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The Effect of Using Concept Maps and Brainstorming Strategies to Develop Creative Thinking Skills Among Students of Islamic Culture at Al-Hussein Bin Talal University

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Abstract: This study aims at determining the effect of using concept maps and brainstorming strategies to develop creative thinking skills among students of Islamic culture at Al-Hussein Bin Talal University**.** To achieve this, the research adopted the quasi-experimental method to reach the final results. The study population consisted of (477) male and female students who studied the Islamic Culture at Al-Hussein Bin Talal University for the academic year 2021/2022. An intentional sample of (130) male and female students who study the subject in the second semester was selected. The researchers prepared two scientific tools for the educational topic, the first was an educational unit from the Islamic Culture study plan, which is the unit of (Fasting), prepared according to the strategies of concept maps and brainstorming; and the second is a creative thinking test tool to measure the impact of the two teaching strategies. The results showed that there were statistically significant differences in the creative thinking test attributed to the teaching strategies, in favor of brainstorming compared to the traditional method and the concept maps. The results also showed that there were differences attributed to the concept maps strategy compared to the traditional method. Moreover, the results showed that there were no statistically significant differences between the performance arithmetic averages of the three study groups (the concept maps, the brainstorming, and the traditional method) attributed to the interaction between the strategy and gender variables on the creative thinking test.

Keywords: Concept mapping strategy, brainstorming strategy, Islamic culture, creative thinking, Al-Hussein Bin Talal University.

1. Introduction

The processes of teaching and learning began with man since his existence. Until recently, it was the teacher's responsibility to deliver information to the learner through spoon-feeding education and then the learner memorizes it without being fully aware of its logic and consistency, except to the extent of his interaction with it. In the modern age, education tends to take care of the learner and his interests. Nowadays, the education process utilizes what modern knowledge has reached by practical and experimental research in the field of education and psychology, which emphasizes the importance of the learner and the need to take care of his interests, contrary to what was known in the past that the learner only receives information and stores it in memory.

The subject of Islamic Culture is one of the university's elective subjects. And because it is related to the student's life, and contributes to building his personality, values, and tendencies, it is necessary to adopt teaching strategies that stem from suspense and persuasion. This can only be done by using strategies of developing thinking about the subject of the lesson, and by making the questions students ask the main focus for the class. A professionally and academically qualified teacher will not be incapable of finding a way that links what is required in the subject of Islamic Culture and what the learners want to reach [1].

In order to shift the teaching of Islamic Culture from the traditional concept, in which the learner is a receiver of information, to the modern concept, in which the learner is the focus of the educational process, effective strategies must be used that enable the learner to follow effective procedures. Since the teaching profession requires knowledge based on instinct and training, and the most difficult thing about it is to confront the learners in the classroom, extensive knowledge of teaching methods, and various learning strategies, and the ability to use them undoubtedly helps in knowing the appropriate teaching conditions to be applied. Thus, the learning process becomes interesting and enjoyable for students, appropriate to their abilities, and closely related to their daily life, interests, needs, desires, and future aspirations [2].

Some educational studies and conferences indicate the necessity of using effective strategies in teaching Islamic Education

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subjects, and not to be restricted to one strategy throughout the course of the educational process [3,4].

Among these strategies is the concept maps strategy which is based on a solid psychology and an extension of Ausubel's theory of meaningful learning. The concept maps are credited to Novak. They appeared within the learning process based on the absorption theory. This process was known as the constructivist process, in which the learner retains previous situations for use and links them to new ones [5].

[6] defined the concept maps as a graphic tool that represents a group of related concepts in a hierarchical manner from the most general to the least abstract, according to Ausubel's theory, and is concerned with linking these concepts with lines so that meaningful words are written on them.

Concept maps develop thinking skills by organizing concepts according to cognitive consistency in the learner's cognitive structure [7].

Among the strategies that studies have proven effective in developing creative thinking skills is the brainstorming strategy, which was invented by Osborne in 1941 and widely spread after that. The brainstorming session is based on the spontaneous production of ideas with freedom from factors that hinder their fluidity. Many experts in the fields of education, commerce, industry and politics in institutions and departments that follow the findings of research and practical studies rely on the method of brainstorming to stimulate different thinking processes, and it involves creative treatment of the complex problems they face in the completion of their development projects [8].

Research Hypotheses

1. There are no statistically significant differences at the significance level ($\alpha \leq 0.05$**)** in the development of creative thinking among students of Islamic Culture at Al-Hussein Bin Talal University attributed to the teaching method (concept maps, brainstorming, the traditional method).
2. There are no statistically significant differences at the significance level ($\alpha \leq 0.05$**)** in the development of creative thinking among students of Islamic Culture at Al-Hussein Bin Talal University attributed to the interaction between method and gender.

