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The Effect of the Learning Mastery Strategy using Interactive Learning Techniques as a Therapeutic Method on the Achievement of Secondary School Students in Mathematics

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ABSTRACT

The current research aims to identify the effect of the learning mastery strategy using interactive learning as a therapeutic method on the achievement of secondary school students in mathematics. To achieve the research objective, the researcher selected second-grade middle school students at Al-Haybah Intermediate School for Boys and determined his research sample, which consisted of (77) students distributed into two sections: Section (A) the experimental group, with (38) students, and Section (B) the control group, with (39) students. The statistical equivalence of the two research sample groups was confirmed in the variables (intelligence test, previous achievement, and previous knowledge test). The researchers chose the partial design with two equivalent groups with a post-test to measure achievement, then controlling the extraneous variables. The experiment was applied in the first semester of the academic year (2024-2025). The results were analyzed statistically using SPSS-26 and using the t-test for two independent samples. The results showed that the students of the experimental group who studied according to the learning mastery strategy and using interactive learning techniques as a therapeutic method outperformed the students of the control group who studied with learning mastery. Using the traditional method as a therapeutic approach.

Keywords: Learning Mastery Strategy, Interactive Learning Techniques.

Introduction

In Iraq the level of academic achievement of many secondary school students in mathematics is still low, and this is confirmed by the results of the ministerial exams. The researcher believes that the reason for this is the lack of a fundamental treatment or that there is a treatment, but it is superficial and does not rise to the required level and the desired goal [1]. From here, the

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importance of the research topic entitled “The Strategy of Mastering Learning and Making Interactive Learning a Remedial Means to Solve the Problem of Students’ Failure to Master Their Required Role in Mathematics” emerges and crystallizes. In other words, what is the means for all or most students to achieve mastery in mathematics? It has become clear to specialists in the field of mathematics education that traditional teaching methods have faced many objections from educators and educational specialists in the field of teaching. These methods have been based on memorization and explanation, and have been satisfied with that. The teacher has become the primary and final focus [2,3]. This is what is expressed in the dictatorial style of teaching, especially in the intermediate stage. This is perhaps because this stage represents the transition from concrete to abstract processes. It is well known that the educational process has three elements: (curriculum -teaching method- student) [4]. The student constitutes one-third of the learning process. In light of this, it is necessary to stimulate intellectual stimulation and brainstorming, and to bring him out of mental slumber and into serious, vital activity. Often, these teachers do not make good use of class time to teach productively, address students' shortcomings and weaknesses, or even diagnose them and identify their causes [5]. This, in turn, leads to poor achievement and deepens negative attitudes toward mathematics and its difficulty [6,7], whereas if the student contributes and is involved in the educational process, he will bear a share of the contribution to scientific progress [8].

The researchers defined the research problem by answering the following question: What is the effect of a learning mastery strategy using interactive learning techniques as a therapeutic tool on students' achievement in mathematics?

1.1. The Importance of Research:

1- The method of preparing educational material can be used as a guide when designing the curriculum, ensuring that the content consists of small, cumulative learning tasks, with appropriate examples of mastering each task.

2- The formative questions included in the study can be considered a good model for teachers to use to diagnose students' mastery of the subject they are teaching, before errors accumulate and weaknesses become more severe.

3- The research will reveal the feasibility of using interactive learning techniques as a treatment for learning failure in mathematics.

4- It may help mathematics curriculum planners in planning mathematics curricula in accordance with modern philosophy, in terms of content, activities, and methods for addressing student weaknesses.

5- Identify the impact of the mastery learning strategy and the use of interactive learning techniques on the students in the research sample.

1.2. The Aims of Research: The current research aims to identify the effect of the learning mastery strategy using interactive learning techniques as a therapeutic method on the achievement of secondary school students in mathematics.

1.3. Hypothesis of Research: There is no statistically significant difference at the significance level (0.05) between the average scores of the students (experimental group) who are treated with interactive learning techniques and the scores of the (control group) who are treated with the traditional method.

