

The Degree to Which Mathematics Teachers Employ Scientific Thinking Methods Among Secondary School Students in Theban District from Their Point of View

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Abstract

This study aims at identify The current study aimed to reveal the degree to which mathematics teachers employ scientific thinking methods for secondary school students in Theban District from their point of view. The available data included (85) male and female teachers, and the results indicated a low degree of mathematics teachers' use of scientific thinking methods among secondary school students in Theban District from their point of view in organizing ideas and in the field of thought processing, and it was medium in the field of interaction with ideas. The results also showed that there were no statistically significant differences in the low degree of mathematics teachers' use of scientific thinking methods among secondary school students in Theban District from their point of view, according to gender and years of service.

Keywords: scientific thinking methods, mathematics teachers

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INTRODUCTION

The rapid cognitive development and the openness of knowledge to information led to the emergence of challenges in the teaching-learning process, as the usual teaching strategies need to be developed and changed to correspond with the future skills that students need, especially thinking skills. Therefore, the teaching-learning process has to activate, revitalize and introduce modern techniques, strategies and methods in education. It is followed and applied in the educational situation to lead to effective learning and the achievement of the desired goals.

The development of teaching strategies is an important necessity, to reach the various desired educational outcomes, and to overcome the individualism that permeates the existing educational situation through the usual learning strategies, which are characterized by memorization and indoctrination, and directing the student's energy and ability to participate in the educational process effectively (Al-Rifai, 2012).

Employing modern teaching strategies in educational situations in the classroom is one of the modern roles of the teacher, as he works on directing and guiding his students, in order to change the student's role towards positive learning, and in order to create positive learning for the student, turning him from a recipient and listener to an active and active student, aware, capable of solving problems, and enjoying an effective activity in the educational process (Saada, Aqel, Al-Zamil, Ashtita, and Abu Arqoub, 2006)

The mathematics curriculum acquires a large and important role in the development of students' thinking skills, through which their ideas are organized, sequenced and how to apply them inside and outside the school so that science education acquires special importance in achieving the associated educational goals (Kapp, 2012) and through the formation of awareness and appreciation of science and its role in life They have, and their acquisition of the appropriate knowledge, skills and attitudes, building their knowledge, acquiring it, understanding it, retaining it and using it, developing them mentally, emotionally and skillfully, and integrating their personality in all its aspects (Abu Galala, 2007).

The main purpose of learning scientific thinking is to achieve a sequence of thinking among students and apply them according to a specific scientific research methodology. Also, these skills overlap and interact with each other through several processes; Previous experiences and observations allow the formation of hypotheses, and in turn, the hypotheses raise the need and desire for more experiences and observations that may lead to modifying or changing the proposed hypotheses (Zaytoun, 2008)

From the foregoing, it can be concluded that in recent decades the interest in using modern and different teaching strategies to develop thinking based on research and inquiry and to develop students' skills and abilities in learning has increased significantly due to the importance of education and the advancement of the educational process of learning and advancement (Hassan (2012), and for the sake of correct outcomes, And preparing a generation that possesses thinking skills and creativity in obtaining information, so teachers have to change their strategies and methods to develop scientific thinking skills away from stereotyping.

THE STUDY PROBLEM:

Modern teaching strategies and methods have gained great attention in various educational systems in the world

because of their impact on students and fulfilling their needs, characteristics and abilities. Teachers activate the skills of scientific thinking, and after reviewing the theoretical literature related to teaching strategies and methods of developing scientific thinking, and given their importance, which may have a role in developing the skills and levels of thinking of higher students, the study aimed to know the degree to which mathematics teachers employ scientific thinking methods among secondary school students in Theban Brigade from their point of view.

STUDY OBJECTIVE AND QUESTIONS:

The study aims at the degree to which mathematics teachers employ scientific thinking methods among secondary school students in Theban District from their point of view, by answering the following questions:

1. What is the degree to which mathematics teachers employ scientific thinking methods among secondary school students in Theban District from their point of view?
2. Are there statistically significant differences at the level ($\alpha = 0.05$) in the degree to which mathematics teachers employ scientific thinking methods among secondary school students in Theban District from their point of view due to the variables (gender, years of experience)?

