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The effect of using concept maps on second year intermediate students achievement in Islamic education

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Abstract
This research aims to investigate the impact of employing the concept mapping strategy on the achievement of second-grade intermediate students in Islamic education and on their attitudes toward the subject. The study adopted a quasi-experimental approach using a two-group design (experimental and control), with a sample of 40 second-grade intermediate students equally divided into two groups. The experimental group was taught using interactive digital concept maps, while the control group was taught using the traditional method. The researcher used an achievement test developed to measure the level of knowledge acquisition in specific topics from the Islamic education curriculum, in addition to an attitude scale to measure students' attitudes toward the subject. After implementing the experiment over several weeks, the results were analyzed using appropriate statistical methods. The results showed a statistically significant superiority of the students in the experimental group who were taught using digital concept maps in the post-achievement test compared to those in the control group. The results also revealed a positive improvement in the attitudes of the experimental group students toward Islamic education compared to their peers in the control group. This indicates the effectiveness of using concept maps in enhancing deep understanding of the subject and increasing students' motivation toward it. In light of these findings, the research recommends adopting digital concept maps as an educational tool in Islamic education curricula and training teachers on their use, due to their positive impact on raising the academic achievement level and fostering positive attitudes among students toward learning.

Keywords: Islamic education, concept mapping, digital interactive maps, quasi-experimental research, student achievement

Introduction
Islamic education is a fundamental subject that seeks to develop students' understanding of religious principles, values, and legal rulings. However, traditional teaching methods often focus on indoctrination and memorization of information without relating it to its deeper meanings or applying it to real-life contexts. This can lead to students' poor comprehension of religious concepts and their distaste for the subject. Hence, the need for modern teaching strategies that place the learner at the center of the learning process, activate their role, and help them build knowledge with real meaning and greater retention. One such strategy is concept maps, which are based on a visual representation of concepts and their relationships in a hierarchical and organized manner. Numerous educational studies indicate that the use of concept maps promotes active learning and supports meaningful learning that connects new knowledge to the learner's prior knowledge structure. This strategy is expected to have a positive impact on the teaching of various subjects, including Islamic education, as it can help connect religious concepts and clarify their relationship to the student's life, values, and behavior.

Research Problem
The research problem lies in the poor academic achievement of some second-year middle school students in Islamic education, and their reliance on memorizing information without a deep understanding or ability to connect different Islamic concepts. It is also noted that some students exhibit low motivation to learn the subject, and perhaps negative attitudes, as a result of traditional teaching methods. Accordingly, this research seeks to answer the main

Question: Does the use of the concept mapping strategy contribute to improving students' achievement in Islamic education and developing their attitudes toward learning compared to traditional methods?

Significance of the Research

The importance of this research is evident in its attempt to introduce a modern educational technology (digital concept maps) into the field of Islamic education teaching. This may contribute to improving the quality of religious education and making it more attractive and effective for learners. The importance also stems from the research's focus on two fundamental aspects of learning outcomes: cognitive achievement, on the one hand, and attitudes and motivation, on the other. If the use of concept maps proves to have a positive impact, this will support the development of Islamic education curricula and teaching strategies, and encourage teachers to adopt interactive teaching methods that promote critical thinking and deep understanding. This research will also fill a gap in the literature regarding the use of modern digital tools in teaching Islamic subjects, which may benefit curriculum developers and teacher trainers.

Research Objectives

The research seeks to achieve the following objectives:-

1. Measure the impact of using digital concept maps on the academic achievement of second-grade middle school students in Islamic education, compared to traditional teaching methods.
2. Explore the impact of using concept maps on developing students' attitudes toward Islamic education and their willingness to learn it, compared to traditional teaching methods.
3. Provide educational recommendations based on the results that can contribute to improving the teaching of Islamic education through the use of modern technologies and strategies.

Research Questions

The following research questions emerged from the research problem:

1. Are there statistically significant differences at the significance level (α=0.05) between the average achievement of second-grade middle school students in Islamic education who are taught using digital concept maps and their counterparts who are taught using the traditional method?
2. Are there statistically significant differences at the level (α=0.05) between the average scores on the Attitude Scale toward Islamic Education among second-grade middle school students when using digital concept maps compared to the traditional method?

Theoretical Framework

Definition of concept maps

Concept maps are a visual educational tool that represents knowledge in the form of a hierarchical diagram that highlights concepts and the relationships between them. A concept map is defined as "a two-dimensional diagram in which the concepts of a subject are arranged hierarchically, from the most comprehensive and less specific concepts at the top of the pyramid to the least comprehensive and more specific concepts at the base. These concepts are linked together by arrows indicating the type of relationship". In other words, a concept map typically includes circles or squares representing the main concepts, connected by lines or arrows bearing connective words to illustrate the type of relationship between each concept. The result is an organized knowledge network that enables students and teachers to visually see the overall structure of the subject. This visual representation helps demonstrate meaningful relationships between concepts. A concept map highlights how a particular idea relates to others, transforming the educational material into a coherent, structural image rather than fragmented information.