1.4. Limits of Research: The research is limited to students of second intermediate school in the General Directorate of Education in the holy Karbala Governorate. It also is limited to the

content of the first three semesters of the curriculum and the time limits of the first semester of the academic year 2024-2025.

1.5. Definitions of the Terms:

1. **Strategy** is defined as a set of procedures and methods used by the teacher to enable the learner to achieve planned educational experiences and educational goals. [9,10]
2. **Learning Mastery:** Learning mastery is defined as a set of integrated educational practices, plans, and methods that aim to achieve the highest level of achievement for learners through a variety of teaching methods and providing appropriate opportunities for each individual according to their speed and readiness for learning. [11]
3. **Interactive Learning:** Interactive learning in mathematics is defined as an active communication and dialogue and mutual influence between the learner and a modern program that has the ability to adapt to the learners' needs and respond to their inputs, by giving them an appropriate degree of freedom to control, reorganize it, speed up steps and positive participation in discovering information, recording notes and solving exercises. [12]
4. **Achievement:** Achievement was defined as the information a learner has acquired or developed through learning academic subjects, measured by the grade the student obtains. [13,14,15]

2. Theoretical background

2.1. Master Learning Strategy

2.1.1. Master Learning Strategy concept: In 1968 Bloom explained the learning mastery strategy as a method of learning to achieve a high level in learning the subject, in which 95% of students reach this level when the teaching process is organized. [16]

2.1.2. Master Learning Strategy steps: There are many steps to Implementing the Learning Mastery Strategy: [17]

1. Divide the content of the curriculum into units, each with a set of educational objectives.

2. Analyze the content of these units into smaller units.

3. Determine the mastery criterion for each unit.

4. Prepare equivalent models of diagnostic tests.

5. Prepare a set of educational materials to assist students who do not reach the mastery level.

6. Begin teaching the first unit. After completing each part, the teacher conducts a formative diagnostic test to determine what has been learned from that unit, i.e., identify students who have not reached the mastery level and provide them with remedial instruction.

7. After addressing the students' weaknesses, other equivalent models of formative testing are reapplied until the students reach the mastery level.

8- After completing all parts of the first unit, a comprehensive test is administered. Students who do not reach the proficiency level are also addressed.

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9- After completing all units, a comprehensive test is administered to measure the students' level of learning proficiency. Based on the test results, students are assigned grades for the semester.

2. 2. Interactive Learning:

2.2.1. Interactive Learning Concept: [18] View it as an educational process that enables students to read, write, and reflect deeply through the use of various teaching techniques and methods, such as problem-solving, role-playing, and brainstorming.

Interactive learning techniques include (brainstorming, dialogue sessions, presentations, question-and-answer sessions, and thinking, pairing, and sharing techniques).

2. 2.2. Steps for a therapeutic teaching plan using interactive learning techniques: [19]

First: Formulate the problem in the form of questions (presented on the board using PowerPoint)

Second: Encourage students to present ideas and record them on the board

Third: Hold a discussion session to discuss ideas and reach conclusions

Fourth: Show a video containing a summary of the lesson

Fifth: Evaluation

3. Methodology:

The researchers adopted the experimental method because it suits the achievement of the research objective [20,21].

3.1. Research Population: The current research population consists of students of second-grade of intermediate school in the General Directorate of Karbala Governorate for the academic year (2024-2025).

3.2. Research Sample: The researchers chose Al-Haybah Intermediate School for Boys, affiliated with the General Directorate of Education in Karbala, that it includes two sections for the second intermediate class. The researchers conducted equivalencies and divided the students into two groups (A&B). Section (A) is experimental group, which will be treated with interactive learning techniques after teaching with the learning mastery strategy, and the number of its students is (38) students, and Section (B) is a control group, which will be treated with the usual method after teaching with the learning mastery strategy, as the number of its students is (39) students.

3.3. Research Tool: A research tool- the achievement test- was developed by the following procedures:

3.3.1. Determining the objective of the test, which is to measure the achievement level of second-grade intermediate school students in the specified educational subject following the experiment.
3.3.2. Determining the educational material: The educational material for the research experiment was selected (the second, third, and fourth chapters) from the revised second-grade middle school textbook for the academic year 2024-2025.