THE IMPORTANCE OF STUDY:

The importance of the study was represented by the theoretical and scientific importance, its practical importance represented in helping mathematics teachers to use modern teaching strategies, methods of developing thinking in the educational process and changing the usual method of teaching in order to increase the effectiveness of teaching. A clear vision to include the mathematics curriculum in modern teaching strategies and methods, and methods of developing scientific thinking and contributing to changing the roles of the teacher and student in the teaching-learning process. The theoretical importance of this study is that it may contribute to presenting a vision for subsequent studies in this field, as it is considered an enrichment of educational literature and the provision of Arab and local libraries.

TERMINOLOGY OF STUDY:

For the purposes of the study, the terms of the procedural and conceptual study were defined, and they are defined as follows:

Scientific thinking: It is defined as “an organized mental activity based on evidence and proof that a person uses to address investigation situations for problems according to a sound and organized methodology within the scope of realistic mental axioms” (Al-Afoun and Abdel-Sahib, 2012).

SCIENTIFIC THINKING METHODS:

It is defined procedurally: it is the planned procedures and activities used by mathematics teachers in the classroom that contribute to the development of scientific thinking among students in the search for alternatives for hypotheses, clarifications, conclusions and ideas, and this was measured by the degree obtained by the sample members through their responses to the paragraphs of the study tool.

STUDY LIMITS: The current study was limited to mathematics teachers in public schools in the education of Theban District during the school year 2021-2022. **DETERMINANTS OF THE STUDY:** The results of the study were determined in the light of the validity of the tool that was adopted and the degree of its stability, and the results were determined in light of the respondents' honesty and objectivity when answering the paragraphs of the tool that was used in this study.

THEORETICAL LITERATURE:

This chapter deals with two domains: the first: Theoretical literature and the second: previous studies related to the subject of the study.

SCIENTIFIC THINKING:

The last decade of the last century witnessed important educational changes, as interest increased in making school curricula more thought-provoking, and education became concerned with stimulating students' thinking through questions, problem solving, discovery and scientific activities, and encouraging students in general to the thinking process through questions that challenge and provoke thinking and reduce Traditional questions that relate to situations, cases, or simple problems.

Students' acquisition of the skills of scientific thinking, observation, measurement, classification, and prediction should be a main goal for teaching mathematics, because the student needs those skills in his scientific activities and experiences, and in order for the student to achieve this, the teacher must possess the thinking skills, ways, means and strategies that help develop them in the student. (Al-Tamimi and Al-Khikani, 2018).

The concept of scientific thinking: It is “a cognitive activity that works to give meaning and significance to environmental stimuli through the cognitive environment to help the student adapt and adapt to environmental conditions” (Al-Atoum, Al-Jarrah, and Bishara, 2008). It is specific mental processes that we deliberately practice and use in processing information and data to achieve various educational goals ranging from remembering information, describing things, taking notes, predicting things, classifying things, evaluating evidence, solving problems, and reaching conclusions (Saada, 2018). The definition of scientific thinking is derived from the foregoing as the ability of students to practice mental processes through science processes

represented in observing, classifying, interpreting, analyzing, inferring, deducing and predicting information.

CHARACTERISTICS OF SCIENTIFIC THINKING:

Thinking is an evolving and developmental behavior that varies in its degree and levels from one age stage to another. Therefore, thinking is an evolutionary behavior that changes quantitatively and qualitatively and according to the growth of the individual and the accumulation of his experiences. There are many forms or patterns such as creative, critical, abstract and logical thinking. Effective thinking is the thinking that leads to the best meanings and information that can be extracted. Thinking is a relative concept. It does not make sense for an individual to reach the degree of perfection in thinking or to achieve and practice all types of thinking (Mazur, 2015) and form Thinking from the overlapping elements of the environment in which thinking takes place, the period of thought, the situation or the experience, and thinking occurs in different forms and patterns (verbal, symbolic, logical quantity, spatial and formal, each of which has a specificity (Al-Atoum, Al-Jarrah and Bishara, 2006).

CHARACTERISTICS OF SCIENTIFIC THINKING:

1. It is an indirect mental activity.
2. It is closely related to humans.
3. It stems from sensory experience and is not limited to it.
4. It denotes the personality as it is an organic and functional part of the environment.
5. Relationships between phenomena, things and events are reflected in a verbal and symbolic way (Abu Jalala, 2012).