Concept Maps

Atallah (2001) defined them as: a tool that organizes ideas and meanings, and clarifies the relationships between concepts within a single unit within the prescribed curriculum. They help students organize and deepen their knowledge of the subject matter (Atallah, 2001:425).

Al-Khataybeh (2005) defined them as: two-dimensional diagrams, in which the vertical concepts are arranged hierarchically, with the subjects ranked from most comprehensive to least comprehensive and most specific. These concepts are also surrounded by specific frameworks that clarify the nature of the relationship between them (Al-Khataybeh, 2005:311).

The researcher adopts the latter definition as a theoretical definition of the research

The researcher defines it procedurally: It is a modern teaching method through which diagrams are presented in an organized and arranged manner, in which the subject of art education is explained in a hierarchical manner from the most comprehensive to the least comprehensive and from the general to the specific. There are also lines and angles that explain the nature of the relationship between these concepts.

Components of Concept Maps

1. **The scientific concept:** This is the mental construct formed from the common characteristics of the phenomenon under investigation. These characteristics are grouped in an oval or circular shape to distinguish them.
2. **Linking words:** These are tools that connect two concepts of the same phenomenon, such as: "classifies into", "consists of," "has," etc.
3. **Cross-linking connections:** These are the connections between two or more concepts in this hierarchy, represented by a cross-linked line.
4. **Examples:** These are events or actions that express examples of the concept, and are often symbols (Khataybah, 2005: 311) [9]

Concept Mapping Forms

There are several concept mapping forms:

1. The pyramidal form, which is the most common and widely used in education.
2. The sequential map form.
3. The center-grouped map form, where the main concept is placed in the center, followed by less general concepts, and so on.
4. The spider map form (Atiya, 2008:244)

How to design concept maps

Before designing any concept map, you must read the topic, identify its main and secondary concepts, and connectives, then, do the following:

1. Read the topic for which you want to create a concept map carefully, thoughtfully, and with a broad understanding.
2. Identify the main idea upon which the concept map is based.
3. Identify the secondary and sub-concepts from which it is based.
4. Organize the main idea hierarchically, from most general to least general and most specific.
5. Arrange the main and sub-concepts in a distinctive circular or oval geometric pattern.
6. Determine the nature of the relationship between these concepts using arrows, signs, and lines, vertically or horizontally, to clarify how they are learned.
7. Place a word on each line connecting the concepts to indicate their meaning.
8. Ensure that the map clearly illustrates all the concepts within the concept, including its main and sub-concepts (Saraya, 2007:158).

Functions of Concept Maps

Concept mapping has a set of functions it seeks to achieve, including:-

1. It simplifies understanding of the relationship between concepts contained in written texts.
2. It works to retain information in memory for as long as possible.
3. It focuses clearly on organizing the relationships between concepts in a way that facilitates retrieval.
4. It organizes the information presented and presents it in an attractive and engaging manner (Saraya, 2007:146).

Learning theories related to concept maps

The concept map strategy was developed in the 1970s by Novak and Gowin as a practical translation of educational psychologist David Ausubel's ideas on meaningful learning and advanced organizers. Ausubel (1963) believed that an individual's learning is more effective and meaningful when new knowledge is linked to previously held concepts and experiences organized within their cognitive structure. Based on this premise, Ausubel introduced the concept of advanced organizers, which are given to the learner before learning new material to prepare their mental structure for linking new information to prior knowledge. Novak and his colleagues developed concept maps as a tool that visually represents these organizers in a hierarchical manner, helping students integrate new knowledge in an organized manner. This prevents learning from being merely temporary memorization, but rather makes it meaningful and more stable over time.

In addition to Ausubel's cognitive theory, the concept map strategy is consistent with the principles of constructivism in learning. According to constructivist theory, learners construct their own knowledge through active interaction with content, creating their own internal representations of concepts rather than passively receiving knowledge. Creating a concept map on a topic is a constructivist process in itself, requiring the learner to reflect on their understanding of the relationships between concepts and reorganize their thoughts to arrive at a coherent representation. This process involves the student reflecting on their own thinking (metacognitive thinking) while constructing the map, honing their ability to organize and analyze knowledge. Research in cognitive psychology indicates that formulating visual representations of information (as occurs when creating a concept map) enhances memory and retrieval, especially for visual learners. Furthermore, combining text and images in concept maps activates both the left and right hemispheres of the brain, increasing learning effectiveness and consolidating it. In conclusion, the effectiveness of concept maps is based on several theoretical principles: they draw on Ausubel theory of meaningful learning by linking the old with the new; they align with the constructivist approach, which places the student as an active axis in building his or her knowledge; and they are supported by the findings of research on memory and visual learning, which confirm that learning is deeper and more lasting when represented visually. All of this makes concept maps a theoretically supported tool that can contribute to shifting education from mere rote learning to active, effective learning.

