



The Effect of a Training Program Based on High Impact Teaching Strategies (HITS) in The Teaching Practices of Mathematics Teachers

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Abstract

The current research aims to identify the effectiveness of a training program based on High Impact Teaching Strategies (HITS) in the teaching practices of mathematics teachers. The researcher used the experimental method and adopted the experimental design with two random groups (experimental and control) with a (pretest and posttest). The study sample consisted of (30) teachers, which are the new mathematics teachers for the first intermediate grade in the General Directorate of Education in Baghdad Governorate / Al-Rusafa Third. Moreover, the teaching practices observation card for mathematics teachers was also used, which consisted of three areas (planning, implementation, and evaluation). The research findings revealed a statistically significant difference between the two research groups (experimental and control) in favor of the experimental group in the variable of teaching practices.

Keywords: Training program, High Impact Teaching Strategies (HITS), Teaching practices.

Research problem

The teaching strategies used in education are an important factor in the success of the educational system. Thus, the use of these strategies incorrectly has become a problem for those in charge of the educational process, especially for new teachers. The researchers found that there is a weakness in the level of their teaching performance through the opinions of some supervisors. Besides, the semi-daily

discussions with many new teachers, including those who study the first intermediate grade, as well as the visit of some of them to their classrooms.

Given the schools of current reality, it can find that the new math teacher practices a set of teaching practices in the classroom that may be ineffective, including:

- 1- Most teachers use the same method in teaching students without taking into account their different abilities and needs.
- 2- Neglecting a large number of class students, their lack of involvement in the class contributes to making their role passive in it.
- 3- The Fear and unwillingness to use alternative strategies as a result of their poor knowledge of them and the mechanisms of their application.
- 4- Many teachers believe that the activities that require the use of alternative strategies create many problems.

Accordingly, the current stage needs to use teaching strategies that are recognized at the scientific level and that have an impact size higher than (0.40). Plus, these strategies are effective and successful in improving teaching practices, starting from planning the lesson and implementing it using appropriate teaching strategies, all the way to evaluation. Based on the foregoing, the research problem is summarized in the following question:

What is the effect of a training program based on high-impact teaching strategies (HITS) on the teaching practices of mathematics teachers?

Research importance

The importance of this study is reflected in the following two areas:

- Theoretical importance: –
 - 1- The first attempt in Iraq (within the researcher's knowledge) includes a training program for high-impact teaching strategies (HITS) for middle school mathematics teachers.
 - 2- The modern global trend is beginning to focus on these strategies because they have proved much more effective than other strategies as a result of the research and studies that have been conducted on them. Many studies have proven this scientifically, such as the study of (Marzano, 2007) and (Hattie, 2009), as well as the new teacher can use it as a bank of strategies to positively influence his students with a high percentage.
 - 3- These ten most effective strategies add a scientific wealth to teachers who have a long experience in teaching theoretical background and to their successful teaching practices in the classroom.

- Practical importance:

The practical aspect can affect the study goals through: -

- 1- Mathematics teachers for the first intermediate grade in developing their teaching practices, by employing the teaching strategies on which they are trained (HITS) in their teaching.
- 2- Educational leaders: This research presented a training program by (HITS) for mathematics for the middle stage, this could be an attempt to develop the teaching of mathematics in the Iraqi Ministry of Education.
- 3- Researchers: It is hoped that this research will contribute to opening new perspectives for researchers in the field of mathematics teaching, and to design similar experiments in different areas of mathematics teaching and different fields of science.

Research objective

The current research aims to: Identifying the impact of the training program on the teaching practices of mathematics teachers (trainees).

Research Hypothesis

In order to verify the research objective, the following null hypothesis is formulated:
The first null hypothesis: There is no statistically significant difference at the level of significance (0.05) between the average scores of the mathematics teachers of the experimental group who were subjected to the training program according to high-impact teaching strategies (HITS). Besides, the average scores of the control teacher for the mathematics teachers who did not subject to the training program in their teaching practices.

