqabi & AL-Kadhimi (2023)), and the emergence of the need to move towards using technology in teaching mathematics as an urgent need. To develop thinking skills and types of intelligences based on the theory of brain-based education, which clearly refers to the concept of mathematical culture, and this is what the study (2021) Qaeed, N.S., Faris, I.J. And a study (Hassan, D. A. K. 2018.) and a study (Hassan, A. K. 2017) and the study (Majeed, B. H., 2022) (Jawad, L. F. (2022)). These and other educational problems prompted the researchers to create a special questionnaire consisting of a set of questions, and it was distributed to a group of mathematics teachers, numbering (22) teachers in (9) Schools from the middle and secondary schools affiliated with the second Baghdad / Al-Karkh Directorate. The result was 95% of the teachers who confirmed that there is a weakness in achievement, and the current research is trying to answer the question:

Q/ Is there an effectiveness of the proposed strategy in light of Anchored instruction Learning in achieving achievement among middle school students?

Importance of the research: The importance of the current research can be explained by the following:

1. All societies are supposed to employ technology in their institutions in order to keep pace with development.
2. Anchored instruction Learning is a theory of education based on the use of technology in the educational process. Anchored instruction Learning provides the learner with the real opportunity to employ and organize knowledge in a real context, so that he can remember it at a later time and apply it flexibly to solve the problems he faces in real life, and this may contribute to raising the level of achievement.
3. It provides a new strategy in light of established education that can help increase mathematics teachers' awareness of the different stages of education.
4. An attempt to contribute to raising the level of achievement by following modern methods of teaching to reach the desired educational aims.

Research objective: The research aims to determine the effectiveness of the proposed strategy in light of established education in:

Achievement among middle school students

Research limitations: This research is limited to:

A - Students of the fifth scientific grade in government preparatory day schools affiliated with the General Directorate of Education in the second Baghdad/Karkh Governorate for the academic year (2023-2024)

B - The first three chapters (logarithms), the second (sequences), and the third (conic sections) of the mathematics textbook scheduled for the fifth scientific grade for the academic year (2023-2024).

Define terms:

A - Effectiveness: Define it

1- Attia (2008) states that:

Achieving the aim and the ability to achieve is the measure by which we know the learner's performance of his role in the learning and teaching process

Attia (2008, p: 61) (Attiya, 2008, p. 61)

The researchers define effectiveness procedurally as: the change that the proposed strategy brings about, in light of established education, in the scientific achievement of fifth-grade students and their mathematical culture. It is measured by the test prepared by the researchers, and the size of the effect is determined using the Et square.

1.2. Strategy

Al-Hila (2009) states that:

A set of procedures selected in advance by the teacher that he plans to use in order to achieve the desired teaching objectives with maximum effectiveness in light of the available capabilities.

(P173) Ailhila, 2009:) (Al-Hila 2009, p. 173)

The researchers define the strategy procedurally as: a set of procedural steps that the researchers followed inside the classroom to implement the teaching process in light of established education in order to achieve pre-determined teaching aims for mathematics according to the available capabilities.

1.3. *Anchored Instruction Learning*

(Foster, 2007) that:

A strategy for designing learning as problem-solving situations that challenges the learner and pushes him to access information and knowledge that qualify him to solve the educational problems he faces. (2007,3 Foster)

The researchers define Anchored instruction Learning procedurally: it is the theory through which the researchers will develop the steps of the proposed strategy in light of its foundations, principles, and educational starting points, and then measure its effectiveness in the mathematical culture of fifth-grade scientific students.

1- (Al-Zuhairi, 2018)

“Students’ comprehension of the various experiences they learn through the academic subject and is measured by the grade the student obtains in the achievement or oral tests.” (Al-Zuhairi, 2018, p. 217)

1.4. *Operational Definition of Collection*

The researchers know the achievement. It is the set of information, knowledge, concepts, and skills to solve problems that students acquire included in the mathematics textbook for the fifth scientific grade, estimated by the score that students obtain in the achievement test prepared to achieve the purpose of this study.

1.5. *Theoretical background: Definition of Anchored instruction Learning*

The Anchored instruction Learning strategy is defined as a strategy for learning and discovering the educational environment, where all scientific activities are designed around real situations in a way that qualifies learners to solve the problems they face. (Ruzic & O’connell, 2007, p2)

This theory goes back to the theorist (John Bransford) and follows the direction of cognitive constructivism thought by providing learners with opportunities to think and work to solve problems. This theory falls within the social constructivist trend by solving the problem collaboratively. Constructivism is a broad trend that falls under the content of many theories and its philosophy. It indicates that education is an effective or active process for constructing knowledge, and therefore the cognitive constructivist school differs from behaviorism, which emphasizes that education is a conditional process and that the mind is a dark box inside which one cannot see what is inside, while in contrast to that, the constructivist trend usually describes the learner as centered. About his learning because the learner controls, controls, and effectively constructs knowledge.

