

Original Research Article

The Effectiveness of a Teaching-Learning Program Based on Cognitive Load Strategies in the Achievement of the Fifth Literary Students of the Subject of Islamic Education and the Development of Their Open Thinking

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Received: 04.06.2023

Accepted: 11.07.2023

Published: 21.07.2023

Journal homepage:<https://www.easpublisher.com>**Quick Response Code**

Abstract: The current study aims at detecting the effectiveness of a teaching-learning program based on cognitive load strategies in the achievement of students in the fifth literary subject of Islamic education and the development of their open thinking. The experimental design with partial control was chosen for two equal groups. The researcher intentionally chose Saad Secondary School for Boys, in Salah Al-Deen Governorate, as a field of experiment. The research sample consisted of (60) students, who were distributed randomly, by (30) students for each group. Equivalence was conducted in the variables (the chronological age of the students, the grades of the last year of the subject of Islamic education, the tribal open-mindedness test). The researcher prepared an achievement test and an open-mindedness test. A statistically significant difference was found between the means of the two research groups in achievement, in favor of the experimental group, as well as the presence of a statistically significant difference between the mean of the two research groups in the pre- and post-test of the open-mindedness test and in favor of the post-test.

Keywords: Educational-learning program, cognitive load, achievement, open-minded thinking.

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STATEMENT OF THE PROBLEM

Through the experience of the researcher in teaching the subject of Islamic education, and his endeavor to diagnose the low level of achievement in this subject for the preparatory stage, he reviewed a number of studies that examined the reality of teaching the subject in general and the preparatory stage in particular as the stage in which the research is to be conducted. The studies dealt with, including the study by (Ahmed and Sahib, 2019), indicated poor achievement. The low level of academic achievement is due to many reasons, including: the schools' failure to accommodate the increasing numbers of students, the student's role in receiving information, and the lack of experience of subject teachers with modern teaching methods and methods. In the researcher's attempt to limit some of the reasons, two questionnaires were prepared. The first which was distributed to a sample of supervisors specializing in Islamic education from the Directorate of Education in Salah Al-Deen

Governorate. They numbered (20), and included a question about male and female teachers' adoption of cognitive load strategies in the classroom educational situation. It became clear from their answers that the majority do not adopt it, that all teaching methods used are the usual ones, and that the teacher and the textbook are the only source of information. As for the second questionnaire, it was distributed to a sample of male and female subject teachers in the preparatory stage in the above-mentioned directorate, and they numbered (24) male and female teachers. A question was asked to them, saying why male and female teachers do not adopt modern teaching strategies? Their answers varied between the lack of educational means, the insufficient time allotted for the lesson to employ the educational means, and the fact that classrooms contain large numbers of students makes it difficult to employ such strategies, and the levels of students' performance in thinking are still low. In light of the lack of consideration of the school curricula by developing students' thinking abilities and making them practice

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mental processes that develop their open-mindedness and benefit them in employing what they learn in situations in a scientifically useful and more developed way, the study seeks to answer the following question: What is the effect of the educational-learning program based on cognitive load strategies on the achievement of the fifth literary students of Islamic Education and the development of their open thinking?

VALUE OF THE STUDY

The significance and value of the study can be summarized through the following:

1. The importance of educational programs lies in alleviating the problems of education and reaching the highest possible level of educational returns with the lowest costs and efforts, and reducing the burden of learning by designing more effective and attractive teaching methods adapted to technological development (Al-Zind, 2004: 178).
2. The great attention given to the cognitive load is due to its being an educational approach that participates with the learner in the educational-learning process as well as its activation of the teaching and learning processes. Perhaps what distinguishes it from other teaching methods is the impact it leaves on all elements of the educational process, so that the activation of all parties is a reason for achieving comprehensive and integrated results (Al-Qahtani, 2014: 420).
3. It may provide data that serves the educational process and its employees and focus on achievement as one of the basic variables that achieve the aims of the educational process.
4. It may supplement the educational-learning programs adopted by the educational process on the effective contribution to the implementation of the teaching procedures for the subject of Islamic education in the Ministry of Education.
5. The program prepared in this study may help curricula makers to design appropriate curricula for students according to cognitive load strategies.
6. Researchers and those interested in the field of education may benefit from the academic achievement test and the open-mindedness test.

Aims of the Study

The current study aims at:

1. Identifying the construction of an educational-learning program based on cognitive load strategies for teaching Islamic education for fifth-grade literary students.
2. Identifying the impact of the (educational-learning) program on the achievement of fifth-grade literary students in Islamic education.
3. Identifying the impact of the (educational-learning) program on developing open-minded thinking for fifth-grade literary students in Islamic education.