Research Problem

Using the appropriate teaching strategy has a crucial effect on the educational process. Several theories and strategies have been put forward targeting the teaching/learning processes. Hence, this study came to determine the effect of using concept map and brainstorming strategies on developing creative thinking skills among Islamic education students at Al-Hussein Bin Talal University, compared to the traditional method. Accordingly, the problem of the study is represented in the following main question:

What is the effect of using concept maps and brainstorming on developing creative thinking skills among students of Islamic Culture at Al-Hussein Bin Talal University?

Research Questions

1. *Are there differences between using concept maps strategy and the brainstorming strategy in developing creative thinking skills among students of Islamic Culture at Al-Hussein Bin Talal University compared with the traditional method attributed to the teaching strategy?*
2. *Are there statistically significant differences in the development of creative thinking skills among students of Islamic Culture at Al-Hussein Bin Talal University attributed to the interaction between strategy and gender?*

Research Objectives

1. Preparing an educational unit according to the strategy of concept maps and brainstorming.
2. Preparing a test of creative thinking, vocabulary form (A).
3. Determining the impact of concept maps and brainstorming on developing creative thinking.

Research Importance

1. Informing teachers of Islamic Culture about the importance of using the concept mapping and brainstorming strategy, which may result in activating the educational / learning process and contributes to the development of creative thinking among students.

2. It may help teachers of Islamic Culture to generalize these strategies to other Islamic Education subjects.
3. Paving the way for those interested and for educational researchers to conduct subsequent studies on other study subjects in order to develop creative thinking in Jordan.

Research Boundaries

1. Students of Islamic Culture subject. Six sections from the total sections taught in the year 2021/2022 were adopted, three for male students and three for females.
2. The unit of Jurisprudence of Fasting (Fiqh Al-Sawm) for the students of Islamic Culture at Al-Hussein Bin Talal University for the academic year 2021/2022.
3. The creative thinking test prepared by the researchers and its psychometric properties.

Procedural Definitions

Concept maps: a teaching strategy that prepares the unit of Fasting in Islamic Culture by arranging the concepts in descending order according to their comprehensiveness, determining the relationships between them, and arranging them in a hierarchical manner so that the most comprehensive and generally concepts are placed at the top of the pyramid, then the less general concepts fall under them. The related or interrelated concepts are linked to each other by lines written on each of them the phrase that shows the relationship between each two concepts.

Brainstorming: a teaching strategy in which learning takes place through interaction between the teacher and the learner, and between the learners themselves. In this strategy, specific problems of fasting are presented to the students, and they are given a chance to compete and express opinions and build them in a scientific manner in order to obtain as many ideas as possible from the group of participating students, within a short period. Then the correct ideas are extract and written on the board, so that the elements of the topic are completed. Then the ideas are linked to Quranic Verses and Prophetic Hadiths.

Creative Thinking: the learner's ability to produce something new, or to reach new solutions to the problems he faces, or the mark that the student achieves in the creative thinking skills scale.

Traditional Method: a series of procedures carried out by the teacher in the classroom, in which he uses instructing and oral discussion with limited use of questions. The teacher sets the examples in order to confirm the cognitive outcomes. The students receive scientific knowledge from the teacher without having a role in reaching it. The teacher's concern is that his students memorize scientific knowledge.

Islamic Culture: one of the university elective courses for all disciplines at Al-Hussein Bin Talal University.

2. Theoretical Framework and Previous Studies

2.1 Theoretical Framework

[6] define concept maps as “a graphic tool that includes the concepts of the subject to be studied and their hierarchical arrangement from most general to least general.”

While [9] defines it as “an educational strategy for building, organizing and teaching school subjects, and it is an educational application of Ausubel's theory of meaningful learning.”

The researchers can define concept maps as “a teaching strategy through which concepts are organized hierarchically from the most general to the least general, using appropriate connecting lines and words that show the relationship between those concepts.”

The importance of concept maps as a teaching strategy stems from the fact that it facilitates students' learning and helps them understand the structure of knowledge and its relationships. It also helps them distinguish between the basic concepts that make up the cognitive structure and the relationships between its concepts and helps them increase attention to the task in question. As it works to organize concepts in a hierarchical manner, which leads to changing the passive role of the teacher [10].

[6,11] point out that the importance of concept maps is summarized in that they help students to comprehend information that has meaningful relationships, they help students remember and retrieve information, and they contribute to increasing students' attention to the task in question. Concept maps arrange concepts in a hierarchical and sequential manner and take into account individual differences among students.