Research limits

- 1- Human limits: Mathematics teachers for the first intermediate grade who are affiliated with the General Directorate of Education of Baghdad Governorate / Al-Rusafa the Third.
- 2- Spatial limits: The General Directorate of Education in Baghdad, Rusafa the Third.
- 3- Objective limits: objective setting strategy, lesson structuring strategy, direct teaching strategy, solved examples strategy, cooperative learning strategy.

The term's definition

• The effect

- It can be defined as “the amount of change intended to be made in the dependent variable by doing what the independent variable causes on it” (Al-Saadoun: 2012, 22), while its
- Procedural defined by that change occurs in the teaching practices of mathematics teachers after they use high-impact teaching strategies (HITS).

•The training program

- (Gomez et al., 1998:63) defines it as "The process by which trainees are provided with skills that help them improve weaknesses in their performance". On the other hand, its procedural definition is the number of training sessions planned for a specific time and with specific goals according to high impact teaching strategies (HITS), targeting a sample of mathematics teachers for the first intermediate grade to introduce them to high impact teaching strategies (HITS) by training to develop their knowledge their skills and scientific trends.

•High Impact Teaching Strategies

- (DETM, 2017:5) noted that (HITS) can be expressed as “educational practices that reliably increase student learning wherever they are applied, obtained from the results of tens of thousands of studies of what has worked in classrooms across Australia and the world”. Procedurally: it is a set of strategies (defining goals, structuring lessons, direct teaching, solving examples, and cooperative learning) that the teachers of the experimental group have been trained on within the training program.

•Teaching Practices

- The teaching practices can be defined as "The activities and procedures carried out by the teacher in different educational situations, and they appear in professional patterns and behaviors through the role that he exercises when interacting with all the situation elements" (Al-Loah, 2012: 488). As for the procedural aspect: it is categorized as a set of teaching actions and behaviors performed by the mathematics teacher when planning, implementing and evaluating during the mathematics lesson for the first intermediate grade students in line with the teaching strategies (HITS).

Theoretical background

High Impact Teaching Strategies

Effective mathematics teaching begins when teachers have high expectations of students and believe that all students can learn mathematics. Along with using differentiated teaching practices and learning experiences (diverse) to meet student's individual learning needs. Besides, focusing on developing conceptual understanding, procedural fluency, skill development, and communication. and problem-solving skills. This includes the teachers' use of a variety of high-impact teaching strategies (Ontario, 2020:3).

Effect size and articulation point:

John Hattie developed a scale that would explain the effect size to be in line with the statistical method used in the meta-analyses, taking into account the sample size. (Hattie, 2009) defined the effect size as “a measure of the difference in the size of change on some variables between the experimental group and the control group after conducting the educational intervention, the effect size scale starts from the highest ($d > 0.40$). Furthermore, the medium ($d \leq 0.40$) and the low ($d \leq 0.10$), and the negative ($d < 0.00$). Meaning that any significant effect on the students’ academic achievement results in an effect size greater than (0.40) it is a high effect, anything whose effect is above zero is positive (Hattie, 2009: 17).

The following is a presentation of the strategies based on scientific indication and included in this research:

1- Setting Goals Strategy

Defining clear goals helps the teacher to clarify the vision and to employ the study material to achieve the goals required of it without neglecting some aspects that may be important. The effective teaching method is a means to achieve the goals of the lesson because of its positive effects on the nature of students’ thinking and increasing their academic achievement. In addition to their abilities to interact and communicate with each other, this, in turn, leads to personality development in their various aspects (Al-Mashhadani, 2011: 35). Similarly, (Hattie, 2009) found that the effect size of goal-setting strategy on the educational process in the classroom is (0.56), which is considered a high effect among the strategies (Hattie, 2009:164).

2- Structuring Lessons Strategy

One of the main ways to improve lessons is enhancing the focus of the teacher and students in the lesson. One of the important tasks of the teacher is to mobilize students to complete assigned tasks and achieve goals directly in the lesson. To do this, it is necessary to plan each lesson to provide the shortest way to achieve the goal that occurs in the classroom. first of all, determine the structure and content of the materials to be studied, the means, and methods of teaching. Further, the implementation of organizational clarity for each lesson from the first to the last minute provides students with the best learning opportunities through organizing, coordinating, and employing the efforts exerted (Al-Sasamah, 2006: 26).

