

The impact of using learning acceleration model on the achievement of mathematics for third intermediate grade students

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Abstract:

The current study aims at identifying the impact of using learning acceleration model on the achievement of mathematics for third intermediate grade students. For achieving this, the researchers chose the School (Al-Kholood Secondary School for Girls) affiliated to the General Directorate of Babylon Education / Hashemite Education Department for the academic year (2021/2021), The sample reached to (70) female students from the third intermediate grade, with (35) female students for each of the two research groups. The two researchers prepared an achievement test consisting of (25) objective items of multiple choice type, The psychometric properties of the test were confirmed, and after the completion of the experiment, the achievement test was applied to the two research groups at the same time, and after processing the data statistically using the statistical bag, the study concluded that the experimental group students who studied according to learning acceleration model outperformed the students of the control group who studied according to the traditional method.

First // Research problem: We live today in an open era, the most prominent characteristic of which is access to knowledge in many forms that are faster, more interesting and attractive, Perhaps what we really need is knowledge that is transformed into projects and works that contribute to changing reality and making the future; Through the study path of the two researchers and their visit to a number of mathematics teachers for the third intermediate grade, and through a questionnaire distributed to them, the researchers concluded that (85%) of the male and female teachers are not satisfied with their students achievement in mathematics, and this was confirmed by the success rates for the past year, which reached to (34.69%), and some studies indicated a decrease in the achievement level as a study (Al-Ayoubi, 2007) and (Mizban, 2018) study.

The two researchers noted that the reason for the low level of achievement is due to most male and female teachers adopting traditional methods of teaching, using few teaching methods, giving ready information to students, not benefiting from the students' mental capabilities and abilities, and not knowing many teachers of modern strategies and models in teaching mathematics, which emphasizes the positive role for the learner and taking into account the individual differences among students.

The two researchers believe that there is an urgent need to keep up with developments in teaching methods and means by relying on modern models and strategies in teaching, as it is no longer acceptable to maintain traditional methods because they are no longer sufficient to meet the educational process requirements, especially that the world is witnessing qualitative and quantitative leaps in all areas of life, and maintain the traditional methods of teaching will inevitably increase the gap between us and developed world countries.

In order to address this problem, the two researchers believe that using learning acceleration model in teaching mathematics to the third intermediate grade female students is that it addresses low achievement problem.

Therefore, the research problem can be determined by answering the following question:

What is the impact of the learning acceleration model on the achievement of mathematics for third intermediate grade students?

Second // study importance: Learning acceleration is concerned with making learning a comprehensive experience that is not limited to the mind only or the body alone, as it includes the body and thought together, by feeding human intelligence in its multiple forms, rational, emotional, physical, social, innate, creative, spiritual, moral, and others on all Levels, to restore the effectiveness of the educational process and so that learning does not become dependent on collecting information, saving it and inserting it in the exam, after which it evaporates from the mind as if nothing had happened.

The current research importance can be explained in two aspects:

1. Theoretical aspect:

- Learning acceleration model is one of the models that develops a practical intellectual methodology for students and helps them build their knowledge and personal growth.

- It offers a new method to invest the human mind and all the senses in learning through practical applications and exercises to achieve the best results.

2. Practical aspect:

- This is the first research in Iraq (to the two researchers knowledge) in measuring the impact of learning acceleration model on the achievement of third-grade intermediate students in mathematics, which helps in building knowledge and developing capabilities, where students are the process core through participation and cooperation among them.
- Teachers and researchers benefit from the achievement test prepared by the two researchers in mathematics for the third intermediate grade students.
- Mathematics Teachers benefit from the model in the teaching process and using methods and activities that help students in developing their thinking skills, which in turn helps improve their achievement level.

Third // Research Objective: The current research aims at identifying the impact of learning acceleration model on the achievement of third intermediate grade students in mathematics.

Fourth // Research hypothesis: For the purpose of verifying the research objectives, the following null hypothesis was formulated:

- There is no statistically significant difference at the level (0.05) between the mean scores of the experimental group students who will study it according to learning acceleration model, and the scores of the control group students who will study it according to the traditional method in the achievement test.