The ideas presented by Ausubel in his theory of cognitive learning are the basic basis for the proposed formulas for designing concept maps, so they are designed according to the following criteria [6,12].

1. Hierarchical structure: the cognitive structure of the learner is organized in a hierarchical manner. The more general and comprehensive concepts and relationships are on top of this structure. Then followed by concepts and relationships that are less comprehensive, then the least comprehensive and more specific.
2. Progressive differentiation: meaningful learning is an ongoing process in which new concepts gain more meanings as new relationships (issue-specific links) are acquired. Accordingly, concepts are never fully learned, but are always elaborated, modified, clarified, and become more comprehensive the more advanced their distinction is.
3. Integrative reconciliation: meaningful learning thrives when the learner perceives new relationships (conceptual connections) between interrelated sets of concepts or issues.

The steps for building concept maps can be stated as follows:

1. Determining the topic to be taught.
2. Extracting the concepts after reading the topic.
3. Presenting the concepts on the board, on the projector, or on the computer.
4. Arranging the concepts from general to specific.
5. Using the arrangement as a guide to construct concept maps in the form of a vertical line.
6. Connecting concepts with lines after placing them in squares and shapes.
7. Writing appropriate words on the lines to describe the relationship between the concepts.
8. Modifying concept maps in light of the feedback from the learners.
9. Giving the learners enough time to read concept maps and extract ideas from them in order to conduct a final evaluation to make sure that they are organized and arranged and that the learners understand them [5].

It is worth noting that conceptual maps, as pointed out by [6] can be represented in any field of knowledge. This confirms the possibility of representing concept maps in the Islamic Culture subject, where the Islamic concepts are characterized by the many interrelated relationships between them. There is an interrelated relationship between the concepts of belief, such as believing in Allah Almighty and the Messengers; between moral concepts such as honesty, trustworthiness, and modesty; between the jurisprudential concepts such as the obligatory, the permissible, the disliked, the forbidden, and the Sunnah; between the concepts of worship such as prayer, and fasting; between the concepts of transactions such as deposit, exchanging, and selling; between the concepts of foods and drinks such as the dead (non-slaughtered) and blood; and between social concepts such as divorce, marriage, and custody [1].

As for brainstorming, it is credited to Osborn in the 1930s, who used this term to describe a group of people sitting around a round table and exchanging ideas [13].

Osborn (1955) laid down the rules and principles regulating how to conduct brainstorming. He began using this strategy at the Creative Education Foundation, which he founded, and in 1955 he established the first institute for creative problem solving. In (1963) Barnes made further modifications and development in an attempt to lay the theoretical basis for the brainstorming method [14].

[15] considers brainstorming one of the most used methods in preparing creativity and creative problem solving in many fields, institutions and departments that adopt the findings of research and scientific studies in addressing the complex problems they face. Brainstorming means "the use of the mind in an active response to the problem. The main purpose of the brainstorming session is to generate a list of ideas that can lead to solving the problem in question."

[13] defines brainstorming as “means of obtaining a large number of ideas from a group of individuals in a short time.”

[16] defines it as “one of the collective learning strategies that aims at eliciting the largest possible number of ideas from learners, initially regardless of how they are elicited, without logic governing the eliciting of these ideas and without any evaluation of the ideas during their elicitation.”

The researchers define brainstorming as “a teaching strategy utilized to stimulate the mind in order to generate creative ideas about the topic under discussion.”

The brainstorming method is based on principles, the most important of which is postponing any judgment on the ideas presented during the first stage of the brainstorming process; quantity generates quality, meaning that the large number

of ideas of the usual type can be a prelude to reaching valuable or unusual ideas at a later stage in the brainstorming process; excluding any kind of criticism or evaluation, it is not permissible to criticize the ideas shared by team members or one of the students, whatever they are, this is in line with the first principle; freedom of thought, whereby participants are encouraged to give as many ideas as possible, regardless of their type, as long as they are related to the topic of the problem under discussion; focusing on the number of ideas, the more ideas put forward the more likely it is that more original ideas will emerge; and the ideas presented belong to everyone, as any member of the participants can combine two or more ideas, improve an idea, or modify it by deleting or adding. [14,15]

The brainstorming process goes through several stages, including defining the topic being discussed and explaining its rules, distributing the participants in small groups and providing them with paper sheets and pens and the appropriate place for the brainstorming session. The brainstorming process begins with writing down ideas and sentences as they are. Then comes the process of crossing out words and ideas far from the original topic. Next, combining similar ideas. After that, summarizing the ideas again on a board. Finally, discussing the ideas in their final form [17].