FUNCTIONS OF SCIENTIFIC THINKING:

Al-Tamimi and Al-Khikani (2018) mentioned many functions of scientific thinking, including:

- Scientific thinking is based on understanding the phenomena surrounding humans in the environment.
- Scientific thinking solves various problems, both from the scientific and the life aspects.
- Giving things new meanings as the individual reveals secrets in the universe that he would not know and the properties of things he was ignorant of.

THE IMPORTANCE OF TEACHING SCIENTIFIC THINKING:

Helping students to consider different issues from the perspectives of others, evaluate the opinions of others in many cases and judge them with a clear degree of accuracy, respect the views, opinions and ideas of others, enhance the enjoyment of the learning process, raise self-esteem and increase self-confidence among students in the face of school skills and life, improving their level of achievement and encouraging them to take responsibility, as well as freeing students' minds and thinking from restrictions on answering correct questions and proposed solutions to the many problems they discuss and working to solve and mitigate them, that is, it enables students to consciously control their thinking and generate more solutions to the problems they feel (Al-Khaznadar, 2012, Al-Rawas, 2012)

Ibrahim (2012) mentioned the importance of thinking for students and teachers as follows:

1. The importance of teaching scientific thinking skills for students: respecting the views, opinions and ideas of others, enhancing and enjoying the learning process, raising the level of students' self-confidence and self-esteem, and liberating students' minds and thinking from restrictions on answering and proposed solutions to the many problems they discuss and work to alleviate Its severity, at least, is to be familiar with the importance of teamwork among students and to provoke their thinking, and how to learn and the ways and means that support it, in order to prepare for practical life after school, and to raise a good citizen for him.
- 2- Its importance for teachers: it is represented in helping them to become familiar with the various learning styles and taking this into account in the teaching-learning process, increasing the motivation, activity and vitality of teachers, and making the teaching process a process characterized by excitement, participation and cooperation between them and the students, and reducing the focus on the delivery process of the study material, because the students They enjoy various educational activities, raise the morale of teachers and their self-confidence, which is reflected positively on the performance of Azaria's desired knowledge, skills and attitudes. N & Amin, 2012.

PREVIOUS STUDIES:

Radwan (2014) conducted a study aimed at knowing the effect of survey and brainstorming strategies on developing creative thinking among tenth grade students who are studying the Islamic education course in the district district in Jordan. The study sample consisted of (41) tenth grade students, divided from Two groups in Fatima Al-Zahraa School for Girls, the control group consisted of (21) students, and the number of the experimental group was (21) students. The tenth grade, although these two strategies had an effective role in developing creative thinking in the Islamic education course, and the results concluded that there is no difference between using the investigation strategy or the brainstorming strategy in developing creative thinking for tenth grade students, and that these two The two strategies have an effective impact in the field of creative thinking in the field of Islamic education.

Saadeh (2018) conducted a study aimed at identifying the degree to which the science teacher at the basic

stage in the Governorate of Amman possesses the skills of using remedial teaching strategies. The study used the descriptive survey method, and the study sample consisted of (121) teachers and teachers in basic schools in Amman. Results: There are statistically significant differences between male and female teachers in the degree of their possession of the skills of using remedial teaching strategies and in favor of the academic qualification, and the differences were in favor of the teachers who hold a scientific qualification.

Atrous (2018) conducted a study aimed at verifying the effect of teaching using reading and metacognition on reading anxiety and motivation among female English language students. A female student and the control group (21) students, and to achieve the objectives of the study, a teaching program was built based on reading strategies and metacognition that consisted of (12) training sessions. The experimental group studied according to the program based on reading strategies and metacognition, and the results revealed statistically significant differences between the arithmetic circles for the response of female students on the scale of external motivation to read in English in favor of the experimental group.

Hajj (2018) conducted a study aimed at knowing the extent to which biology teachers use methods to develop scientific thinking among their students. The study was conducted in Iraq and used the descriptive approach, and the questionnaire was a tool for it. The study sample consisted of 0 31 biology teachers and teachers, and the results of the study showed that there are shortcomings The methods used by subject teachers to develop students' thinking, such as the method of research, investigation and exploration.

Qawasmeh and Syouf, (2017) conducted a study that aimed to know the effect of the computerized five-year learning cycle in acquiring scientific concepts and scientific thinking skills among fourth-grade students in the College of Islamic Education / American Program. A study of (48) fourth-grade male and female students divided into a control group and an experimental group, and the results showed that there were statistically significant differences in acquiring scientific concepts and scientific thinking skills in favor of the computerized five-cycle model strategy.