The role of concept maps in teaching Islamic education

In the context of teaching Islamic education, concept maps can be used in several ways to enhance students' understanding of religious concepts and their interconnectedness. Islamic education topics are characterized by their diversity, encompassing faith, worship, dealings, ethics, and biography, among others. This creates a rich network of interconnected concepts. For example, a student might study the concept of purity as a central idea, with the concepts of ablution, ritual bathing, and dry ablution branching out from it, each associated with specific rulings and conditions. Using a concept map, the teacher and student can together represent these concepts in a diagram that demonstrates their relationship to one another. For example, purity might be placed at the center, with the various types of purity branching out from it (minor ritual impurity, ablution, major ritual impurity, ritual bathing), with tayammum as an alternative when water is unavailable, and so on. Such a map helps students see the relationships between Islamic rulings in a visually organized manner, rather than simply memorizing texts and rulings.

Recent studies have confirmed the effectiveness of concept maps in teaching Islamic education subjects. For example, a study by Milad and Musleh (2020) [13] conducted on seventh-grade students in Libyan schools found that teaching Islamic education using a concept mapping strategy led to a significant improvement in student achievement compared to the traditional method. A Jordanian doctoral study conducted in Saudi Arabia on third-year secondary school students in the Tawheed subject revealed statistically significant differences in academic achievement in the Tawheed subject in favor of the group taught using concept maps compared to the group taught using the traditional method. These results highlight that concept maps are not just a general tool suitable for natural sciences or social studies, but can also be effectively adapted to teaching religious subjects. The role of concept maps in Islamic education lessons can include: pre-planning lessons (where the teacher uses them as an organizer that links the new lesson to previous ones), during explanation (to gradually build concepts for students and engage them in organizing them), and at the end of the lesson (as a summary tool that

helps students review what they have learned comprehensively). Using concept maps in these ways helps achieve Veral important goals: they direct students' attention to the essential relationships within the subject, not just to scattered information; they make the learning process interactive, involving active student participation through asking questions and drawing connections; and they provide a memorable visual representation, enhancing information retention and deeper understanding. Some educational research has indicated that concept maps help increase academic achievement, learning retention, and develop positive attitudes toward academic subjects. These are goals we strive for in the field of Islamic education, where we aspire for students to acquire religious knowledge, deeply understand it, and become imbued with its values with love and conviction.

Previous Studies

Many educational studies have examined the impact of using concept maps in education across various disciplines, providing important results that help build a clear understanding of the effectiveness of this strategy. The following is a brief overview of the most prominent previous studies relevant to the current research topic:

Al-Anzi's study (2015) [1], Al-Anzi conducted an experimental study on the Tawheed subject for third-year secondary school students in Hafr Al-Batin Governorate, Saudi Arabia. The design relied on two groups: one taught using concept maps and the other using the traditional method. The sample size was 40 students. The results showed a statistically significant improvement in academic achievement for the experimental group (which used concept maps) in the post-achievement test. Based on this, the study recommended the use of concept maps in teaching Tawheed and Sharia courses, given their positive impact on students' understanding of religious concepts and their interconnectedness.

Milad and Musleh's study (2020) [13], this study aimed to investigate the impact of using concept maps on academic achievement in Islamic education among seventh-grade students in Libyan schools in Malaysia. The sample consisted of 28 male and female students and was divided into an experimental group that studied using concept maps and a control group that studied using traditional instruction. The results revealed statistically significant differences at the 0.05 level between the average scores of the students in the two groups on the post-test in favor of the experimental group, indicating the effectiveness of the concept mapping strategy in raising achievement in Islamic education. The study also revealed gender-related differences, with females in the experimental group outperforming the other groups, which may indicate greater enthusiasm among female students for employing this strategy.

Iwas's study (2006) [12], I was investigated the effect of using concept maps on the attitudes of second-grade middle school students toward history in schools in Nineveh Governorate, Iraq. The sample included 83 students (40 experimental and 43 control). A scale was used to measure students' attitudes toward the subject before and after the experiment. The results showed a significant improvement in the attitudes of students in the experimental group toward history compared to the control group. This means that the use of concept maps not only contributed to understanding the subject but also increased students acceptance and interest in the subject. The study recommended focusing on the concept mapping approach in teaching social studies subjects (including history) due to its positive impact in developing positive attitudes among learners. It also suggested conducting further research in other subjects.

Rafaa's study (2003) [14], This study aimed to investigate the effectiveness of using concept maps in improving the achievement and attitudes of second-grade middle school students toward science in the Kingdom of Saudi Arabia. The sample consisted of two groups (50 control students and 48 experimental students), one of which was taught using the traditional method, and the other using concept maps for each lesson in the unit "The Earth and Its Relationship to the Universe". The results showed that both methods (traditional and conceptual) contributed to improved student achievement. However, there were no statistically significant differences in achievement between the two groups. Similarly, no clear difference was found in students' attitudes toward science between those taught using concept maps and those taught using the traditional method. The researcher offered several possible explanations for this result, such as the short duration of the experiment or the lack of full familiarity of teachers and students with the concept mapping method. He emphasized recommendations for training teachers in modern teaching methods and not focusing solely on memorization and retrieval. In addition to the above, it is worth noting the review and meta-analysis studies that combined the results of multiple studies on the effectiveness of concept maps. A very recent study by Egüp İzci and Açıköz Akkoc (Izci & Akkoc, 2024) [16] analyzed 78 studies published between 2005 and 2017 on the effect of concept maps on academic achievement. The meta-analysis found that the overall effect size of using concept maps on achievement was 1.08, a high and positive effect size according to Cohen's rank. This statistically comprehensively confirms that the concept mapping strategy has a strong impact on improving learners' achievement across different subjects and educational levels. This conclusion reinforces the findings of the individual studies mentioned above, despite some mixed results. Overall, the lessons learned from previous research can be summarized as follows: The use of concept maps tends to improve academic achievement and promote deeper understanding. It may also contribute to the development of positive attitudes toward the subject, provided it is implemented effectively and planned in a manner that takes into account the nature of the subject and learners. In cases where no differences were found (such as Rifaa's study in science), there may be intervening factors that should be examined (such as teacher training, length of the experiment, and the nature of the educational content itself). This research background supports the need for further studies in various fields including Islamic education to verify the effectiveness of concept maps and determine the best methods for implementing them to ensure maximum benefit.