The most important elements of the brainstorming process success lie in the clarity of the problem in question among the participants and the activity leader; the clarity of the principles and rules of work and adherence to them by all; and the experience of the teacher or activity leader and his confidence and faith in the brainstorming method as one of the cognitive trends in stimulating creativity [15].

As for the steps of teaching according to brainstorming, the brainstorming session goes through several steps, including:

1. Asking a proposed question with the opportunity to generate as many ideas as possible.
2. The question is placed in a circle or a square, from which arrows for answers or ideas come out.
3. Answers or ideas are not evaluated as they are elicited.
4. Each group presents what they have accomplished in front of the other groups.
5. Learners record those ideas or answers.
6. Any idea can be discussed in the same way as the one before, and so on.
7. This method is suitable for all age groups [16].

As for creative thinking, most researchers and educators agree that the development of thinking is one of the main objectives of the education process, and that memorizing study materials does not necessarily lead to the development of thinking skills. They also stressed the importance of nurturing creativity in its early stages, because early experiences in creative thinking help on how to use mental abilities in the field of differentiated thinking and creative problem solving [15].

In terms of terminology, the definitions of creativity and its nature have varied. There are many definitions proposed by researchers and they have been classified by [18] in four main aspects:

1. The first aspect: the concept of creativity based on production. There have been many definitions of the concept of creativity within this aspect. Among those who defined creativity within this framework, Piers and Stein, as Piers says, “it is the ability to avoid the normal routine and the usual ways of thinking with new and uncommon production that can be implemented and achieved”. Stein defines creativity as “the ability to produce something new, acceptable and useful that achieves the satisfaction of a large group of individuals in a limited period of time” [19].
2. The second aspect: creativity is the characteristic of the creative personality. The concept of creativity comes within this aspect through Guilford's definition of creativity, referred to in [20]; where he says it is “the thinking in an open framework, from which production is characterized by a unique feature, which is the multiplicity of answers provided that are not limited by the information and ideas presented.”
3. The third aspect: the concept of creativity as a process. Torrance defined creativity within this framework by saying “it is the process of realizing change, the imbalance in information, and missing elements; searching for evidences and indicators in the situation; setting hypotheses about those evidences and indicators in the situation; testing them and linking the results; re-testing and conducting the appropriate modifications; then re-testing again to reach the various results and present them to others” [21].
4. The fourth aspect: the concept of creativity based on the creative situation. This means all the different circumstances, factors and situations that help to develop creative abilities. The circumstances are divided into two parts:
   i. General circumstances: related to society and its culture in a general.
   ii. Special circumstances: related to the school curricula, and it helps teachers, principals, supervisors and educators

to provide the conditions for the development of creativity and creative thinking among learners [19].

Creativity includes a set of sub-mental abilities as follows:

1. Fluency: includes the quantitative aspect of creativity, and it means the ability of the individual to produce the largest possible number of ideas and answers in a specific unit of time. It is measured by the number of responses and the speed of their issuance.
2. Flexibility: represents the qualitative aspect of creativity, and it means the individual's ability to diversify the ideas that he comes up with according to the situation he is exposed to. The learner with flexible thinking is able to change where necessary.
3. Originality: means the individual's ability to produce the largest possible number of uncommon and skilled ideas, or ideas that have distant links to the situation he is exposed to and are appropriate to the nature of the presented problem [22].

Based on the above, creativity can be defined as "presenting a set of data about a specific reality to the individual, so that the individual presents unfamiliar ideas or opinions characterized by fluency, flexibility, and originality."

[12] believes that there are scientific methods and activities that contribute to the development of creative thinking, including giving learners the opportunity to complete tasks and scientific activities that require creative decisions; respecting the learners' questions and their scientific ideas; using different methods in teaching which makes mental abilities a target for the educational process; giving learners homework that require the use of different mental abilities in research and creative thinking; encouraging learners to be free to express their scientific ideas and feelings; encouraging teamwork; and providing opportunities for self-learning and appreciating it.

2.2 Previous Studies

[3] conducted a study aimed at developing creative thinking skills among talented tenth grade students in King Abdullah II Schools for Excellence, through the application of a program based on the use of conceptual maps in teaching. The study used the quasi-experimental approach, and it was applied to a sample of 86 male and female students who were distributed into two groups, experimental group (43 students) and control group (43 students). Torrance's creative thinking test was used, and the program was applied only to the students of the experimental group. The results revealed that there were statistically significant differences between the responses averages of the experimental and control groups in the post-application in favor of the experimental group, and there were no differences between the averages of the experimental group members in the post and follow-up applications.