Alawa (2017) conducted a study aimed at revealing the extent to which some modern teaching strategies contribute to improving the teaching process from the point of view of secondary education teachers. (High Schools in the municipality of Ain Al-BaydaOum El Bouaghi during the academic year (2016/2017), and the study showed the following results: The cooperative learning strategy, the problem-solving strategy and the role-playing strategy contribute to a high degree in improving the teaching process from the point of view of secondary education teachers.

COMMENTING ON PREVIOUS STUDIES:

By reviewing previous studies, the following is noted:

Most of the studies that dealt with the topic of developing methods of scientific thinking skills emerged, which indicates the importance of the topic and its finding. The researcher also benefited from previous relevant studies, through her theoretical literature, research methodology, and the results that resulted from it. The current study differs from its predecessors in that it aims the degree to which mathematics teachers employ scientific thinking methods for secondary school students in Theban District from their point of view, and this is what a previous study did not address, according to the researcher's knowledge.

METHOD AND PROCEDURES:

RESEARCH METHODOLOGY: In this study, the descriptive survey method was used, due to its relevance to the nature of the study, and the questionnaire was used as a means of collecting data from the study sample members.

STUDY COMMUNITY: The study community consisted of mathematics teachers in Theban District, in the academic year 2021/2022, and their number was (98) male and female teachers.

THE STUDY SAMPLE: consisted of public school teachers in the education of the Dhiban Brigade, the sample included (30) teachers and (55) female teachers, totaling (85) and the table (1) shows the members of this sample by gender and years of experience.

TABLE NO. (1). DISTRIBUTION OF THE STUDY SAMPLE ACCORDING TO GENDER AND YEARS OF SERVICE

Variable	Level	Repetition
Gender	Male	30
	Female	55
	Total	85
Service years	Less than 5 years old	5
	From 6-10 years	63
	More than 11 years	17
	Total	85

STUDY TOOL: A questionnaire was developed to know the degree to which mathematics teachers employ scientific thinking methods for secondary school students in Theban District from their point of view, after reviewing the theoretical literature and referring to the studies, which consisted of four areas and (23)

paragraphs.

STUDY TOOL: A questionnaire was developed to know the degree to which mathematics teachers employ scientific thinking methods for secondary school students in Theban District from their point of view, after reviewing the theoretical literature and referring to previous studies with which the questionnaire in its initial form consisted of (27) paragraphs.

THE VERACITY OF THE TOOL: The instrument's veracity was verified by presenting it to a group of (10) arbitrators with expertise and competence.

THE STABILITY OF THE TOOL: To verify the stability of the tool, it was distributed in its final form to an exploratory sample from the study community and from outside its sample consisting of (30) managers, by giving them sequential numbers from (1-30), and after three weeks the questionnaire was applied to the same sample, According to the test-retest method, the Pearson correlation coefficient was calculated and it amounted to (0.83), and the reliability coefficient was calculated using the internal consistency method using Cronbach's alpha equation, and the internal consistency value was (0.80) for the resolution items, which is an acceptable value for the purposes of The current study.

STATISTICAL PROCESSING:

To answer the first question: Arithmetic means and standard deviations were extracted.

To answer the second question: t-test analysis and One Way Anova were used to extract differences.

Standard for judging arithmetic averages. In order to judge the value of the arithmetic averages within three categories: (high, medium, and low), the range was divided between the highest and lowest gradation of the resolution, which is (5 - 1 = 4) on the number of arithmetic average distribution categories: 1) - 2.59 (low) and (2.60) - 3.39 (medium). and (3.40-5 high).

PRESENTATION AND DISCUSSION OF THE RESULTS:

First: the results related to the first question, which states: What is the degree to which mathematics teachers employ scientific thinking methods for secondary school students in Theban District from their point of view?

THE FIRST DOMAIN: IDEA PROCESSING.

To answer this question, the arithmetic means and standard deviations were calculated and the rank was determined.

TABLE NO. (2) ARITHMETIC AVERAGES AND STANDARD DEVIATIONS OF ALL DOMAINS, ARRANGED IN DESCENDING ORDER.