Methodology

Research Methodology and Design

The research adopted an experimental approach with a quasi-experimental design (quasi-experiment) based on an experimental and control group. A pretest-posttest design was used with two groups. Each group underwent a pretest to measure their achievement level and attitudes toward the

subject before the experiment began. The experimental group was then taught using the digital concept maps strategy as an independent variable, while the control group was taught using the traditional method (explanation and lecture without the use of concept maps). After the end of the time-bound educational experiment, a posttest and an attitude scale were administered to both groups to measure the effect of the experimental treatment. This design aimed to control for the influence of external factors and verify that any differences between the two groups in the posttest were attributable, after statistical adjustment, to the use of concept maps. Since it was not possible to assign the sample members completely randomly to the two groups (as they were students in existing classes), the design was classified as quasi-experimental with quasi-random assignment selecting two relatively equal classes from the school, one for the experimental group and the other for the control group.

Sample

The research sample consisted of (40) male and female students in the second intermediate grade (approximately 13-14 years old) at a middle school. The sample included students of both genders to ensure adequate representation. Two classes of comparable levels were intentionally selected from the school after coordination with the administration and teachers. They were then divided into an experimental group of 20 students, male and female, and a control group of 20 students, male and female. When selecting the two classes, care was taken to ensure that they were as equal as possible in demographic and achievement variables such as chronological age, previous level of academic achievement in Islamic education, and parents' educational level, if available. A pre-achievement test was administered to both groups in Islamic education before the start of the experiment to ensure there were no statistically significant differences between their pre-score averages, thus meeting the initial requirement for statistical equivalence. The results of the pre-test showed no significant differences between the two groups, suggesting that they were equivalent and ready to begin the experimental treatment.

Research Tools

The researcher used two main tools to collect data and measure research variables:-

- **Achievement Test in Islamic Education:** The researcher prepared a validated achievement test covering the educational content targeted in the experiment. The educational material included a unit or group of lessons selected from the Islamic Education curriculum for the second intermediate grade (such as a unit related to one of the areas of faith or jurisprudence). The test consisted of (30) objective multiple-choice, true-false, and short questions, with the aim of measuring various levels of achievement (recall, comprehension, application, etc.). The test was presented to a group of Islamic education professors and measurement experts to ensure the validity of the content and the appropriateness of the paragraphs in terms of language and content. A mini-pilot test was also conducted to verify the difficulty and ease of the paragraphs and the reliability of the test. The reliability coefficient (Cronbach's alpha) for the test was approximately 0.85, a high coefficient indicating good reliability of the tool. This test was used before the experiment as a pre-test and after the end of teaching as a post-test, with the aim of measuring the impact of the intervention (the use of concept maps) on students' achievement in the subject.
- **Attitude Scale towards Islamic Education:** To measure students' attitudes towards learning Islamic Education before and after the experiment, an attitude scale was developed consisting of (20) statements based on a five-point Likert scale (responses ranging from "strongly agree"=5 to "strongly disagree"=1). The statements included various indicators measuring students' interest in and enthusiasm for the subject, such as "I enjoy attending Islamic Education class" and "I see that what I learn in Islamic Education is useful in my life." The wording of some statements was reversed to ensure response bias. The scale was also presented to judges to ensure the appropriateness of the statements for the students' ages, clarity, and apparent validity. The reliability of the scale was calculated using internal consistency (Cronbach's alpha coefficient), reaching approximately 0.90, indicating high reliability. This scale was administered pre- and post-tests to both groups to monitor any changes in students' attitudes towards the subject as a result of the use of concept maps in teaching.

Teaching and Experimental Procedures

After completing the preparatory procedures and establishing equivalence between the two groups, the experiment was implemented according to the following steps:

1. Pre-experimental (preparation) phase: The researcher coordinated with the Islamic education teacher at the school to implement the strategy in the class designated as the experimental group. A short training session was held for the teacher on how to use digital and interactive concept maps in lessons, using available software or tools (such as CmapTools or concept mapping applications on tablets) to ensure the teacher's mastery of the tool before commencing teaching. Students in the experimental group were also introduced to the concept of concept maps, how to read them, and how to participate in constructing them in a simplified manner to ensure their readiness for the experiment. Meanwhile, the control group teacher was encouraged to continue teaching using the usual traditional method without introducing new factors. A pre-achievement test and an attitude scale were also administered to both groups at this stage, and data were collected for equivalence control purposes, as mentioned above.