3- Explicit Teaching Strategy

Direct teaching is a method with an organized method of teaching, and it has a significant impact on the design of the educational material content intended to be taught. However, its presentation is in a systematic, organized, and direct manner. This method is characterized by a sequence of steps and procedures (Al-Shammari, 2019: 26). (John Hattie 2009) found the effect of a direct teaching strategy

with a size of 0.59. As mentioned previously, any effect above (0.40) is a strong effect, therefore the direct teaching strategy has a strong effect on learning outcomes regardless of the learning environment and the class and students state (Hattie, 2009: 204).

4- Worked Examples Strategy

This strategy is based on providing students with educational instructions before practicing independently. A study by (Atkinson et al, 2000: 185) observed that learning through the strategy of worked examples is very effective and highly effective learning. So that students acquire a deeper understanding of the solution principles when they receive solved examples at the beginning of acquiring cognitive skills and using these principles to solve problems themselves. (Hattie, 2009) pointed out that the meta-analyses of the research showed that providing students with the worked examples strategy had a significant effect on students' learning and that the effect size of the worked examples strategy is (0.57) (Hattie, 2009: 172).

5- Collaborative Learning Strategy

The cooperative learning strategy depends on the teamwork that exists between the teacher and groups of students on the one hand, or between groups of students on each other. On the other hand, to learn the lesson, understand it, and communicate it to all students. Teaching based on the use of the cooperative learning strategy is a system based primarily on cooperation and individual responsibility in the first place. It requires a great deal of teamwork within a specific educational framework, intending to achieve a high-quality level of education, and at the same time, suitable for all students (Al-Shammari, 2019: 113). (Hattie, 2009) found the effect size of the cooperative learning strategy is (0.59) in the meta-analyses of the research when compared to individual work, and its effect is significant on students' achievement and learning (Hattie, 2009: 201).

The two researchers believe that these strategies answer the following important questions:

- Why does every teacher need several teaching strategies and not just one? and how can he lead the teaching to appear professional, distinguished, and effective?
- How does the teacher choose the appropriate strategy for a particular educational situation?
- How can the teacher reap the most fruits possible when using effective teaching strategies?

● Teaching practices

It is what the teacher accomplishes in the tasks of skills and competencies measurably. It is possible to measure the teacher's performance according to the objective observation form prepared for this purpose. Also, it's possible to measure the results of the teacher's performance by measuring the learner's performance, which is the outcome of effective teaching (Al-Fatlawi, 2003: 24 - 25). Teaching practices and skills are among the basic requirements for the teacher, and knowing these skills and acquiring them is among the priorities necessary to carry out his role fully and successfully. Since the development of the educational process depends mainly on the teacher and the nature of the skills that possesses, in addition to his ability to achieve educational goals (Jawamir, 2013: 318).

Principles of Teaching Practices

(Saada et al., 2006: 47) stated that there are seven principles or foundations upon which sound teaching practices are based. These principles are as follows:

1- Good practice encourages communication between the student and the teacher:

The constant communication between the student and teacher inside and outside the classroom is the most important factor in the student's motivation and participation. Besides, the teacher's interest in the students helps to enable them to overcome the difficulties in their academic path, in addition to urging them to work. Hence, it can be said that the student's knowledge of some teachers and their communication with them will support their intellectual commitment, and will encourage them to think about their own values, and their plans (Assaad, 2018: 28).

2- Good practice encourages students to cooperate:

Learning becomes stronger if it is the result of the efforts of an integrated team because working with others usually helps to engage more in learning. Likewise, the exchange of opinions and ideas, and responding to others' reactions helps to improve thinking and deepen understanding (Al-Saadawi, 2018: 58).

3- Good practice encourages active learning:

Students do not learn by just sitting in the classroom listening and receiving information only, but students should talk about what they learn and write about it. They should work to find the link between what they learn and their acquired experiences so that what they learned is applied to their daily lives (Khairy, 2018: 19).