Paragraph No.	Paragraphs	Arithmetic average	Standard deviation	Rank	Score
6	Encourage the students to identify the temporal and spatial dimensions of the problem	2.68	.50	1	Medium
7	Continuously informing students of the value of their ideas	2.63	.58	2	Medium
4	Encouraging students to discover different ways to reach the goal	2.62	.58	3	Medium
5	Giving immediate feedback to students to evaluate their work	2.56	.40	4	Medium
1	Urging the students to focus their thoughts on the problem under study	2.56	.39	5	Law
2	Encouraging students to extract the relationship between laws when studying	2.54	.39	6	Law
3	Directing students to infer possible outcomes of a problem	2.52	.58	7	Law
	Total score	2.57	.50	-	Law

Table (2) shows that the degree to which mathematics teachers employ scientific thinking methods for secondary school students in Theban District, from their point of view, for the field of ideas processing was low with an arithmetic mean (2.57) and a standard deviation (50.) The table indicates that paragraph (6) (I encourage the students to determine the temporal and spatial dimensions of the problem), in the first place, it ranked first, with an arithmetic mean (2.68), a standard deviation (.50) and a medium degree, and Paragraph (3) (students' faces to infer possible results for the problem.) ranked The latter has an arithmetic mean (2.57) and a standard deviation (.50).

THE SECOND DOMAIN: INTERACTION WITH IDEAS.

To answer the paragraphs related to this area, the arithmetic averages and standard deviations were calculated.

TABLE NO. (3) ARITHMETIC AVERAGES AND STANDARD DEVIATIONS OF THE FLUENCY DOMAIN, ARRANGED IN DESCENDING ORDER

Paragraph No.	Paragraphs	Arithmetic average	standard deviation	Rank	Score
15	Directing students to identify points of agreement and disagreement between ideas	2.65	.83	1	Medium
10	Encourage the students to make the necessary decisions to solve the problem	2.64	.83	2	medium
11	Encourage students to present evidence to solve the problem individually	2.61	.73	3	Medium
12	Encourage students to examine their different points of view	2.61	.75	4	Medium
13	Instruct the students to analyze the information and sort the task out of it	2.60	.70	5	Medium
14	Helping students distinguish between right and wrong ideas	2.54	.70	6	Low
	Total score	2.63	.58	-	Medium

The results in Table (3) showed that the degree to which mathematics teachers employ scientific thinking methods for secondary school students in Theban District from their point of view, as a whole, was average with an arithmetic average (2.63) and a standard deviation (.58), and the table showed that paragraph (15) Direct the students to identify points of agreement and disagreement between ideas. It ranked first, with an arithmetic mean (2.65) and a standard deviation (.83), with a medium degree, while Paragraph (14) ranked (help students distinguish between wrong and correct ideas.) in the rank. The latter has an arithmetic mean (2.54) and a standard deviation (.70) with a medium degree.

THE THIRD DOMAIN: ORGANIZING IDEAS.

To answer the paragraphs related to this area, the arithmetic averages and standard deviations were calculated.

TABLE NO. (4) ARITHMETIC AVERAGES AND STANDARD DEVIATIONS OF THE RISK AND CHALLENGE DOMAIN, ARRANGED IN DESCENDING ORDER

Paragraph No.	Paragraphs	Arithmetic average	standard deviation	Rank	Score
21	Determine for students the general frameworks for the lesson	2.67	.50	1	Medium
22	Direct the students to research the viewpoints of making the hypothesis	2.60	.57	2	Medium
19	Stimulate the students' minds by brainstorming to generate as many new ideas as possible	2.59	.54	3	Low
20	Instruct students to think about the positive and negative aspects of the ideas presented	2.59	.54	3	Low
23	Encouraging students to develop a plan to confront the problem that includes appropriate ideas and solutions	2.55	.54	5	Low
17	Taking into account individual differences among students when using various teaching strategies	2.55	.54	5	Low
18	Encouraging students to evaluate their ideas to adopt other ideas they need	2.54	.54	7	low
16	Use the questions to present the study material as problems	2.54	.54	7	Low
	Total score	2.54	.39	-	Low

The results in Table (4) showed that the degree to which mathematics teachers employ scientific thinking methods among secondary school students in Theban District, from their point of view as a whole, was weak with an arithmetic average(2.54) and a standard deviation (.39), and the table showed that paragraph (36) Which states (I accept failure as the experience that precedes success) ranked first, with an arithmetic average (2.67) and a standard deviation (.50) and a medium degree, while paragraph (16) (Use questions to present the study material in the form of problems.) ranked The latter has an arithmetic average (2.54) and a standard deviation (.53) with a weak degree.