Fifth // Research limitations: The research is limited to:

- 1- Third intermediate grade Students in middle and secondary day schools for girls in the Hashemite district of the Educational General Directorate in Babil Governorate for the academic year (2021 / 2022)
- 2- First chapter (Relationships and Inequalities in Real Numbers) and second chapter (Algebraic expressions) of the mathematics textbook to be taught to third-grade intermediate students.
- 3- First semester (first course) for the academic year (2021 / 2022)

Sixth / terms identification:

First: the effect: (Ibrahim, 2009) who defined it as “the ability of the factor under study to achieve a positive result, but if this result is failed and not achieved, the factor may be one of the direct causes of negative repercussions.”

(Ibrahim, 2009:30)

Second: model: (Abu Jadwa, 2008) who defined it as “a group of procedures practiced by the teacher in the educational situation, which includes the material design and its presentation and treatment methods.”

(Abu Jadwa, 2008: 317)

- **The two researchers define it procedurally:** it is a group of organized and interactive steps that lead to learning acceleration of the experimental group students for the purpose of achieving the desired goals of teaching mathematics for the third intermediate grade students.

Third: learning acceleration was defined by:

- **Mayer (2010)** as it is to achieve positive results by using mind and the whole body in the educational process as quickly and efficiently as possible.
(Mayer, 2010:32)
- Glossary of terms as it is to combine rapid learning theory and brain research in a positive learning environment to achieve the fastest growth rate.
(Glossary of Terms,2014)
- **The two researchers define it procedurally:** it is a set of organized steps that the researcher uses with experimental group students in order to achieve their learning acceleration from their study of mathematics topics.

Fourth: The achievement was defined by:

- **(Alderman, 2007)** as it proves the ability to achievement what has been gained from the educational experiences for which it was developed.

(Alderman, 2007:101)

The two researchers define it procedurally: it is the final score obtained by two research samples students in the post-achievement test prepared by the researcher after studying the first and second semesters of the mathematics book for the third intermediate grade students

The first theme: theoretical background

Learning acceleration model

Learning acceleration is an integrated philosophy on life and learning. In that capacity, it constitutes a completely new view of things, concerned with getting rid of mechanization, and returning humanity to the learning process. It works to return the learner, not the trainer or the teacher, not the auxiliary materials, not the demonstrations, to the center of the educational process.

Learning acceleration is a structural process, not a cosmetic process, when learning acceleration is applied, it will have an impact on the system as a whole, and on the trainer personality and the institution as a whole. People who have most benefited from acceleration learning are those who have treated acceleration as a way of life, transforming their apprentices from a bowl filled with fire waiting to be kindled, the training programs were transformed from a process of indoctrination, enhancement and propaganda into a vehicle that carries life, intelligence and spirit to the trainees.

(Mayer 2008:30)

Learning acceleration stages (Learning Acceleration episode):

The contemplator in the learning acceleration field finds that it goes through four stages. Researchers and scientists have differed in naming the learning acceleration stages. Smith, Lovatt and Wise 2010 mentioned that learning accelerating episode consists of four stages; which are:

- ❖ Preparation stage: the stage of attracting attention.
- ❖ Presentation stage: The stage of the initial introduction of the new knowledge, or the skill that is being taught. It is the stage of the first confrontation between the learner and the subject.
- ❖ Exercise stage: the stage of integration of new knowledge or new skill.
- ❖ Performance stage: The stage of applying what the learner has learned to real-life situations.

It should be noted that despite the different names of learning acceleration four stages; however, each name indicates the same stage, and these stages focus on learning and the student; it is not for the education and the teacher, and the teacher task is to facilitate the learning process.

(Al-Mallah, 2018:13, 14)

Second: previous studies

1- (Al-Naqbiya and Ambo Saidi, (2014) study:-

This study was conducted in the Sultanate of Oman, it aimed at identifying the impact of teaching science using the learning acceleration cycle model on the attitude towards science and self-concept among tenth grade students.

2- (Al-Zahrani, (2020)) Study:

This study was conducted in Egypt; it aimed at identifying the effectiveness of the learning acceleration model in science teaching on the attitude towards the subject among the first intermediate grade students.

Research Procedures:

First: Experimental design: in this research, the two researchers adopted one of the experimental designs for two equal groups (experimental group, control group) with post-test, as the control group will study in the traditional method, while the experimental group is taught according to the learning acceleration model.

Second: research community: The research community includes third-grade intermediate students in the middle and secondary day schools for girls affiliated to the General Directorate of Babylon Education / Hashemite Education Department for the academic year (2021/2022), as the total number of middle and secondary day schools for girls reached (17) schools. While the total number of the research community members reached (3304) female students distributed among (10) middle schools and (7) secondary schools.