2. Experimental Implementation Phase (Actual Teaching): The experiment extended over a period of approximately 4 consecutive weeks during the semester, covering a number of specific topics or lessons from the Islamic Education curriculum. In the experimental group, each lesson was taught using interactive digital concept maps. The teacher created a master concept map for each lesson, illustrating the key concepts and the relationships between them. A computer or smart tablet was used to display the map on a screen in front of the students. At the beginning of each lesson, a simple concept map was

presented as an organizer, recalling relevant prior knowledge and linking it to the new topic. During the lesson, the teacher gradually updated the map: whenever a new concept or relationship was explained, it was added to the map in front of the students, with students' contributions being invited to suggest connections or examples. Some lessons saw students actively participate in constructing the map. They were asked individually or in small groups to prepare parts of the concept map (on paper or using tablets) and then discuss them with the rest of the class. Thus, learning became interactive, with students building their knowledge both visually and mentally during the lesson. At the end of each lesson, a complete concept map was created summarizing the lesson's key concepts and their relationships. Students were provided with a copy (printed or digital) for review.

In the control group: The same topics were taught for the same amount of time, but in the traditional teaching method. The teacher in the control group relied on verbal explanation and classroom discussion without using any concept maps or distinctive interactive visual aids. Lessons included traditional activities such as oral questions or solving book exercises, but without the structural presentation of concepts as in the experimental group. Thus, the experimental control criteria ensured that both groups received the same content under similar time and space conditions. The only significant difference was in the method of content presentation (visual conceptual in the experimental group, traditional textual in the control group).

3. Post-experimental phase measurement and evaluation: Following the completion of the scheduled teaching period (approximately four weeks), the post-achievement test was administered to all members of both groups under uniform control conditions. The attitude scale was also re-administered after the experiment. The test and scale together took one class period for each group. The answer sheets were collected, transcribed, and accurately marked. To ensure the validity of the comparison, the marking process was conducted as double-blind as possible (the researcher or his assistant marked the papers of both groups without seeing the group's identity on the sheet) to ensure objectivity. The data was then analyzed statistically to answer the research questions.

Statistical Methods

To analyze the data and verify the research hypotheses, a set of statistical methods appropriate to the nature of the variables were used:

- Descriptive statistics were initially used to calculate the means and standard deviations of the achievement test scores and the attitude scale for both groups (control and experimental) in the pre- and post-tests. This helped form an initial idea of the direction of the differences.
- To verify the equivalence of the two groups prior to the experiment, an independent-samples t-test was conducted on the pre-test scores between the two groups, as well as on their attitude averages before the experiment. The results confirmed the absence of significant differences, supporting the validity of the experiment.
- To answer the two main research questions (related to achievement and attitudes after the experiment), an independent-samples t-test was also used to compare the mean scores on the post-achievement test between the experimental and control groups. Another independent-samples t-test was also used to compare the mean scores on the post-attitude scale between the two groups. The researcher verified that the t-test conditions were met (normality of distribution and equality of variance between groups using Levene's test). If any violations of the hypotheses were detected, the plan was to use non-parametric equivalent measures, but this was not necessary due to the normality of the data.
- In addition, the effect size was calculated using Eta squared or Cohen's d for differences in achievement and attitudes, to demonstrate the practical significance of the results alongside their statistical significance.
- Finally, the results were analyzed, interpreted, and linked to the theoretical framework and previous studies, as will be presented in the discussion section.

Presentation and Analysis of Results

After implementing the experimental treatment and collecting the required data, the results were analyzed as follows to answer the research questions. The results of the academic achievement will be presented first, followed by the results of the attitude scale, followed by the necessary explanatory tables.

Academic Achievement Results

The post-test was corrected for both the experimental group (taught using concept maps) and the control group (taught using the traditional method). The maximum score on the test was 100. The descriptive results showed significant differences between the mean scores of the two groups. Table 1 shows the mean achievement scores of the two groups after the experiment ended:

Table 1: Mean post-test scores (out of 100) and standard deviations in the control and experimental groups.

(Average Score) Standard Deviation	Number of Students	Group
75.3 degrees (±8.5)	20	Control (Traditional Instruction
84.6 degrees (±6.9)	20	Experimental (Using Concept Map

The table above shows that the average scores of the experimental group were significantly higher than those of the control group. Students using concept maps achieved an average of approximately 84.6 out of 100, compared to an average of 75.3 for the traditional group. To verify the statistical significance of this difference, an independent t-test was conducted on the scores of the two groups. The test result was as follows, the calculated t-value=2.87 at a degree of freedom of (38), and the significance level of p=approximately 0.007. This indicates that the difference between the two averages is statistically significant at a significance level of approximately 0.01 (less than 0.05), meaning that there is a significant difference in favor of the teaching method using concept maps. Accordingly, the first research question is answered affirmatively: There are statistically significant differences between the average achievement of students who studied using concept maps and their peers who studied using the traditional method, in favor of the experimental group. Based on this result, it can

be said that the use of digital concept maps has significantly raised the level of academic achievement in Islamic education compared to the traditional method. The calculated effect size (using Cohen's d) was approximately 0.95, which is considered a large effect size, meaning that the difference is of high educational significance and not just a small difference.