SECOND, THE RESULTS OF THE SECOND QUESTION:

Results related to the second question: Are there statistically significant differences at the level ($\alpha = 0.05$) in the degree to which mathematics teachers employ scientific thinking methods among secondary school students in

Theban District from their point of view due to the variables (gender, years of experience)?

FIRST: THE GENDER VARIABLE:

Arithmetic averages and standard deviations were calculated, and the "T" test was extracted for independent samples of the answers of the same individuals. The degree to which mathematics teachers employ scientific thinking methods for secondary school students in Theban District from their point of view .

ACCORDING TO THE GENDER VARIABLE:

TABLE NO. (5) ILLUSTRATES THIS.

Gender	Number	Arithmetic average	Standard deviation	"T" value	Indication level
Male	30	2.88	.53	0.66	0.155
Female	55	5.56	.59		

The results in Table (5) indicate that there are no statistically significant differences at the significance level ($\alpha = 0.05$) in depending on the gender variable. In addition to the unavailability of a number of qualified trainers to give training courses to teachers in different ways: Also teachers follow the traditional methods of teaching.

According to the experience variable: The arithmetic averages and standard deviations of the estimates of the degree to which mathematics teachers employ scientific thinking methods for secondary school students in Theban District were calculated from their point of view, according to the variable of experience, and table (6) illustrates this.

Table No. (6) Arithmetic averages and standard deviations of estimates of the degree to which mathematics teachers employ scientific thinking methods for secondary school students in Theban District from their point of view according to the variable of experience.

TABLE NO. (6)

Domain	Experience	Number	Arithmetic average	Standard deviation
Ideas Processing	less than 5 years	5	2.46	.61
	From 6 to 10 years	63	2.52	.62
	more than 10 years	17	2.49	.55
Organizing ideas	less than 5 years	5	2.66	.57
	From 6 to 10 years	63	2.76	.59
	more than 10 years	17	2.64	.58
Interact with ideas	less than 5 years	5	2.57	.57
	From 6 to 10 years	63	2.68	.51
	more than 10 years	17	2.70	.48
Total score	less than 5 years	5	2.47	.48
	From 6 to 10 years	63	2.49	.58
	more than 10 years	17	2.49	.47

The results in Table (6) indicate that there are apparent differences between the arithmetic averages of the degree to which mathematics teachers employ scientific thinking methods for secondary school students in Theban District from their point of view, according to the variable of experience, as the owners of a category (from 6 to 10 years) and owners of a category (more than From 10 years) to the total score at the highest arithmetic mean of (2.49), followed by the owners of the category (less than 5 years), as their arithmetic mean reached (2.47), and to determine whether the differences between the means are statistically significant at the level ($\alpha = 0.05$) were Application mono contrast analysis of variance The results of the analysis of variance were as shown in Table (7).

The results of the arithmetic mono contrast analysis of variance test to the degree to which mathematics teachers employ scientific thinking methods among secondary school students in Theban District from their point of view, according to the variable of experience.

TABLE NO. (7)

Domain	Contrast source	total squares	average squares	Calculated 'F' value	Indication level
Ideas Processing	Between groups	.109	.054	.158	.83
	within groups	107.888	.345		
	Total	107.997			
Organizing ideas	Between groups	.937	.469	1.352	.39
	within groups	108.483	.347		
	Total	109.420			
Interact with ideas	Between groups	.521	.261	1.008	.39
	within groups	80.981	.259		
	Total	81.502			
	within groups	52.353	.167		
	Total	52.399			
Total score	Between groups	.008	.004	.016	.95
	within groups	82.678	.264		
	Total	82.686			

The results in Table (7) showed that there were no statistically significant differences at the level ($\alpha = 0.05$) of the degree to which mathematics teachers employ scientific thinking methods for secondary school students in Theban District from their point of view, according to the variable of experience.

RECOMMENDATIONS:

1. Directing mathematics teachers and preparers of mathematics teacher preparation programs to use modern teaching strategies.
2. Introducing mathematics teachers in different academic levels to the importance of using different scientific thinking because of its effective role in developing students' skills and abilities in analysis, thinking, classification, organization and interaction with ideas
3. Conducting experimental and quasi-experimental studies that measure the degree of students' use of scientific thinking methods in the mathematics course.

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