Hypotheses

From the aims of the study, the researcher formulates the following hypotheses:

1. There is no statistically significant difference at the level of significance (0.05) between the mean scores of the students of the experimental group who will study the Islamic education subject in the (educational-learning) program according to the cognitive load strategies, and the students of the control group who will study the same subject in the usual traditional way in the achievement test in the subject of Islamic education.
2. There is no statistically significant difference at the level of significance (0.05) between the mean scores of the students of the experimental group who will study the Islamic education subject using the (educational-learning) program according to the cognitive load strategies and the students of the control group who will study the same subject in the usual way in the open-thinking test.
3. There is no statistically significant difference at the level of significance (0.05) between the mean scores of the students of the experimental group who will study Islamic education using the (educational-learning) program according to the cognitive load strategies in the pre and post open thinking test.

Scope of the Study:

The study is limited by the following:

1. Secondary and preparatory day schools for boys affiliated to the General Directorate of Education in Salah Al-Deen governorate.
2. A sample of fifth grade literary students in secondary and preparatory day schools for boys affiliated to the General Directorate of Education in Salah Al-Deen governorate.
3. The first semester (course) of the academic year (2022-2023 AD).
4. The content of the first three units in the Islamic Education Book for the fifth grade of secondary school, for the academic year 2021 AD.

Defining Terms:

A. Educational-Learning program:-

Al-Laqani and Ali (1999) defined it as “the general scheme that is placed earlier on the process of learning and teaching, and includes educational procedures and experiences that the learner must acquire during a specific period to achieve specific goals”. Al-Laqani and Ali (1999: 1) and Muhammad (2004) define it as “all experiences, events, or any educational activity presented to the learner under the supervision of the educational institution and within a period of time” (Muhammad, 2004: 16).

Saad (2006) defines it as “a system of information and practical educational activities that operate under specific conditions and instructions that include content, activities, and elements that are

presented in an accurate scientific manner and teaching and evaluation methods according to the objectives of the program, taking into account the learners' needs and characteristics" (Saad, 2006: 4).

The procedural definition: the activities and experiences employed by the researcher according to the strategies of the cognitive load to teach Islamic education to the students of the experimental group of the research sample.

B. Cognitive Load:-

It is defined by Sweller (1998:6) as "the sum of the mental activities that occupy the working memory capacity during a specific time".

Moreover, Al-Feel (2015:93) defines it as "the total mental energy consumed by the learner while addressing a learning topic, solving a problem, or performing a specific task, and this mental energy varies from one subject to another and from one learner to another".

Procedural definition: A set of procedures followed by the researcher with the fifth literary students through the stages of the educational program to reduce the mental effort of their working memory and distractions through the use of appropriate teaching-learning strategies and identifying activities and teaching aids.

C- Achievement:

Shehata and Al-Najjar (2003:89) define it as "the amount of information and knowledge obtained by the student expressed in degrees in the test prepared in a way that can measure the specified levels".

It is also defined by Allam (2006: 305) as "the degree that an individual achieves or the level of success s/he achieves in a subject or educational field".

In addition, Alderman (2007: 101) defines it by "proof of the ability to accomplish what has been gained from the educational experiences for which it was set".

Procedural Definition: The achievement achieved by the students of the research sample in the subject of Islamic education, measured by the grades they obtain after responding to the items of the achievement test in the subject of Islamic education prepared by the researcher for the purpose of this research.

D- Open-Minded Thinking:

This is defined by Abdul Hamid (2006:188) as the student's ability to deal with data, figures and graphs, and depends on a set of components or skills represented in describing, organizing, summarizing, representing, analyzing and interpreting data, with the ability to predict and infer.

Also, Abu Al-Rayad (2013:7) states that it is mental operations and skills that the student performs while dealing with data, statistics, and statistical problems. These skills are describing, organizing, summarizing, and graphic representation of the data, then analyzing the data and reaching conclusions about that data.

Procedural definition: It is a set of organized mental operations that include describing, organizing, summarizing, representing, analyzing and interpreting data, which are carried out by students of the fifth literary through their practice of tasks, activities and issues, which are measured by the degree that the student obtains in the test prepared for this purpose.

Theoretical framework and previous studies

First: The educational-learning program: Among the theories that contributed to the emergence and development of educational designs and programs are general systems theory, communication theories, learning and education theories, including behavioral theories and cognitive theories (Saraya, 2008: 107). The educational program is one of the outputs of the science of instructional design, and it is a set of planned and organized academic strategies, activities, experiences, and knowledge to achieve the goals of the educational process in the best way (Al-Ghurari, 2003: 18). The program design has a set of different procedures, related to the selection of the educational material, to be designed, analyzed, organized, developed, and evaluated for educational curricula that help the learner in a faster and better way on the one hand, and to follow the educational methods on the other hand, with minimal effort and time (Qatami, 2001: 31). The educational program is not limited to a set of facts or information formulated and presented in a textbook, but rather extends and expands to cover the cognitive, emotional and skill aspects, which leads to achieving integrated growth for the learner (Al-Wakil and Hussein, 1990: 298). When preparing the educational program, it must go through three basic stages: the program planning stage, the program implementation stage, and the program evaluation stage.