It is encouraged to develop metacognitive processes, and this is what the theory of grounded education is based on, and that teaching is consolidated or established through multimedia and educational means such as video discs, interactive computers, and data shows through the special environment for solving problems. Grounded education works to help learners increase their self-confidence and develop Their problem-solving skills. (yishyu&hsinn, 1997, p6)

Anchored instruction Learning aims to help learners overcome the problem of ineffective knowledge (latent knowledge) (which is the inability of students to employ the knowledge they have to provide appropriate responses in many different situations or problems) by making the learners engaged in educational tasks. The learners Beginners, when immersed in the phenomenon of interest, will be able to delve into new wells of knowledge and delve deeper into it. Anchored instruction Learning takes place in complex problem-solving environments, which are called micro-contexts, which enable learners

to discover the problem from several directions. These contexts operate in cooperative learning environments, which The role of the teacher is to direct the educational process. (matter, 2010 ,p8-9)

The roles of the teacher and the learner in Anchored instruction Learning theory:

First: the role of the teacher

- 1- The availability of a context for the problem provides students with information and knowledge to the extent that it helps them solve problems and encourages students to reach and define the problem.
- 2- His role changes from a mere transmitter to a guide, guide, and trainer, and organizes the learning environment as an atmosphere of open-mindedness and democratic opinion spreads.
- 3- The teacher facilitates students' engagement during the solid learning process.
- 4- Provides educational scaffolds to solve the problem as a temporary framework to support learning and is a leader within the classroom and a participant in the work during the project.

Second: The role of students

- 1- He uses his knowledge as tools to solve the problem.
- 2- He carries out a social negotiation process with others to test the validity of the knowledge construction he has reached, with students participating in solving various problems.
- 3 - Creative - active, and his role is positive when receiving knowledge, so he builds his knowledge himself.
- 5- He has the skill of teamwork to solve problems and cooperative education.

1.6. Proposed Strategic Steps in Light of Established Education

Creating cooperative groups according to the number of students in the class. Each group includes (4-6) students, taking into account the individual differences between them, and this division is constant in all classes.

First: Insight and generation of solutions, which are:

- 1- Using technology to present applications of scientific material that is considered to enrich the material specified in the book (preparation for the lesson)
- 2- The teacher should explain the scientific material in its details, which he specified with the specific aim and behavioral purposes, using the smart board, multiple educational means, and mathematical representations, with the aim of discovering information by the student through multiple management of information from its various sources, and processing and synthesizing the mathematical knowledge he has acquired.

Second: Determine problem-solving strategies appropriate to the topic of the lesson.

- 1- Representation: Various representations, such as shapes, pictures, and models, can be used to help Students understand the problem and solve it. This is done using educational techniques.
- 2- Diagram: A diagram can help visualize the solution and understand the relationship between the data and what is required.
- 3- Comparison Comparing the issue with other similar issues can help solve it. -4- Easing: It contributes to transforming the question from complexity to simplification so that it is easily accepted and solved by the learner. The more the question is divided or simplified into simple sections, the easier it becomes to reach its solution.

Third: Conclusion: The teacher summarizes the information that was presented and encourages the learners to extract ideas and generate new solutions to link them in subsequent lessons.

Fourth: Monitoring the solutions and examining the results. Here he looks at the results and their impact and evaluates himself by asking him whether he reached the correct solution to the problem given to him and evaluating his strengths and weaknesses in the alternative solutions.

1.7. Collection

Achievement tests are an organized means that aims to measure the amount of information that the learner possesses in any field of knowledge. It also indicates his ability to understand or apply it, analyze it and benefit from it in various life situations. Therefore, educational institutions are interested in

achievement because it is an indicator of the extent of his progress towards educational aims. . Achievement reflects the educational outcomes that institutions seek to achieve, in addition to their keenness to achieve a high level of achievement, because the level of achievement indicates the efficiency of institutions and their ability to achieve their aims, This is because the level of achievement indicates the efficiency of institutions and their ability to achieve their aims, and achievement determines, to a significant degree, the social and economic value of the individual. It is an indicator of the social value and career ambition that the individual aspires to achieve.