[23] aimed at identifying the effect of using the concept mapping strategy in developing creative reading skills in the English language among first-year secondary students. To achieve the objective of the study, the quasi-experimental approach was applied to an intentional sample of first-year secondary students from Ibn Al-Ameed Secondary School in Tabuk. Two classes were chosen and distributed randomly. The first class represented the experimental group, which studied a selected unit using the concept maps strategy. While the second class represented the control group, which studied in the usual way. The results of the study found that there were statistically significant differences between the averages of the experimental and control groups in the post-application of creative reading skills testing in fluency, flexibility, and originality skills in favor of the experimental group students. Thus, there was a significant effect on the fluency and flexibility skills, while the effect was moderate in the originality skill.

[24] conducted a study aimed at determining the effect of using the brainstorming method on developing creative thinking in the subject of Islamic culture among a sample of students in the third scientific secondary grade in the city of Tabuk. The study sample consisted of (100) male and female students from Tabuk government schools, one for males and the other for females. Two classes were selected from each school, with (25) male and female students for each class. The four classes were divided into two groups, experimental and control. The researcher applied the Torrance test for creative thinking on the four classes. The results of the study showed that there were statistically significant differences between the averages of the study groups in creative thinking attributed to the teaching strategy and there were no statistically significant differences attributed to the interaction between the method and gender.

3. Research Methodology and Procedures

The research adopted the quasi-experimental approach and proceeded according to the following procedures:

1. Obtaining approval from the Department of Islamic Studies to implement the study to students of Islamic Culture.

2. Meeting with the teachers of Islamic Culture, to agree on the implementation of the study. And meeting with the students, where the researchers informed the students that this study is for scientific research purposes, and that marks will not be counted for it in the academic subject (Islamic Culture/Islamic Studies Department). The researchers also clarified the concept, purpose, procedures, and steps of these strategies, and specified the necessary lectures to be given according to the new strategies.
3. Selecting the classes on which the study will be implemented randomly. Male students were divided into three groups; first experimental group studied using the concept mapping strategy, a second experimental group studied using the brainstorming strategy, and a control group studied in the traditional way. Female students were divided in the same way.
4. The researchers prepared the items of the creative thinking test in Islamic Culture according to the Torrance test of creative thinking and presented it to a group of arbitrators to verify its validity.
5. Preparing educational materials, which included the unit of Fasting in the subject of Islamic Culture and presenting them to a group of specialists.
6. Conducting a creative thinking test on an exploratory sample consisting of (19) male and (17) female students from outside the study sample, with the aim of verifying the stability of the study tool and determining the time it takes for students to answer the test.
7. Giving an initial lecture to the students of each of the first experimental groups (concept maps strategy), in order to clarify the general ideas of this strategy with examples and assigning them to prepare concept maps for the lessons that will be given according to this strategy so that the students interact during the lecture with the educational material. And giving another lecture for the second experimental groups (brainstorming strategy), in order to clarify the general ideas of this strategy with examples. This is done with the assistance of the subject teacher in distributing the students and carrying out the procedures for presence and absence and monitoring during the application of the study.
8. The researchers taught the study groups according to the previously mentioned distributions two lectures per week for each group. The experiment continued for a month and a half, starting from March 9, 2022.
9. The test prepared according to Torrance test for creative thinking was conducted for the three groups immediately after the end of the experiment, to ascertain the effect of the interaction between the strategy and gender in developing creative thinking skills.
10. Students' answers to the test were corrected according to the correction instructions.
11. The data were entered into the computer for analysis and results.

3.1 Research Sample Members

The research sample members consisted of (130) students of Islamic Culture, (65) male students and (65) female students. The sample members were chosen in an intentional way, who were the students of the Islamic Culture classes. This facilitates the study procedures, and since the students of Al-Hussein Bin Talal University are similar to the students of the surrounding universities, it can be ensured that the study sample is composed of different population groups as shown in Table (1).

Table 1: Distribution of the research sample into groups

Study groups	Male	Female	Total
Experimental (concept maps)	23	22	45
Experimental (brainstorming)	21	23	44
Traditional way	21	20	41
Total	65	65	130

3.2 Research Tools

The research relied on the following tools:

1. Educational materials: After reviewing the theoretical literature of the concept mapping and brainstorming strategies, the researchers prepared an educational unit of Islamic Culture, which is the Fasting unit according to the concept mapping and brainstorming strategies.
2. Creative thinking test-vocabulary form (A). The researchers prepared a creative thinking test in Islamic Culture similar

to Torrance test for creative thinking. The prepared test consisted of seven sub-tests: *Asking*, *Guessing Causes*, *Guessing Consequences*, *Product Improvement*, *Unusual Uses*, *Unusual Questions*, and *Just Suppose*. Where the first three sub-tests depend on the image installed at the beginning of the test, which is a picture of a family sitting at the *Iftar* table in Ramadan. As for the rest of the sub-tests, it depends on what is presented at the beginning of the test. The researchers prepared the test after reviewing the theoretical literature on Torrance test for creative thinking.