Third: research sample: The research sample was intentionally selected, represented by Al-Kholood High School for Girls, which is affiliated to the General Directorate of Babylon Education (the Hashemite Education Department), in order to cooperate with the school administration and the fact that the students come from a close social and economic environment, and after identifying the school in which the experiment will be applied, the two researchers visited the mentioned school before starting the experiment and found that the school includes four divisions for the third intermediate grade students, the two researchers randomly chose section (C) to represent the experimental group that will be taught in a learning acceleration model, as the number of its students reached (35) students, and section (A) to represent the control group that will be taught in the traditional method, as the number of its students reached (35) students.

Fourth: Control procedures: The control procedures include controlling everything that would affect the dependent variable (educational achievement) as well as the independent variable (learning acceleration model), which may affect the research results reliability, so the two researchers verified the following:

1- Internal safety of the experimental design:

For the purpose that the current research to be true with the standard in which the difference between the two research groups (experimental and control) can be attributed to the independent variable (learning acceleration model) and not to any other variable, the two researchers conducted equivalence between the two groups in the variables (previous achievement in mathematics, the chronological age of the students calculated in months, a test of prior knowledge in mathematics, an intelligence test) by calculating the arithmetic mean and standard deviation of the data that represent these variables, the two researchers also applied (Levin's test) for two independent samples to find out the difference significance between the degrees variance of each of the variables, and it was found that the (F) value of these variables is greater than the approved significance level (0.05), this indicates that the experimental and control groups are homogeneous in all the variables mentioned, and by applying the test (t-test) for two independent equal samples to find out the significance of the difference between the mean scores of the students of the experimental and control groups in the mentioned variables, it was found that the t-value is greater than the approved significance level (0.05), and a freedom degree (68), which confirms the equivalence of the two research groups in all the variables mentioned before conducting the experiment.

2- External safety of the experimental design:

In order for verifying the external safety of the experimental design, the researcher controlled a number of variables that she believes may affect the research experiment safety, including:

(2-1) experiment circumstances and its related accidents:

Both groups' members were not exposed to any emergency or accident that would affect the course of the experiment or the two dependent variables (achievement and pivotal thinking) besides the independent variable.

(2-2) Experimental extinction (leaving in experience):

Experimental extinction, which results from some cases of absence from work or moving from one school to another or from one section to another, did not occur, except for some individual absences and in small percentages that did not affect the experiment course.

(2-3) Maturity:

The female students in the research sample did not have any significant change because they are of the same age, and if there are changes in psychological or biological maturity, these changes will be equal for all female students as they are equal in this variable.

(2-4) Impact of Experimental Procedures:

The experimental procedures that affect the experiment course that the researcher tried to limit their effects are as follows:

(2-4-a) experiment Confidentiality:

The researcher was keen not to inform the students her research nature and its objectives to ensure that the students' activity did not change while dealing with them.

(2-4-b) School subject: The experimental and control groups students were taught the same subjects, which are:

- Chapter One (Relationships and Inequalities in Real Numbers)
- Chapter Two (Algebraic expressions)

From the mathematics textbook schedule for the third intermediate grade students, part one, second edition for the year 2019

(2-4-c) Duration of the experiment: The duration of the experiment was uniform and equal for the two experimental and control groups, as the experiment began on Monday, 8/11/2021 and ended on Monday, 24/1/2022.

(2-4-d) place of the experiment: The experiment was applied to the experimental and control groups in Al Kholoud Secondary School for Girls and in two similar halls.

(2-4-f) research tool: The two researchers prepared the achievement test in a way that suits the scientific material that she taught to the two groups students (experimental and control) in a way that suits the research sample. The test was applied to both groups at the same time and place.

(2-4-j) Class distribution: The two researchers complied with the weekly lesson schedule approved by the school administration, which stipulates (4) lessons per week for one section. The two researchers studied (8) lessons per week with two lessons per day for four days.

Fifth: Research Requirements:

1- scientific subject identification: The scientific material that will be taught during the research experiment was identified on the experimental and control groups according to the content vocabulary from the mathematics book for third intermediate grade students, the first semester of the academic year (2021-2022) by its authors (Jassem et al. 2019) second edition of the Ministry of Education, General Directorate of Curricula.