4- The good practice provides students with immediate feedback:

Knowing what you know and what you do not know improves and directs the learning process. Generally, students need feedback related to their performance to benefit from the courses and to know their level of progress towards achieving learning outcomes. Moreover, Students also need help after the start of the study in evaluating their current knowledge and abilities (Nip and Zaccia, 2010: 119).

5- Good practice means adding time to effort (giving the time needed to achieve learning):

Effort and time are equal to learning, and there is no alternative to adding time to the effort to achieve learning, because the effective use of time and effort by teachers and students alike is the only guarantee for the success of learning, and the realistic distribution of time means the availability of effective learning for students (Barnes, 2016: 12).

6- Good practice gives high expectations:

High expectations are necessary for each individual, for weak students who do not want to stress themselves. As well as, for the distinguished and intelligent, and it is important to set high

expectations for student performance because this helps them try to achieve them (Connie and Brockhardt, 2014: 27).

7- A good practice that understands that intelligence is of several types and that students have different learning styles:

Students have different ways of learning, and there are multiple ways of learning, therefore sound teaching practices take into account diversity and difference (Ghayyad and Al-Shanjar, 2018: 38).

Teaching practice skills

The success of mathematics teachers in school is necessary and essential, and that is by using several skills that make the teaching process successful and effective, thus achieving the desired goals, and among the most prominent of these skills that (Zaytoun, 2007) referred to are:

- 1- Lesson planning (educational objectives, content analysis, lesson preparation, evaluation,.... etc.).
- 2- Implementation of the lesson (teaching style, lesson presentation skills, class questions, formulating (the art) of questions and directing them, arousing motivation, reinforcement, class skills, scientific activities, etc.).
- 3- Evaluation of the lesson ((tribal-diagnostic, constructive and final evaluation). (Zaitoun, 2007: 677)

Teaching practice evaluation

Evaluation of teaching practices should include all stages of transferring knowledge or skill from its source to transmitting it and training on it. Therefore, it includes:

- 1- Evaluation of the teacher's planning for the lesson (planning):

Evaluation at this stage focuses on determining the teacher's level, abilities, and skills in planning for teaching. This stage is of great importance, as it precedes the implementation of teaching, but rather is the guarantee for the success of teaching implementation as desired (Talafha, 2013: 170).

- 2- Teacher evaluation during teaching (implementation):

At this stage, the evaluation focus is on what the teacher does in the classroom and during his interaction with his students, and these are the most important stages of teacher evaluation in the light of which a judgment can be issued (Mazen, 2015: 178).

- 3- Teacher evaluation after teaching (evaluation):

At this stage, the evaluation focus is on the effects that the teacher left on his students, that mean the changes that this teacher was able to make in the students' behavior as a result of teaching, and

although this stage originally includes student evaluation, it represents an important indicator of the teacher's evaluation and judgment on his abilities and skills. (Sheer & Fung, 2007: 303).

Based on what was mentioned previously, the researchers believe that sound teaching practices emphasize:

- Using various methods with all students. Encourage them to exchange ideas with their peers in class, as well as provide students who do not have sufficient experience and knowledge with the information needed to meet this need.
- Urging the students, from the first lesson, to participate in activities that encourage them to become acquainted with each other. Using collaborative learning methods, students of different or different attainment are encouraged to exchange views on topics discussed in class.
- To show the students the time required for each stage of the lesson. Students are also expected to complete their scientific duties immediately, clearly transferring the minimum time required for students to prepare for the lesson and to work on their homework, while helping students set goals for their learning.
- Providing feedback to students immediately after completing the procedures for each step of the lesson. Also, provide students with exams and duties after correction and comment on them as soon as possible within a week of completion, giving students written comments about the weaknesses and strengths of scientific duties, and it is also preferable to discuss the results of class duties and examinations with students.

Research Methodology & Design:

The researchers used the experimental method and adopted the experimental design with two random groups (experimental and control) with a test (pre and post-test) for the teaching practices of mathematics teachers. The following Table shows the experimental design used in the research.