Validity of the Educational Material

The researchers designed the *Fasting* unit according to the concept mapping and brainstorming strategies. The tool was presented to specialized arbitrators, and all the opinions of the arbitrators were taken into consideration, as most of them focused on linguistic proofreading and integrating some of the outputs.

Test validity

To determine the validity of the test prepared by the researchers, it was presented to a group of (9) arbitrators. The arbitrators included university professors specializing in Islamic education teaching methods, social studies, measurement and evaluation. They also included educational supervisors and teachers who hold a master's degree in education. The arbitrators' comments were related to phrasing, the appropriateness of the test items to their intended purpose and changing of the last item.

In light of the opinions and suggestions of the arbitrators, some changes were made in the phrasing of the test paragraphs, and the last paragraph was changed, and thus the test became in its final form.

Test reliability

The researchers prepared a test for creative thinking in Islamic culture according to the Torrance Test for Creative Thinking Vocabulary Form (A). The reliability of the test was verified by applying it to an exploratory sample from outside the study sample, consisting of (36) male and female students. The aim of this experiment on the exploratory sample was to ensure the clarity of the test items, and to determine the time required by students to finish the test. Test reliability was confirmed with the concept of internal consistency and the use of the Cronbach' alpha formula, where the reliability coefficient was (0.71).

3.3 Research Variables

1. **Independent variables**
    i. **Teaching method:** concept maps, brainstorming, and the traditional method.
    ii. **Gender:** male, female
2. **Dependent variable:**
    i. **Creative thinking**

Statistical Processing

Data were entered into the computer using the statistical program (SPSS) and analyzed to extract the arithmetic averages, and the standard deviations of the performance of the research sample members on the creative thinking test. The Tow-way ANCOVA was used to investigate the significance of differences on the levels of creative thinking combined. The researchers used the LSD test for post-hoc comparisons.

4. Research Results and Discussion

This part deals with a presentation and discussion of the results of the research, which aimed to determine the effect of using conceptual maps and brainstorming in developing creative thinking among students of Islamic studies in the subject of Islamic culture at Al-Hussein Bin Talal University, through answering the following two questions:

1. *Are there differences between using concept maps strategy and the brainstorming strategy in developing creative thinking skills among students of Islamic Culture at Al-Hussein Bin Talal University compared with the traditional method attributed to the teaching strategy?*

4.1 The research results and discussion related to the first question:

To answer this question, the researchers calculated the arithmetic averages and standard deviations of the performance of the three study groups on the creative thinking test. Table (2) illustrates this:

Table 2: Arithmetic averages and standard deviations of the study groups' performance on the creative thinking test.

Strategy	Number	Total score	Arithmetic average	Standard deviation
Traditional	41	42	22.45	2.07
Brainstorming	44		30.66	1.05
Concept maps	45		24.17	4.10

Table (2) indicates that the arithmetic average of the group that learned using the brainstorming strategy was the highest in the total number of creative thinking skills, reaching (30.66). The arithmetic average of the group that learned using the concept maps strategy came in second place (24.17), while the arithmetic mean of the group that learned according to the traditional method was (22.45). To determine whether the differences between the averages of the three study groups are statistically significant at the level of significance ($\alpha = 0.05$), the researchers applied the Two-way ANCOVA, and the results of the analysis came as shown in Table (3).

Table 3: two-way ANCOVA results for the performance of the study groups on the creative thinking test.

Variance source	Sum of squares	Degree of freedom	Average of sum squares	F value	Significance level
Creative thinking test	278.643	1	278.643	35.894	0.05
Strategy	298.705	2	149.353	19.239	0.05*
Error	978.145	126	7.763		
Total	1555.493	129			

Table (3) shows that the value of (F) for the teaching strategy was (19.239) for the total sum of creative thinking skills, which is statistically significant at the level of significance (0.05). This indicates that there are statistically significant differences between the performance averages of the three study groups (concept maps, brainstorming, and traditional) on the creative thinking test. Accordingly, rejecting the first null hypothesis, which states that there are no statistically significant differences at the significance level ($\alpha = 0.05$) in the development of creative thinking of Islamic studies students attributed to the teaching strategy.

Since there are statistically significant differences between the arithmetic averages of the three study groups on the creative thinking test at the significance level ($\alpha = 0.05$), the modified arithmetic averages were calculated for the performance of the three study groups on the creative thinking test, and the (LSD) test was used for post-hoc comparisons to determine the sources of these differences. The results were as shown in Table (4).