1. Program planning stage:

This stage includes the following steps:

The first step: The Analysis: that is, analyzing the educational reality into general educational goals, educational problems, identifying students' needs, and analyzing learners' characteristics. Analysis means studying and collecting information and translating it into activities before designing or developing it. It includes resource analysis, task analysis, and learner needs and problems analysis (AbdulQader, 2013:71).

The second step: The Design: The design process includes plans, initial drafts, preparation of educational materials, selection of appropriate teaching aids, identification of teaching methods and activities,

evaluation methods, and how to address them to achieve the educational goals of the program (Qatami *et al.*, 2000: 141).

1. The implementation stage of the program (application): the stage in which the educational program is actually implemented, where classroom teaching begins using previously planned and prepared educational materials, as the appropriate teaching method is determined to achieve the goals, i.e. the method of presenting the educational material, and how to use appropriate technical means, activities, and arranging the teaching environment (Salamah, 2006: 17).

2. Program Evaluation Stage: Evaluation is a diagnostic and therapeutic process that shows how much teaching and learning has been achieved and what the teacher and learner have received in terms of feedback on their performance, method of teaching and its suitability for learners. (Al-Aqeel, 2003: 17). The evaluation process continues from the beginning of planning the program and follows with it until the implementation of the program, and after implementation also.

Second: Cognitive load strategies: John Sweller laid the foundation stone for the cognitive load theory, which is one of the cognitive theories on the one hand, and one of the learning and teaching theories on the other. This belongs to the theory of information processing, as it deals with the most important information presented by the theory of information processing, especially what is related to memory and its types. Working memory pays attention to information and processes it into audio and visual elements only. It is also characterized by the limited time that the information retains. This limitation stands behind the weakness of education, which necessitates the existence of strategies to confront it, and this is what Sweller did in the mid-eighties. The long-term memory is the one that stores the information, the knowledge that has been processed, and the skills that the individual has learned, and its capacity is not specified (Al-Feel, 2015: 131). The cognitive load theory according to Sweller(1999) states that good learning occurs among learners when the cognitive load on working memory is kept at a minimum in order to facilitate changes in memory remotely. It confirms that learning occurs by means of these two types of memory (Matar, 2011: 3).

Sources of Cognitive Load

1. Intrinsic (essential) cognitive load: This type highlights the difficulty in some of the content to be learned. This load is formed as a result of the complex nature of the information that must be dealt with, such as the difficulty of chemistry, physics, mathematics...etc. (Sweller & Chandler 1994, 185-231).

- 2. External (extraneous) cognitive load:** This type of load is attributed to the learning methods used in presenting information to students. The load appears because of extra effort as a result of improper teaching. The mismatch between the experience and the difficulty of the task occurs in two ways, the first of which is the experience that exceeds the experience of the learner, and secondly, the experience of the learner exceeds the difficulty of the task. This happens because of the interaction with the necessary information for the task while maintaining and preserving the task on the one hand, and the interaction between the information that is not important on the other hand, as all this leads to a loss of time and effort (Kalyga *et al.*, 1998: 1-17).
- 3. Germane Cognitive Load:** When the learner participates in the intended process to process the knowledge that leads to the construction of the cognitive schema. The cognitive load will increase in any way and the load is appropriate or compatible as it helps and supports the construction of the mental schema (Sweller *et al.*, 1998:251-296).

Learning and educational strategies based on the cognitive load theory: Cognitive load theory refers to a set of educational strategies that reduce the cognitive burden or load on the learner's working memory, including:

- Focused Attention Strategy:** This strategy works to reduce the distraction of attention during the presentation of the educational material, which requires the elimination of the causes of distraction that result from the textual and visual elements of the educational material itself. So, the distraction occurs when a person needs to pay attention and think about more than one source of information in one activity. This requires reviewing the presentation of educational materials to remove or reduce distraction, so the strategy of focusing attention came to direct the learner's attention to specific stimuli in the classroom without other stimuli (Ali, 2011: 207).

Steps for conducting the Focused Attention Strategy:

1. The teacher begins the strategy by announcing the specific focus point for the educational task, which s/he implements by writing it on the board or displaying it, and often the focus point is a *concept*.
2. Students are required to make the point of focus which has set their focus of attention, to set the necessary time while doing focus on a task, away from distraction factors.
3. Guiding students to adjust and determine the method of teaching which is appropriate to the educational task, and at the appropriate time for

their learning patterns (Nofal and Faryal, 2009: 156).