- Previous study

The previous study can be summarized as shown in Table 1

Table (1) *Studies that included teaching practices*

Seq.	Researcher name	Study Aim	Sample size	Most important result
1	Al-Ruwaili and Al-Harbi, 2018	The study aimed to know the reality of the teaching practices of mathematics teachers in the light of the theory of brain-based learning, and to know the effective mathematical	(90) male and female secondary school teachers divided between (50) male and	The study results showed that the average teaching practices of mathematics teachers in the light of the

		operations related to both sides of the right and left brain, and to find out whether there are statistically significant differences between the average teaching practices of mathematics teachers in the light of the theory of brain-based learning. It is attributed to the gender variable	(40) female teachers	theory of brain-based learning were low, as well as the absence of statistically significant differences between the average responses of the sample due to the gender variable
2	Bayoumi and Al-Gundi 2019	The study aimed to identify the reality of classroom teaching practices for primary school mathematics teachers in the light of contemporary professional standards for teaching and learning mathematics, and to find out whether there are statistically significant differences between the performance scores of these teachers due to the differences in academic qualification variables and years of teaching experience	From (24) primary school teachers	The study results showed that there were statistically significant differences at the level of significance (0.05) between the average teachers' performance due to the variable of academic qualification arranged as follows: Teachers' diploma, bachelor's, postgraduate studies. There were also statistically significant differences between the average teachers' performance scores due to the variable years of experience. Arranged as follows: 10 years and over, 5-10 years, less than 5 years

Table (2) *The experimental design of the research*

Group	Equivalence	Independent variable	Dependent variable	Research tools
Experimental	- Teaching practices	Training program	Teaching practices	Teaching Practice Observation Card
Control	- Supervisor evaluation - General characteristics of trainees	Without subjecting them to the training program		

Research procedures

- 1- Research community: It consists of all mathematics teachers for the first intermediate grade who belong to the General Directorate of Education in the province of Baghdad / Rusafa Third, for the academic year (2022 - 2021), and their number is (534) teachers.
- 2- The research sample: represents the new mathematics teachers for the first intermediate grade, as they were chosen randomly with the help of the Preparation and Training Department in the General Directorate of Education in Baghdad Governorate / Al-Rusafa Third. It consisted of (30) teachers using a simple random drawing method (Melhem, 2002: 249). (15) teachers were selected for the experimental group, and (15) teachers for the control group.
- 3- Equivalence of the two research groups: Although the random selection ensures equivalence between the experimental and control groups (Al-Batsh and Abu Zina, 2007: 274). In addition, the researchers were keen to equalize between the two research groups in several variables and other factors that they believe may affect in the experiment results with its interaction with the independent variable and its effect on the dependent variable, as shown in Table (3):

Table (3) *The arithmetic mean, standard deviation, and t-value of the equivalence variables*

Group		Variables		Significance at (0.05)
		Teaching Practices	Annual Supervisor Evaluation	
Experimental	Arithmetic mean	82.2	68.466	N.S
	Standard deviation	4.039	6.696	
Control	Arithmetic mean	80.866	68.20	
	Standard deviation	5.667	7.494	

	deviation			
t-value	Calculated	0.742	0.103	
	Tabular	2.048	2.048	

4- Controlling the extraneous variables: The researchers tried, as much as possible, to prevent or reduce the effect of the extraneous variables that affect the course of the experiment, in order to obtain accurate and objective results. The most important of these variables are:

- Selection of the sample members: the effect of this variable was controlled, as the two research groups (experimental and control) were chosen randomly.
- Measurement tool: the researcher was able to control this variable using an observation card for teaching practices.
- Experimental extinction: the members of the research sample (teachers) were not subjected to interruption or leave the training, as well as no official holiday occurred during the training period. As for the sample of students, the research sample students did not stop or leave attending school throughout the experiment duration.

Research requirements

1- Construction of the training program:

First stage: analysis and identification of training needs: The stage of analysis and identification of training needs is a basic entry point for training and a prerequisite for any training process.