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3.3.3. Formulating the behavioral objectives: The behavioral objectives were formulated according to Bloom's cognitive levels and presented to the judges.
3.3.4. Determining the number of test items: The number of items for the achievement test was determined to be (30) test items, including (25) objective items and (5) essay items, taking into account the abilities of students at this age level.
3.3.5. Preparing the specifications table: The specifications table for the achievement test was prepared after determining the number of classes assigned for teaching, the percentage of content for each chapter, and determining the relative weight for each of the six Bloom's cognitive levels.
3.3.6. Formulating the achievement test items. After preparing the specifications table, the test items, which amounted to (30) items, were formulated.

3.3.7. Test Validity: The test's validity was verified using two types of validity:

3.3.7.1. Apparent Validity: The test items were presented in their initial form to a number of judges in the field of mathematics and its teaching methods, as well as some mathematics teachers. In light of the judges' guidance, some modifications were made to the items.

3.3.7.2. Content Validity: The preparation of the test specifications table and map for the achievement test is an indicator of the test's validity.

3.3.8. Application on the Information Sample and the Statistical Analysis Sample:

3.3.8.1. Information Sample: To ensure the clarity of the test items and instructions, and to determine the time required for completion, the test was administered at Al-Bilsan Intermediate School for Boys. The completion time was approximately 50 minutes, and it was found that the answer instructions were clear.

3.3.8.2. Statistical Analysis Sample: After applying the test to the information sample and making appropriate adjustments to the test, it was ready to be reapplied for the purpose of conducting statistical analysis of the test items. The test was administered to a second survey sample of (100) second-grade intermediate students on Sunday, December 29, 2024, at Al-Warka' Secondary School for Boys, after students were notified a week prior to the application date.

3.3. 9.Statistical analysis of the test items: The following was done:
3.3.9.1. Correcting the papers and finding the final grades for the students.
3.3.9.2. Arranging the grades in descending order.
3.3.9.3. Determining the upper and lower groups, each group consisting of (27) students, since the total number of the group is (100) students.

3.3.10. Statistical Analysis
3.3.10.1. Difficulty Coefficient for Test Items: The difficulty coefficient was calculated for each of the (30) test items. The difficulty coefficient for the (25) objective items ranged between (0.46-0.65). The difficulty coefficient was also calculated for the (5) essay items, which ranged between (0.31-0.41), according to their difficulty coefficient equation. All items were considered acceptable because they ranged between (0.20-0.80).
3.3.10.2. Discriminative Power of Test Items: The discriminating power equation was applied to each of the test items, and it ranged between (0.33-0.89). Therefore, it is considered good because it is (0.30) or above. [22]

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3.3.10.3. Effectiveness of false alternatives: The effectiveness of the alternatives for each item of the test was determined according to the alternative effectiveness equation. It was found that all of them were negative, meaning that the alternatives were more attractive to students in the lower group.
3.3.11. Reliability of the test items: The reliability of the test was verified using the Cronbach's alpha equation.
3.3.12. The final form of the test and its application: The test was administered simultaneously to both research groups on January 8, 2025, after the researcher informed the students a week before the test date.

4. Results and Discussions

4.1. Results

The researchers applied the achievement test to the research sample and used the statistical program (SPSS-26) to arrive at a statistical description of the final data for the experimental and control groups in the achievement test. Table (1) shows this description.

Table (1)

The statistical description of the two groups (experimental and control) in the

Group	Section	Number of Students	Mean	Standard Deviation	Standard Error of the Mean	95% Confidence Interval of the Mean	
						Maximum	Minimum
Experimental	A	38	30.55	3.825	0.621	12.066	8.578
Control	B	39	20.23	3.865	0.617		

The researchers also used Levene's Test for two independent samples to determine the significance of the difference between the variances of the scores of the students of the research sample, the experimental and control groups. The value of (F) reached (0.395) at a significance level of (0.531), which is greater than the approved significance level of (0.05). Accordingly, the two groups are homogeneous in the achievement variable.