(Al-Zahir et al., 1999, p. 50)

2. Previous Studies

1- Shyu 2000 study: A study conducted in Taiwan. The study aimed to find out the effects of video based on Anchored instruction Learning on attitudes towards mathematics and problem-solving skills at the primary level. The sample size was 60 male and female students. The experimental method was used and the results concluded that there was an effect on attitudes towards mathematics. And improve problem-solving skills

2- Al-Khazraji 2022: A study conducted in Iraq that aimed to identify the effectiveness of a learning-educational program according to the learning anchors in acquiring mathematical concepts, skills, and analytical thinking. The research sample consisted of 42 female students from the primary stage. The experimental method was used, and the results concluded that there was a statistically significant difference between The average scores of the experimental and control group are in favor of the experimental group

3. Research Methodology and Procedures

First: Research methodology and design: The researchers used the experimental method, including a quasi-experimental design for two experimental and control groups with a post-test, to measure the effectiveness of the independent variable (Anchored instruction Learning) on the dependent variable (achievement), and the method is appropriate to achieve the research aim.

Table 1.
Experimental research design.

Measurement of the dependent variable	Dependent variable	Independent variable	Parity	Group
1-Achievement	1-Test	The proposed strategy in light of established education	1- Chronological age in months 2- Intelligence 3- Mathematical culture test for equivalence purposes	Experimental
		The usual method	4- Testing previous mathematical knowledge 5- Previous achievement	Control

Second: The research community The research community consisted of all students of the fifth scientific grade of the governmental preparatory boys' day schools affiliated with the General Directorate of Education in the second Baghdad / Karkh Governorate for the academic year 2023-2024.

Third: The research sample: The researchers intentionally chose (Al-Suyuti Preparatory School for Boys) from among the education schools in Baghdad/Al-Karkh Governorate II (the outskirts) according to the task facilitation book Appendix (1) for the following reasons:

1- Cooperation by the school administration with the researchers.

2- The social and economic environment gives a good convergence in the level of students according to their social and economic environment. The school included four classes for the fifth scientific grade, Classrooms were chosen randomly to represent Section (B) of the experimental group, and the number of students in it reached (30) students after excluding the students who failed statistically, and Section (C) to represent the control group, and the number of students in it was (30) students after excluding the students who failed statistically. In the following table:

Table 2.

Distribution of the research sample students into the two research groups (Experimental and control).

Reason for exclusion	Number of students after exclusion,	Number of excluded students	Number of students before exclusion	Division	Group
Failed last year	30	3	33	b	Experimental
	30	5	35	c	Control
	60	8	68	The total	

Fourth: Control procedures

To ensure that the experiment proceeds correctly and clearly, some factors and variables that may affect the application of the experiment and the accuracy and validity of the results were controlled, before the actual teaching began, as follows:

a. Internal integrity of the experimental design.

To verify the internal soundness of the experimental design, equivalences were conducted for the two research groups with some variables, namely previous achievement in mathematics, a test of prior mathematical knowledge, an intelligence test, chronological age, and a test of mathematical culture), and in order to verify the equivalence of the students of the two research groups in the above variables, the results showed

There are no statistically significant differences among students of the two research groups

b. External validity of the experimental design (controlling extraneous variables).

To ensure the external validity of the experimental design, the researchers controlled extraneous variables, including the conditions of the experiment and the accidents accompanying it, the experimental expiration, the subject teacher, the academic content, the teaching plans, and the distribution of classes.

Fifth: Research requirements

It includes the following:

1. Determine the scientific subject that will be studied during the implementation of the experiment, as it is represented by the chapters (first three) of the mathematics book for the fifth scientific grade.
2. Analyze the content of the mathematics book according to the components of mathematical knowledge.
3. Formulating behavioral objectives: (130) behavioral objectives were formulated based on Bloom's classification of the cognitive field with its six levels: knowledge, comprehension, application, analysis, synthesis, and evaluation.
4. Preparing teaching plans: The researchers prepared (35) daily teaching plans for each group, with (70) plans for the two research groups.

Sixth: Preparing the research tool.

The achievement test was constructed according to the following steps:

1. Determine the aim of the test, which is to measure the achievement of the two research groups.
2. Review previous studies
3. Determine the test items and present them to the arbitrators to reach the final image.
4. Formulating the test items, as (30) substantive items were drafted.
5. Preparing test and answer instructions.

6. Presenting the test items to the judges in mathematics and methods of teaching it. The first exploratory application (information sample) was applied to (30) students from the fifth scientific grade and from other than the research sample to ensure the clarity of the instructions for the test items and determine the time required for it. It was found that the instructions are clear, as well as the selection items are understandable to everyone, and the time taken to answer was calculated. .

The second exploratory application (sample of statistical analyses): It was applied to (100) students from the fifth scientific grade and not from the research sample to ascertain the difficulty, ease, and discriminating power of the test items, as it became clear after applying the equation of difficulty and discriminating power that it was acceptable and identical, as indicated by the study (Al-Rifai, 2022, p. 172, a study by (Hassan, 2019, p. 117), a study by (Muhammad 2018), and a study by (Al-Fatlawi, 2024).