Table 4: The arithmetic averages and standard errors of the study groups' performance on the creative thinking test.

Strategy	Number	Total score	Arithmetic average	Standard error
Traditional	41	42	24.35	0.54
Brainstorming	44		30.54	0.52
Concept maps	45		27.47	0.52

Table (4) indicates that the average arithmetic mean for the group that learned using the brainstorming strategy was the highest in the total number of creative thinking skills, as it reached (30.54), followed by the arithmetic mean of the group that learned using the concept map strategy (27.47). While the arithmetic mean of the group that learned according to the traditional method (24.35). As for the results of the (LSD) test for post-hoc comparisons to determine the sources of these differences, they came as follows:

Table 5: The results of the (LSD) test for post-hoc comparisons between the arithmetic averages for the performance of the study groups on the creative thinking test.

Strategy		Brainstorming	Concept maps	Traditional
		30.54	27.47	24.35
Brainstorming	30.54	-	3.07*	5.00*
Concept maps	27.47		-	2.80*
Traditional	24.35			-

Table (5) indicates that the differences between the study groups on the creative thinking test are in favor of the brainstorming strategy compared with the concept maps and the traditional method, as well as in favor of concept maps strategy compared to the traditional method.

The results showed that there were statistically significant differences on the creative thinking test attributed to the teaching strategies, in favor of brainstorming compared to traditional and concept maps. And there are differences in favor

of the concept maps strategy compared with the traditional method. The superiority of the brainstorming group over the traditional and concept maps groups may be attributed to the students' benefiting from the procedures in which the brainstorming method was built, as these procedures helped the students reach the desired results in their learning by themselves through active participation in learning. In these procedures, several ideas are discussed, and many ideas are listened to from the students participating in the brainstorming sessions, and comments, criticism, responses or feedback are given about each proposed idea. It could also be that the steps taken by the brainstorming strategy played a role in keeping students away from cognitive inertia. It enhances the students' self-confidence by supporting the independent steps of each student to form his opinion on each topic and put it before his colleagues and defend it without fear or shame of failure or criticism.

Moreover, the brainstorming strategy is basically based on stimulating the mind and reflecting on concepts and information. This method gives the student a wide space and experience in learning how to go beyond the literal memorization of information, but rather to think. This thinking moves with the students to each new lesson or concept. Thus, the student deals with concepts by thinking, not by memorizing. And since the brainstorming strategy is the one that trained him to think, he uses it in every situation, so the effect of learning is longer than just memorizing information. This interpretation is reinforced by the fact that the brainstorming strategy is based on organized procedures that begin with identifying the problem and end with solving that problem. These procedures are used with every problem, so the effect of learning according to them is stronger and lasting.

The teacher's encouragement for the students to analyze and scrutinize ideas and concepts and make this part of their behavior provides opportunities and situations with which students interact and participate actively and lively. So that the student is not just a receiver of information, and this leads to the consolidation of his educational content.

The organization of the topic in brainstorming is in the form of problems consisting of short, organized issues and topics arranged from easy to difficult. Those issues and topics are presented to the students in sequential steps which enables the students to go through them easily. This enhances the students' desire to participate in brainstorming sessions and expressing opinions in a way that is based on thinking about the issues in depth instead of just reviewing those ideas. And all this may not be available in the traditional method.

Furthermore, the focus of the brainstorming strategy on the student, and making him the main axis around which the learning process revolves, helped each student to express his opinion freely. While the traditional learning may not provide this opportunity for every student, as it focuses on presenting ideas collaboratively, and some students may feel embarrassed to present their ideas in front of their colleagues which makes the expression of opinions dependent only on the strongest students or those who have higher confidence. This result agrees with [3].

As for the superiority of the concept maps method over the traditional method in the creative thinking test, it may be attributed to the fact that concept maps develop students' creative thinking skills by relying on basic thinking processes or skills which motivates the student to use those skills, such as classification and arrangement. Moreover, the concept maps used in this study linked pieces of information and concepts with each other, by building networks of information. These networks may have an impact on the process of organizing information and storing it in long-term memory. This means that the concept maps supported the student's information coding skill, and it is known that the coding skill is one of the remembering skills, and the remembering skill is one of the basic or pivotal skills of cognitive thinking.

Some concept maps also worked on identifying the similarities and differences between some of the concepts and ideas in the lessons, as well as on classifying and arranging information according to certain characteristics. So, they may have helped the student to organize the new information he stored in a new way. Comparing, categorizing, and arranging skills are considered among the most important organizing skills.