To know the significance of the difference between the arithmetic means of the students' scores in the experimental and control groups, the researchers applied the t-test for two independent samples. The t-value (t) reached (11.790) at a significance level of (0.00), which is less than the approved significance level of (0.05) and with a degree of freedom of (75). This means that the experimental group, who studied according to the strategy of mastering learning using interactive learning techniques as a therapeutic method, outperformed the control group, who studied according to the strategy of mastering learning using the traditional method as a therapeutic method, in the achievement test, as is clear in Table (2).

Table (2)

(F) & (t) values for the two research groups in the mathematics achievement test

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Levene's test for equality of variances		(t-test) for equality of means		Degree of freedom	Statistical significance at the 0.05 level
F value:	Significance	t value:	Significance		
0.395	0.531	11.790	0.00	75	significant

Therefore, the hypothesis is rejected and the alternative hypothesis is accepted. To determine the size of the effect of independent variable (learning mastery strategy using interactive learning techniques as a therapeutic method) on the dependent variable, the eta square test (η^2) was used to determine the size of the effect of the independent variable. The t-test was used to confirm the difference, which is a true difference attributable to the independent variable and not to other variables. The value (d) was calculated, which expresses the effect size.

Table (3)

The size of effect of the learning mastery strategy using interactive learning techniques on Achievement

Independent Variable	Dependent Variable	t -value	DF	η^2 value	d -value	Effect Size
Instructional Strategy	Achievement	11.681	75	0.645	1.34	Large

It is clear from the table (3) that the effect size of the learning mastery strategy using interactive learning techniques as a therapeutic method on the dependent variable, which is achievement, is large, as the value of Eta square (η^2) reached (0.645) and the value of (d) reached (1.34), which is greater than (0.8). [23]. Accordingly, the effect of the learning mastery strategy using interactive learning techniques as a therapeutic method on the achievement of second-year middle school students in mathematics was large and in favor of the experimental group.

4.2. Discussions:

The results obtained by the researchers in the current study indicate that students in the experimental group outperformed the control group in the research sample. Students in the experimental group studied according to the learning mastery strategy using interactive learning techniques as a therapeutic method, while students in the control group studied according to the learning mastery strategy using the traditional method as a therapeutic method in the achievement test. This may be due to:

4.2.1. The researchers' adoption of the learning mastery strategy using interactive learning techniques as a therapeutic method helped organize the scientific content of the educational material, making learning meaningful for the students in the experimental group.

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4.2.2. The researchers also noted that the steps of the strategy helped attract students' attention to the lesson and motivate them to generate their own unconventional ideas and interact with the teacher and with each other, which had an impact on their self-confidence.
4.2.3. The teaching strategy placed the learner at the center of the educational process, which is consistent with modern educational trends that stipulate allowing the learner to develop self-confidence. This strategy helps students transfer and exchange their information with each other, which in turn raises their academic level.

5. Conclusions

Based on the research findings, the following conclusions can be drawn:
5.1. There is a clear impact of the teaching strategy on raising the level of achievement of students in the experimental group who studied mathematics according to the learning mastery strategy using interactive learning techniques as a therapeutic method in the second intermediate grade, compared to the achievement of students in the control group who studied according to the learning mastery strategy using the traditional method as a therapeutic method.

5.2. The steps of this learning mastery strategy using interactive learning techniques as a therapeutic method are fully consistent with modern educational trends.

5.3. Adopting the strategy contributed significantly to linking previous information, ideas, and cognitive experiences with new information, ideas, and experiences, and helped students extract what could assist them in the educational situation they were engaged in.

5.4. Adopting a new teaching style for the student helped them to discuss their ideas with their peers and generate new ideas.

6. Recommendations

Based on the research findings, the researchers propose the following recommendations:
6.1. Encouraging and motivating mathematics teachers at all levels to use mastery learning using interactive learning techniques as a therapeutic method in teaching their students.
6.2. Developing in-service training courses at the Directorate of Preparation and Training for mathematics teachers to implement the steps of the teaching strategy.
6.3. The necessity of including the steps of this strategy in the curricula of mathematics teacher preparation programs in colleges of education.

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