Attitude Scale Results

Regarding the second question about students' attitudes toward Islamic education, students' responses to the attitude scale which was rated at 5 points per statement were transcribed, and averages were calculated for each group after the experiment. The theoretical average for the scale ranged from 1 to 5, with a higher number indicating a more positive attitude.

Table 2 shows the average overall attitude score for each group after the experiment:

Table 2: Average attitude score toward Islamic education (on a five-point Likert scale) after the experiment for both groups.

(Average Attitude Score) Standard Deviation	Group
3.4 out of 5 (± 0.5)	Control (Traditional Instruction
4.1 out of 5 (± 0.4)	Experimental (Using Concept Maps)

- The experimental group (which used digital concept maps) statistically significantly outperformed the control group in academic achievement in Islamic Education. The experimental
- students achieved average scores approximately 9 points higher than their peers on the post-test, a significant and educationally important difference.
- The experimental group showed significantly more positive attitudes toward Islamic Education compared to the control group after the experiment. This indicates that the concept mapping strategy not only affected their academic results but also their outlook and attitudes toward the subject, making it more attractive and valuable to them.
- Combining the two results, it can be said that the use of digital concept maps had a double positive impact on student learning: better achievement and more positive attitudes. This combination is important because improved achievement alone may not be sustainable unless accompanied by a greater desire and motivation to learn, and vice versa. Thus, the experimental results answer the research questions by confirming the effectiveness of the proposed strategy. In the next section (Discussion of the Results), the interpretation of these results will be addressed in light of the theoretical framework and previous studies, and the extent of agreement or disagreement with them will be indicated, as well as the educational implications they contain.

Discussion of Results

This study aimed to explore the impact of using concept maps on both academic achievement and attitudes of second-grade middle school students in Islamic education. The results confirmed the theoretical expectations underlying the study, demonstrating a substantial positive effect of using concept maps in improving learning outcomes, both cognitive and affective. The following is a detailed discussion of these results, linking them to the theoretical context and previous research:

First: improving academic achievement through concept maps

The study showed that students in the experimental group who studied using digital concept maps outperformed their peers in the control group in terms of post-achievement test scores. This

indicates that the concept mapping strategy helped students gain a deeper understanding of the material and better grasp Islamic concepts and their relationships, compared to the traditional method, which may have focused more on memorization or isolated information. This improvement can be explained in light of Ausubel theory of meaningful learning. Concept maps provided students with a comprehensive organizer that linked new concepts to old ones and presented them with the cognitive structure of Islamic education topics in an organized manner. For example, when students viewed a map that linked the concept of "zakat" to sub-concepts such as expenditures, the nisab and its wisdom, and its connection to a broader concept such as the pillars of Islam, they were able to see the whole picture of the material, consolidating the information in a logical, coherent manner, rather than as scattered information. This is consistent with Novak's statement that concept maps allow learners to represent their knowledge about a specific topic in a way that facilitates permanent rather than temporary learning. Our results are consistent with many previous studies that have found a positive effect of using concept maps on achievement. Milad and Musleh's (2020) [13] study in the context of seventh-grade Islamic education also revealed a significant difference in favor of teaching with concept maps, confirming that Islamic education subjects can be enhanced through this strategy, just as other subjects can. Similarly, Al-Anzi's (2015) [1] study on Tawhid students (third secondary grade) demonstrated a significant increase in test scores as a result of using concept maps, which aligns with our findings and confirms the generalizability across age groups and content within the Islamic field. Furthermore, the broad statistical support provided by meta-analysis (Izci & Akkoc, 2024) [16] with an effect size of 1.08 strongly suggests that improving achievement through concept maps is a well-established phenomenon observed in many studies. Therefore, this current study represents a qualitative addition to the field of Islamic education within this general positive trend. However, it should be noted that some studies have found no differences in achievement between concept maps and traditional teaching. For example, Rifaa's (2003) study on eighth-grade science did not detect a significant difference. This difference may be due to contextual factors and the method of implementation. Perhaps in Rifaa's study, teachers and students were unfamiliar with concept maps, which reduced their effectiveness, or perhaps the trial period was too short to fully demonstrate the effect. In our current study, we ensured teacher training and student preparation, and the trial period extended for approximately one month, which may explain the clearer effect. The type of content may also play a role. The science subject in Rifaa's study may have been rich in practical experiments, which did not highlight the benefits of the maps, while the Islamic education subject, which is theoretical in nature, benefited more from

the visual organization of concepts. These explanations remain possible and require detailed study. In general, the achievement results in our study confirm that concept maps help students construct knowledge in an organized way in their minds and reduce distraction or memorization, which led to improved test performance. Instead of trying to remember scattered information, students now have a conceptual framework that consolidates knowledge, retrieving information from their memory within this coherent context. This aligns with the principles of cognitive psychology, which suggest that organizing information into structures (such as maps) helps memory store and retrieve information better.