2- Formulation of behavioral objectives: The general objectives for teaching mathematics for the third intermediate grade and what is included in the first and second chapters to be taught in the mathematics book have been determined and based on Bloom's classification in the cognitive domain ((knowledge (memorialization), comprehension (understanding), application, analysis, synthesis , evaluation)

3- Preparation of teaching plans: The researcher has prepared teaching plans for the educational content that she will study during the experiment period, which are (20) for the two experimental groups that were taught based on learning acceleration model, and the control group who studied based on the traditional method, where each group is (10) of plans.

Sixth: research tool:

One of the requirements of the current research is to prepare an achievement test in mathematics for the third intermediate grade students in the first and second semesters of the textbook topics, which are the first chapter (relationships and inequalities in real numbers) and the second chapter (algebraic expressions) in order to verify the goal and hypothesis of the research, the two researchers followed the following steps.

1- Test objective identification: Determining the test objective is to measure the level of achievement of female students in the academic content of the mathematics subject to be taught to them.

2- scientific subject identification: The scientific subject that will be studied for the experimental and control groups for the three chapters was determined, where the first chapter (relationships and inequalities in real numbers) and the second chapter (algebraic expressions) of the mathematics textbook for the third intermediate grade, second edition of 2019

3- Formulation of behavioral objectives: Behavioral objectives have been formulated based on Bloom's classification of the cognitive domain with its six levels, and the final number is (94) behavioral objectives.

4- Test items number identification: The number of achievement test items was identified by (25) test items, taking into account the abilities of students at this age level.

2- Preparation of the test map (specification table): The test map (specification table) is one of the important procedures in building achievement tests. It was prepared after determining the lessons number allocated for teaching, the content ratio for each chapter, and the relative weight of each of Bloom six levels.

5- Formulation of achievement test items: The two researchers prepared (25) objective test items to build an achievement test of the multiple-choice type with four alternatives as the test is characterized by validity, reliability and comprehensiveness because it is not affected by the Self- correcting, and the answer in this type of tests is determined by choosing the alternative appropriate among the alternatives presented.

(5-1) Preparation of test instructions:

A- Answer instructions: The instructions for the test and how to answer on its items have been formulated in the answer sheet so that it is easy for the student to understand the items and answer it, identify the answer time and choose only one alternative for the item and not leave any item unanswered with an illustrative example of how to answer.

B - Correction instructions: The two researchers prepared model answers for the test items and gave one score for the correct answer and zero for the wrong answer or indicated by more than one sign or left out, on this ground, the total score for the items ranged from (0) degrees to (25) degrees.

6- Test validity: For the purpose of verifying the test validity, the two researchers verified two types of validity:

A- Face validity: To ensure the items safety, their suitability for the purpose of the research, clarity of the formulation, objectivity and attractiveness of alternatives, and their measurement of the behavioral goals that were set for them, the researchers presented the achievement test in its initial form to a group of experts specialized in educational and psychological sciences and mathematicians specialists in order to know their opinions by judging on:

- Clarity of instructions and questions and the extent to which they achieve the desired purpose.
- Judging the reasonableness of the proposed alternatives.

b- Content validity: The content validity was verified by preparing the specification table (test map) and thus it was ready for application.

7- The exploratory application of the test:

A - The first exploratory sample: The two researchers applied the achievement test to a first exploratory sample that was intentionally chosen from the research community. For identifying the time taken to answer the achievement test items and to ensure the items clarity and answer instructions.

Composed of 20 female students in the third intermediate grade from Al-Manar Intermediate School affiliated to the General Directorate of Babel Education \ Hashemite District.

b- The second exploratory: the two researchers applied the test again for the purpose of conducting a statistical analysis of the test items. Where the test was applied to a second exploratory sample consisting of (100) female students of the third intermediate grade distributed over two schools affiliated to the General Directorate of Education, Babylon, Hashemite District.

8- Statistical analysis of the achievement test items: After applying the test to the second exploratory sample, the following was done:

1- Test papers Correction

2- Arranging students answer scores in descending order from the highest score to the lowest score.

3- Sorting and determining the scores of the higher scores group and the lower scores group by relying on a higher (27%) and lower (27%) percentage from two groups for the purpose of statistical analysis.

(8-1) Difficulty coefficient for the achievement test items:

The difficulty coefficient was calculated for each objective test item, which was (25) items according to its difficulty coefficient equation, and it was found that it ranges between (0.24 - 0.62)

(Al-Zahir et al., 1999)

(8-2) The discriminatory power of the achievement test items:

The discriminatory power was calculated for each of the objective test items according to its discrimination coefficient equation, and it was found that it ranges between (0.33 - 0.66) and Eble indicates that the discrimination coefficient if it is greater than (20%) is considered acceptable.