Second stage: planning and designing the training program: In this stage, the structural formula of the training program is developed and what it should contain of educational objectives, scientific material, methods, activities, and training means, and this stage includes a series of sub-steps

Third stage: Implementation of the training program: The training program was implemented for mathematics teachers, the research sample in the Martyr Ali Hassan Al-Saadi Intermediate School for Boys, affiliated to the General Directorate of Education in Baghdad Governorate / Al-Rusafa Third, for a period of (5) days, starting from the date of Sunday 14/11/2021 until Thursday 18/11/2021, and its implementation took (22.5) hours of training over (5) days, at a rate of four and a half hours per day.

Fourth stage: Evaluating the training program: The evaluation process plays an important role in planning and implementing the training program, and ensuring the extent to which the objectives of the training program have been achieved. The methods of evaluating the training program varied between (pre-constructive and final).

2- Research tool

Observation card:

The observation card was prepared according to the following steps:

The following is a presentation of the steps for preparing an observation card for teaching practices:

a- Preparing the initial form of the card: The observation card was prepared as follows:

- Determining the card objective: The card aims to know the teaching practices of new mathematics teachers for the first intermediate grade, the research sample.
- Determining the card areas: Three areas (planning, implementation, and evaluation) have been identified for the observation card, and some indicators indicate it under each field.
- Correction of the observation card: the observation card in its initial form consisted of (63), the researcher adopted the 5-point Likert scale to measure the teaching practices in the indicators, and the ratings are (very high, high, medium, low, weak) as the quantitative ratings were determined by giving scores (1,2,3,4,5), respectively.

b- Validity of the observation card: to ensure the validity of the observation card, it was presented to a group of arbitrators and specialists in mathematics and its methods of teaching. The main aim of this test was to express their opinions and observations regarding the validity of the indicators. These indicators obtained an agreement percentage (80%) or more, and thus the observation card became in its final form out of (52) indicators, distributed among the three areas of teaching practices, and the degree obtained by the teacher is limited to (52-260) degrees.

c- Reliability of the observation card: to calculate the reliability, a supervisor and a teacher who hold graduate degrees in the methods of teaching mathematics with experience were used. The researcher briefed them on how to use the observation card and the method of recording measurements. Then, the researcher and the two observers collectively observed four of the new mathematics teachers for the first intermediate class affiliated with the Directorate of Education of Baghdad Rusafa Third, on Tuesday, 2/11/2021. The (Pearson correlation coefficient) was adopted (Sulaiman and Abu Allam, 2009: 582), as Table (4) shows the correlation coefficients between the two observers:

Table (4) *Correlation coefficients between the researcher and the observers according to the areas of the observation card*

Seq.	Areas	Correlation coefficient between the researcher and the first observer	Correlation coefficient between the researcher and the second observer	Correlation coefficient between the first and second observers
1	Lesson planning	0.922	0.908	0.909
2	Lesson Implementation	0.929	0.922	0.924
3	Lesson Evaluation	0.919	0.862	0.883

General correlation coefficient	0.928	0.922	0.924
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- d- The observation card in its final form: after the researchers determined the validity and reliability of the observation card for teaching practices, and thus the observation card was prepared in its final form and ready for application.

Experimental application procedures

After the two researchers obtained all official approvals, and in agreement with the Preparation and Training Department in the Baghdad Education Directorate / Rusafa Third, the place and time for implementing the training program were determined, the researcher followed the following steps to implement the research:

- 1- The two researchers met with the Department of Preparation and Training in the Baghdad Education Directorate / Al-Rusafa Third, to randomly select a sample of (30) new mathematics teachers (beginners).
- 2- The teachers were divided by simple random drawing into two groups of (15) teachers for the experimental group, and (15) teachers for the control group, and equivalence was conducted between the two groups in a number of variables on Sunday 5/9/2021.
- 3- The pre-application of the teaching practices observation card according to high-impact teaching strategies in teaching mathematics on the two research groups (experimental and control), who teach mathematics for the first intermediate grade on Wednesday 3/11/2021 until Thursday 11/11/2021, before implementing the training program.
- 4- Starting the implementation of the training program on Sunday 14/11/2021, until Thursday 18/11/2021.
- 5- After completing the training program, the teaching practices observation card was applied to the experimental and control sample groups, starting from Sunday 28/11/2021 until Thursday 6/1/2022.