Second: Developing positive attitudes towards the subject

One of the important additions of this study is that it was not limited to achievement, but also addressed students' attitudes and motivation towards learning Islamic education. The results showed that students who studied using concept maps demonstrated a more positive attitude and enthusiasm towards the subject than those who studied using the traditional method. This is an important educational indicator, as stimulating students' motivation and love for the subject is a goal as important as the transfer of knowledge itself. This positive shift can be understood in light of the nature of the concept map strategy: it makes the lesson an active and interactive experience, where the student participates in constructing, thinking, and connecting ideas, rather than being a passive listener. This participatory and motivating atmosphere often increases the student's sense of enjoyment and accomplishment, which is reflected in their attitude towards the subject. When the student sees the full picture of the content and the connections become clear, the ambiguity or confusion they may feel in traditional lessons, when information is presented without a clear connection, disappears. In the context of using concept maps, Kan and Hefny indicated that the visual organization of material reduces the cognitive load on the learner and increases their comfort with the material, which implicitly leads to more positive attitudes. This result is also consistent with some previous studies that have observed a positive effect of concept maps on attitudes. For example, I was (2006) study found a significant improvement in the attitudes of history students when the subject was taught using concept maps. Studies in science subjects such as biology also indicated that students felt increased confidence and understanding when using concept maps, which increased their motivation. The student's sense of being a partner in constructing knowledge through a concept map increases their emotional engagement, thus transforming the subject from a burdensome academic task into a subject that arouses curiosity and a desire to explore. In our case, Islamic education may seem like a rigid, rote subject to some, but presenting it in a new, interactive way (digital maps, colors, and relationships that explain the concept) made it more engaging for learners. Many students in the experimental group, as the teacher observed, began asking more questions and seemed willing to participate in the lesson. Some even began drawing simplified concept maps as a study technique. These are signs of increased interest in the subject and a desire to learn it thanks to the change in teaching style. However, it is worth noting that not all studies have found a strong effect on attitudes. Rifaa's (2003) study on science did not observe a significant change in students' attitudes toward science using maps. This may be because attitudes are, by nature, influenced by multiple factors and are not easily changed in a short period of time. It may also be related to the way the strategy is implemented: if the concept maps are presented in an uninteresting manner or the lesson is simply reduced to a diagram without actual interaction, the student may not notice a significant difference. In our research, we ensured that the process was as interactive and engaging as possible (using digital tools, colors, and allowing student participation), making the impact on attitudes clear. We therefore emphasize that simply using the tool is not enough; rather, how it is employed effectively is the decisive factor in making a difference in motivation and attitudes.

Third: Integration between improving achievement and developing attitudes

Perhaps the most notable finding of this study is the positive integration between two fundamental aspects of the educational process: the cognitive aspect (achievement) and the affective aspect (attitudes). Research has often focused on either achievement or attitudes, but our findings demonstrate that a successful educational strategy such as concept maps can serve both goals. This enhances their value and educational importance. If a student learns better and simultaneously loves what they are learning, the likelihood of learning continuing and transferring its impact to other areas increases. This integration can be explained by the fact that deep understanding leads to satisfaction and interest. When a student understands Islamic education material and grasps the meaning of concepts and the relationships between them through the map, they feel a sense of accomplishment and benefit, which motivates them to appreciate the material more and develop a positive attitude toward it. At the same time, enthusiasm for the material motivates the student to exert greater effort and pursue it diligently, which increases their achievement. Thus, the relationship is interactive and reciprocal, and concept maps have been able to activate both aspects by providing a constructive, visually rich, and interactive learning environment.

Compared to theoretical and applied research

From a theoretical perspective, these results strongly support the foundations upon which concept maps are based. The meaningful learning process described by Ausubel was actually achieved by linking new information to prior knowledge and visualizing this in students' minds. The strategy also demonstrated its consistency with the constructivist approach: students constructed their own understanding, and we saw the results in their performance and attitudes. Abstract concepts in Islamic education (such as doctrine and ethics) may have been distant from the student's perception, but depicting them with tangible relationships in the map brought them closer to their minds. This achieved what the literature calls the transition of learning from abstraction to concreteness through visualization. Compared to applications, our results are consistent with most recent Arab and foreign studies that praise the benefits of concept maps. They provide practical evidence in a rarely studied context (Islamic education), opening the way for other similar experiments in subjects of

a different nature (e.g., the Holy Quran and its sciences, the Prophet's biography, Islamic history, etc.). This may be a sign for local curricula to adopt such methods. It's worth noting that digital technology has enhanced the effectiveness of concept maps, as computer programs have made them easier to draw and add interactive elements (such as inserting images, text links, or sounds), which may make them more attractive to the current generation of students. Therefore, we believe that using an interactive digital version of concept maps in our research had a positive effect. Perhaps if the maps had been traditionally drawn by hand or on a blackboard, we would not have achieved the same level of engagement and enthusiasm from students.