(Eble, 1972, p269)

(8-3) The effectiveness of Wrong Alternatives: The necessary statistical operations were performed to calculate the effectiveness of the wrong alternatives for each of the objective test items of the multiple choice type, and using its equation, it was found that it ranges between (-0.03) and (-0.48), This means that students answers in the lower group were attracted to more than senior group students, and it turned out that all the wrong alternatives to the test items were effective.

9- The reliability of the achievement test: To calculate the reliability coefficient of the achievement test, the researcher used the Kewder-Richardson (K-R20) equation, and the reliability coefficient value of the achievement test was (87.35).

The final form of the achievement test and application: The achievement test was applied in its final form at the same time on the experimental and control groups on Sunday 23/1/2022 after the two researchers informed the students a week before the test date.

First, results Presentation

To verify the null hypothesis validity, which states that ((there is no statistically significant difference at the significance level (0.05) between the average scores of the experimental group students who will be taught by adopting the learning acceleration model, and the average scores of the control group students who will study in the traditional method in the achievement test)).

After applying the achievement test, correcting the students' answers, and using the statistical program (SPSS) to obtain a statistical description of the raw data for the experimental and control groups in the achievement test.

It was found that the arithmetic mean of the experimental group students' scores was (19.69) with a standard deviation of (3.81), while the mean scores of the control group students were (16) with a standard deviation of (4.68).

By applying the Levene's Test for two independent samples to know the difference significance between the differences in the students' scores of the two experimental and control groups, the value (F) was (3.53) at the significance level (0.065), which is greater than the approved significance level (0.05), which means that the two groups are homogeneous in this the variable.

By applying (t-test) to two independent samples to know the difference significance between the mean scores of the experimental and control groups students, the t-value reached (3.61) at the significance level (0.001) which is smaller than the approved significance level (0.05) and with a degree of freedom (68), and this indicates the superiority of the experimental group students who studied by adopting the learning acceleration model over the control group students who studied according to the traditional method in the achievement test.

therefore, the null hypothesis was rejected and the alternative hypothesis accepted, which states that: There is a statistically significant difference at the significance level (0.05) between the mean scores of the experimental group students who studied by adopting the learning acceleration model, and the scores of the control group students who studied using the traditional method in the achievement test, in favor of the experimental group.

To find out the extent of the independent variable influence (learning acceleration model) on the dependent variable (achievement), the Eta square (η^2) was used to determine the effect size of this independent variable and for the purpose of making sure that the differences size that occurred using (t-test) are real differences that returned to The independent variable and not to any other variables, and then calculate the (d) value, which expresses this effect size.

And it was found that the effect size of (learning acceleration model in the variable (Achievement) is significant, as the (d) value of (2.5) is greater than (0.8), and this means that the effect of the independent variable on the achievement of third intermediate grade students was large and in favor of the experimental group who studied according to this variable.

Second: results Interpretation:

The research results related to the null hypothesis showed that the experimental group students who studied according to learning acceleration model were superior to control group students who studied according to the traditional method in the achievement test, and the researchers can attribute this to:

1. Teaching with the foursteps learning acceleration model (connection, activation, presentation, fixation) has an effect on the achievement of the third intermediate grade students, as it made the teaching process interesting and likable for the students.
2. The model created a cooperative learning environment among the female students, encouraging them to integrate with the school and raising the shyness factor.

Third: Conclusions:

The two researchers reached to the following most important conclusions:

1. Teaching mathematics using learning acceleration model helped to raise achievement level of third intermediate grade students.
2. The interaction and cooperation of the experimental group students (who studied according to learning acceleration model) is more than the interaction of the group that studied according to the traditional method.

Fourth: Recommendations:

1. Using learning acceleration model in teaching mathematics and moving away from the usual methods that focus on the teacher and ignore the learner.
2. Conducting training sessions illustrating how to use learning acceleration model.

Fifth: proposals:

For complementing this research, the two researchers suggest:

1. Conducting similar studies to the current study at different stages of study aimed at identifying the impact of learning acceleration model on achievement and pivotal thinking in mathematics.
2. Conducting a study similar to the current study to identify the impact of this model on other aspects of learning, such as developing lateral thinking, creative thinking and geometric thinking in mathematics.

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