Concept maps put information, concepts, and ideas together into new templates and structures. This may provide an opportunity for students to think and encourage them to generate new ideas and summarize the information contained in the lessons, by focusing on important information and main ideas, and leaving unimportant information. The skill of summarizing is one of the skills of integration, which means placing or arranging the parts that have common relationships with each other, so as to lead to a deeper understanding of those relationships.

It is possible that the use of concept maps helped the student to use several types of multiple intelligences according to Gardner's theory. The thinking that the student uses when investigating cause-and-effect relationships between information and ideas is a logical-mathematical intelligence. When the student interprets this logical thinking in the form of a map, he uses his spatial intelligence. When he talks to other students to explain his ideas, he uses his linguistic intelligence. When working with others, he uses his personal intelligence. This result agrees with [23] and [24].

2. *Are there statistically significant differences in the development of creative thinking skills among students of Islamic Culture at Al-Hussein Bin Talal University attributed to the interaction between strategy and gender?*

4.2 The research results and discussion related to the second question:

To answer this question, the researchers calculated the arithmetic averages and standard deviations of the performance of the three study groups on the creative thinking test, according to strategy and gender. The following table illustrates this:

Table 6: Arithmetic averages and standard deviations of the study groups' performance on the creative thinking test according to the interaction between strategy and gender.

Group	Gender	Number	Arithmetic average	Standard error
Control	Male	21	22.54	2.91
	Female	20	22.76	3.12
	Total	41	22.67	2.98
Brainstorming	Male	21	29.86	1.54
	Female	23	31.67	0.74
	Total	44	30.67	1.54
Concept maps	Male	23	27.65	4.67
	Female	22	26.15	3.61
	Total	45	25.35	4.37
Total	Male	65	27.35	3.87
	Female	65	27.63	3.35
	Total	130	27.49	3.67

Table (6) shows that there are apparent differences between the arithmetic averages of the three study groups according to the interaction between the strategy and gender. In order to determine whether the differences between the arithmetic means of the three study groups according to the interaction between the strategy and gender are statistically significant at the level of significance ($\alpha = 0.05$), the researchers applied the Two-way ANCOVA. The results of the analysis came as shown in the table (7).

Table 7: Two-way ANCOVA results for the performance of the study groups on the creative thinking test.

Variance source	Sum of squares	Degree of freedom	Average of sum squares	F value	Significance level
Creative thinking test	78.514	1	78.514	11.825	0.001
Strategy	298.911	2	149.455	22.525	0.000
Gender	0.345	1	0.345	0,52	0.754
Interaction between strategy and gender	18.619	2	9.309	1.403	0.121
Error	816.127	123	6.635		
Total	1212.511	129			

Table (7) indicates that the value of (F) for the effect of the interaction between the teaching strategy and gender was (1.403) on the creative thinking test at the level of significance (0.121). This indicates that there are no statistically significant differences between the performance averages of the three study groups (concept maps, brainstorming, and traditional method) attributed to the interaction between strategy and gender on the creative thinking test, which means accepting the second null hypothesis which states that there are no statistically significant differences at the significance level ($\alpha = 0.05$) in the development of creative thinking for Islamic Culture students attributed to the interaction between strategy and gender.

The results showed that there were no statistically significant differences between the performance averages of the three study groups (concept maps, brainstorming, and traditional) attributed to the interaction between the strategy and gender variables on the creative thinking test. This supports the null hypothesis which states that there are no statistically significant differences in the development of creative thinking attributed to the interaction between strategy and gender. The lack of interaction between strategy and gender may be due to the fact that the two strategies, brainstorming and concept maps, are useful and valid for both genders, meaning that males and females can benefit from the two strategies in developing their creative thinking skills.

This means that the gender variable is not the decisive factor in the process of increasing students' performance on the

creative thinking skills test. Rather, it is the strategy variable that leads to these differences in the performance between students. This is supported by the result of the first question, which showed the excellence of male and female students in the brainstorming and concept maps groups, and the absence of interaction between strategy and gender. This result agrees with [23].

5. Research recommendations

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

1. The College of Education should encourage teachers in other colleges to use the brainstorming and concept maps strategies in the teaching-learning process.
2. The books of Islamic Culture should include lessons based on concept maps and brainstorming for teachers to benefit from in their teaching.
3. Conducting training courses for faculty members on preparing educational lessons based on brainstorming and concept maps and using them in the educational process because of their impact on increasing students' achievement and developing creative thinking in the Islamic Education topics.
4. Encouraging researchers to continue doing research related to preparing educational lessons based on brainstorming and concept maps strategies and their usage in developing different cognitive processes in the field of Islamic Education, and other study topics.

Conflict of interest

The authors declare that there is no conflict regarding the publication of this paper.

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