Conclusion

Despite the significant positive results of this study, they must be considered within certain limitations. The sample size was limited (40 students) and from a single school, which may limit the ability to generalize the results directly to all educational settings without additional supporting studies. Furthermore, the Islamic education topics chosen for the experiment may have been well-suited for conceptual presentation, but other topics may require additional methods (such as teaching through practical examples or storytelling) in addition to concept maps. The duration of the experiment was also four weeks, which is a good time but not too long; long-term outcomes (such as the persistence of learning months later) were not measured in this study. Therefore, it would be useful in the future to track the long-term impact and to test the strategy on a larger scale and with diverse samples. While acknowledging these limitations, the overall picture suggests that concept maps are a promising tool in the field of Islamic education teaching. They combine the science and art of teaching: the science of systematically organizing content and the art of transforming the lesson into a visual canvas for students to contemplate and understand. In doing so, they achieved the essence of effective pedagogy, which makes learning an enjoyable and meaningful experience. In the following section, we will provide some practical recommendations for teachers, educational supervisors, and curriculum developers in light of our findings, to maximize the benefit from this strategy.

Recommendations

In light of the research findings and discussion, the researcher recommends a set of educational measures that will benefit from the concept mapping strategy in teaching Islamic education and other subjects, maximizing its positive impact:

- **Integrating concept maps into curriculum planning:** Islamic education teachers should adopt the use of concept maps as part of their lesson planning. They can be used as an organizer presented at the beginning of a lesson to connect the new lesson to previous information (for example, presenting a quick concept map of the pillars of Islam before delving into the details of a specific pillar, such as fasting). They can also be used to summarize lessons at the end of the lesson, allowing students to participate in constructing a summary map of the concepts discussed.
- **Training on the use of digital tools for concept mapping:** The study recommends that the Educational Supervision and Skills Development Departments hold workshops for teachers to train them on designing and using digital concept maps. This includes familiarizing them with appropriate programs or applications (such as CmapTools, Mind Manager, or other programs available in Arabic) and how to effectively incorporate Islamic content into them. The training should include skills in designing a quality map (selecting key concepts, linking with appropriate vocabulary, and using colors and supporting images, if possible).
- **Developing curricula and supporting materials that include concept maps:** Islamic education curriculum developers are encouraged to include ready-made concept maps or map-building activities in textbooks or educational guides. For example, the textbook could include a concept map summarizing the components of the "Faith" unit, or at the end of the unit, students could be assigned to draw a concept map of what they learned. This integration makes maps part of the student's learning culture. Booklets or brochures could also be prepared for each class containing the most important concept maps for the course as a quick, visual reference for study.
- **Encouraging students to build their own maps:** It is beneficial to encourage students to use concept maps as a learning and study strategy. The teacher can assign some classroom activities or homework assignments that require students to create a simple concept map on a specific topic (for example, a map of the manifestations of Eid celebrations in Islam and its connection to spiritual and social values). This activity promotes self-learning and strengthens students' organizational skills. The teacher should guide students in mapping skills, evaluate them, and provide them with feedback to improve them.
- **Diversifying the use of concept maps (flexibility in application):** The study recommends that teachers be flexible and creative in their use of concept maps. They are a tool that can be adapted
- **To different teaching methods:** they can be used in group work (where the class is divided into groups, each of which designs a part of a larger map, and then the parts are combined), as a formative assessment tool (students are asked mid-lesson to draw what they have understood on a miniature map, which immediately reveals the teacher's level of comprehension), or even as a brainstorming tool (beginning the lesson with a blank map, which is gradually filled with students' ideas before being guided to the correct concepts). Diversifying the methods of use will maintain the element of novelty and excitement and prevent student boredom.
- **Creating an appropriate technical environment:** If we are to use digital concept maps effectively, appropriate technical infrastructure must be provided in schools. Therefore, it is recommended that relevant authorities (the Ministry of Education and school administrations) provide interactive screens, computers, or tablets in Islamic education classrooms as much as possible to enable teachers and students to view and construct maps easily. Appropriate software should also be provided and technically supported, ensuring it is in Arabic, easy to use, and includes templates appropriate for Islamic content.

- **Conducting competitions and enrichment activities:** To encourage teachers and students to adopt the concept mapping approach, education directorates or schools can organize competitions for the best concept map in a specific Islamic education topic, whether among teachers or students this will encourage creativity in design and focus on content quality. Some outstanding maps can also be shared in educational exhibitions or school publications as examples of outstanding student work, boosting students' self-confidence.
- **Continued research and development:** Finally, the study recommends that educational researchers conduct further research on the use of concept maps in other curriculum areas and measure their impact on higher-order thinking skills (such as analysis and problem-solving) in Islamic education. It would also be useful to explore the effectiveness of online interactive concept maps (such as the use of collaborative platforms where students collectively design a concept map remotely) on the motivation of the new digital generation. All of these research efforts will help improve and better adapt the strategy and link it to deeper learning outcomes. In short, these recommendations emphasize that the concept mapping strategy has become a modern necessity for developing our teaching methods, including the teaching of religious values and concepts. Implementing these recommendations requires collaboration between teachers, supervisors, curriculum planners, and educational decision-makers to make the learning process more effective, enjoyable, and fruitful.

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