The psychometric properties of the test were also confirmed, which included all types of face validity, content validity, and construct validity based on the Pearson correlation coefficient, and the results were good and similar, as indicated by the study (Hammadi, 2017, p. 329), and the study (Al-Azami and Jassim, 2019). The reliability of the test was verified based on the Kudrichard-20 equation.

. 10. The test in its final form: The achievement test in its final form consisted of (30) items of the objective type, and the test was applied to the two research groups on Wednesday, corresponding to 1/14/2024 AD, after the students were informed a week before the test to prepare appropriately for it.

Seventh: Statistical methods.

The researchers used statistical methods represented by the Cooper equation, the use of the statistical bag, the Pearson correlation coefficient, and the Marrieh Eta, Levin, and Rechartard equation 20.

3.1. Presentation and Interpretation of Results

After applying the achievement test and correcting the students' answers, the SPSS statistical package was used to obtain data results for the experimental and control groups in the achievement test, as shown in the following table:

Table 3.

The value of (t) and (F) for the experimental and control groups in the variable (Achievement).

Statistical significance at level (0.05)	Degree of freedom	standard deviation	SMA	t-test to equal the means		Levene's test to equalize the contrast		Variable	
				الدالة من الطرفين	t	Indication	F		
Statistically significant	58	4.015	21.500	0.000	4.513	0.066	3.501	30	Experimental
		3.244	17.433					30	Control

It is clear from the table that the average score of the students in the experimental group is equal to (21.500), while the average score of the control group is equal to (17.433), and by applying Levene's test

for two independent samples and to find out the significance of the difference between the variance of the scores of the students in the two groups (experimental and control), the calculated T-value reached (4.513) At the significance level (0.000), which is smaller than the approved significance level (0.05), and with a degree of freedom (58), so the null hypothesis is rejected and the alternative hypothesis is accepted, meaning that there is a statistically significant difference between the average scores of the experimental group and the control group.

To determine the extent of the effect of the independent variable (Anchored instruction Learning) on achievement, the Eta square test (η^2) was used to determine the size of the effect as shown in the following table:

Table 4.

The value of (D) and (η^2) and the size of the effect on achievement for the experimental and control groups.

Size amount of effect size	D value effect size	Degree of freedom	t value	Dependent variable	Independent variable
Big	0.24	58	4.513	Sports culture	Proposed strategy

4. Interpretation of Results

Interpreting the results of applying the achievement test. The results of applying the achievement test indicated the superiority of the students of the experimental group who were taught with the proposed strategy in accordance with established education over the control group who were taught in the usual method in the variable (achievement). The researcher attributed this superiority to a number of reasons, the most important of which are:

1- Teaching students the proposed strategy and using technology to present the lesson made the students see the applications in daily life of the concepts presented in the lesson. It had a clear role in moving the student from the level of recollection to the level of comprehension and understanding.

2- Working in cooperative groups within the classroom to solve problems cooperatively has made the student have the skill of teamwork and become active and have a positive role when receiving knowledge, so he builds knowledge himself, and this leads to a transition from receiving information to building and assembling information and arriving at a solution.

Negotiation during group solving, cooperation, and the spirit of competition with his colleagues in solving the problems presented in the lesson and testing the validity of what he arrived at in constructing knowledge raised the student's level to the ability to evaluate the solution he arrived at.

5. Conclusions

Based on the results of the current research reached by the researchers, the following can be concluded:

1- Teaching according to the proposed strategy had a high positive impact on achievement.

2- Presenting the scientific subject by linking it to the lives of students in the form of problems that affect their lives. Encourage students to approach mathematics with enthusiasm and enthusiasm and make them love the subject.

3- The proposed strategy, in light of Anchored instruction Learning, makes the classroom environment an attractive, active and interactive environment and makes the student the focus of the educational process and not just a recipient of information.

6. Recommendations

In light of the research results, the researcher recommends the following:

A- We hope that the Ministry of Education and the Directorate of Preparation and Training will train their teachers to use Anchored instruction Learning and invest in the teaching plans developed by the researcher to teach mathematics to the fifth scientific grade.

B - The necessity of moving from the method of memorization and memorization to a method based on making the student the focus of the educational process and moving away from stereotyping in teaching mathematics, which leads to overcoming dormant knowledge.

C - Teaching according to the established education in the proposed strategy had a high positive impact on the achievement of the students of the research sample.

Proposals

1- Applying the proposed strategy to other academic stages.

2- Conduct a similar study on other variables such as (mathematical or creative thinking, attitude towards mathematics)

Conducting a diagnostic and remedial study to identify ineffective knowledge among middle school students

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