Results

1. The purpose of the first null hypothesis, states that: "There is no statistically significant difference at the significance level (0.05) between the average scores of mathematics teachers of the experimental group who subjected to the training program according to high-impact teaching strategies (HITS), and the average scores of mathematics teachers Mathematics for the control group who did not subject to the training program in their teaching practices, as shown in Table (5):

Table (5) *Results of a t-test for two independent samples between the two research groups for the Teaching Practice Observation Card*

Area	Group	Number of teachers	Arithmetic mean	Standard deviation	Degree of freedom	t-test		Statistical significance
						Calculated	Tabular	
Planning	Experimental	15	52.400	1.723	28	48.731	2.048	S.
	Control	15	20.333	1.877				
Implementation	Experimental	15	161.200	4.857	28	69.169	2.048	S.
	Control	15	52.133	3.700				
Evaluation	Experimental	15	27.866	1.457	28	41.551	2.048	S.
	Control	15	8.533	1.060				
The card as a whole	Experimental	15	241.466	6.545	28	79.492	2.048	S.
	Control	15	81.000	4.276				

Effect size: In order to show the effect size, the researchers adopted Cohen's d equation, which reflects the effect size of the training program in the three areas (planning, implementation, and evaluation) of the teaching practices observation card. Table (6) shows the values of (d) and the effect size of the training program on the observation card for teaching practices as a whole and each of its sub-areas among the mathematics teachers in the research sample

Table (6) *The effect size of the training program on teaching practices*

Independent variable	Dependent variable	Value of (d) the effect size	Effect size
Training Program According to High Impact Teaching Strategies (HITS)	Planning	17.798722	S.
	Implementation	25.262004	S.
	Evaluation	15.174345	S.
	The card as a whole	29.026995	S.

Interpretation of results:

The results of the current research showed that there is a statistically significant difference between the two research groups (experimental and control) in favor of the experimental group in the variable of teaching practices with a large effect size. The researchers attribute this result to the following reasons:

- 1- The training program was constructed to suit the teacher's needs. Also, the subject of the training program is new and interesting for the teachers.
- 2- The researchers provided the appropriate training environment and prepared all the requirements, thus motivating the trainees to participate effectively.
- 3- The training program contained a variety of strategies, information, individual and group activities, a variety of theories, and the correlation between theoretical and practical information in the presentation of the training program.
- 4- The training program had a prominent role in providing teachers (trainees) with new information that they did not possess before.
- 5- The positive role of the experimental group trainees, through their active participation in individual and group training activities.

Conclusions

- 1- The training program based on High Impact Teaching Strategies (HITS) for mathematics teachers contributed to meeting their training needs.
- 2- Training mathematics teachers for the first intermediate grade to prepare and implement teaching plans according to the high impact teaching strategies (HITS), which contributed to raising the level of their teaching practices with a large impact.
- 3- The effect size of the training program according to the high impact teaching strategies (HITS) on all areas of the teaching practices observation card was large, as the area of implementation got the highest effect size, followed by planning and then evaluation.

Recommendations

- 1- Adopting the training program based on High Impact Teaching Strategies (HITS) in in-service mathematics teacher training programs, because of its positive impact on their teaching practices in the field of planning, implementation and evaluation of the lesson.
- 2- Attempting direct coordination between the preparation and training department, the supervisors of the specialization, school administrations, and teachers, to identify their training needs and professional preparations.
- 3- It is important and necessary to encourage teachers to attend the training courses prepared by the Preparation and Training Department.
- 4- The directorates of education must provide teachers with training packages that contain training programs with their literature, data, facts, and training materials.

- 5- The necessity of emphasizing the practical aspect of teaching strategies by writing plans and implementing them during training courses.

Suggestions

- 1- Testing the effectiveness of a training program according to high-impact teaching strategies (HITS) among student teachers (applicants) in improving professional readiness.
- 2- Researching the effectiveness of the current training program in other dependent variables such as the competencies of the knowledge economy or the development of creative teaching skills.
- 3- Conducting some research similar to the current research on mathematics teachers in the primary and preparatory stages to investigate the effectiveness of the training program.

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