4. Finding out what information they possess on this subject, and after organizing the information, we are able to generate questions that will help us to know what we want.
 5. Encouraging the students to write notes in the chart specialized for the required information to exchange among themselves the information that they have reached.
 6. A chart is used for more educational-learning activities such as drawn charts and educational pictures (Ali, 2011: 219).
- **Free goal strategy:** This strategy considers that presenting the educational information or problem in a free goal manner enables the student to focus on the information that is presented to him/her, and uses it when necessary to achieve the desired goal in order to spare the working memory the high levels of cognitive load. It aims to define the educational outcomes that the student is expected to achieve after passing through a specific educational experience (Ali, 2011: 208).
 - **Free Goal Strategy:** This strategy considers that presenting the educational information or problem in a free goal manner enables the student to focus on the information that is presented to him/her, and the student uses it when necessary to achieve the desired goal in order to spare the working memory the high levels of cognitive load. It aims to define the educational outcomes that the student is expected to achieve after passing through a specific educational experience (Ali, 2011: 208)

Free Goal Strategy Steps:

1. Present the strategy on the board or the projector, and then tell the students that it is a visual strategy that helps them organize the information visually, and choose the subject to be taught.
2. The teacher trains his students on how to fill in the chart through the following steps:
 - A. Writing the topic at the top of the chart, distributing the chart as activity sheets to the students (topic _ sub-topic).
 - B. Divide the students into collaborative groups. Create a list of questions. Start by asking, What do you want to know more about?
 - C. Find out what information they possess on this subject, and after organizing the information, we are able to generate questions that will help us to know what we want.
 - D. Encouraging students to write notes in the chart of information required to exchange among themselves the information they have reached.
 - E. An ordinary chart is used for more educational-learning activities than drawn

charts and educational pictures (Ali, 2011: 219).

- **Formality strategy:** The formality strategy considers that the limits of working memory can be expanded under some circumstances, by reducing the external (extraneous) cognitive load during the design of education, and includes the student's position and content experiences with pictorial schemes, graphs, or shapes and maps. Cognitive content operates according to a form of storable images and without mental effort (Qatami, 2013: 574).

Principles of work according to the formality strategy

1. When the student sees how the concepts that make up the scientific phenomenon are related. This facilitates the learning process, and focus is on the basic information.
2. The student's mind organizes and stores information in an orderly manner. When previous information is recalled, schemas begin to provide a framework in which new information is absorbed and put into place.
3. Presenting information through a visual organizer that contains the main ideas is easier to remember than presenting it in a long text presented through words.
4. The use of both the spoken language or the visual language to form schemes leads to active and effective learning. The student uses both languages in order to form the cognitive structure in his mind and organize it (Al-Feel, 2015: 161).

Brevity strategy: it is a mental process carried out by the student to extract the basic elements in the text of the educational material by forming coherent phrases that lead to a clear meaning in the mind of the student. In addition to that, it allows the student to identify the main ideas in the text of the study material, and to integrate the important information in the text by organizing and realizing the relationships between them. Here, the teacher directs the students to integrate the new information presented to them in the (text) and to identify the main ideas, and this procedure gives the opportunity to monitor the understanding of the subject matter (Abdul Bari, 2010: 178).

Brevity Strategy Steps

1. Read the educational material to be summarized with understanding and consideration, and search for the main topic that is the focus of the lesson.
2. Look for the main and important general ideas in the studied topic, and the important detailed information, neglecting the repeated information.
3. Look for the relationships between the main ideas, and between the ideas and the detailed information that they contain (Al-Zaghoul, 2003: 91).

4. If the material is relatively long, summarize infrequently, after four or five paragraphs so that the summarization process is not tedious. Write what you have summarized in an integrated and organized text and in your own language. You can review what you have summarized before the class or final exam in the form of charts or equations (Ali, 2011: 21).

Open- Minded Thinking: It is a dimension of personality in which extroverted individuals are distinguished by the cognitive style that distinguishes creative individuals from traditional, realistic individuals. They have high confidence, are sensitive to beauty, are more aware of their feelings, and are distinguished from closed people who are resistant to change and are mysterious, and each of them can perform different appropriate functions in society (Johnson, 2006: p.4). It is thinking in which two conditions are met: sound methods and methodology are followed and the best information is used in terms of its accuracy and adequacy (Al-Awfi and Abdel-Rahman, 2010, 69). Baron points out that active open-minded thinking is a cognitive ability represented in the willingness to think which contributes to human tendencies to avoid bias towards self-thinking and the tendency to think in a way that enhances and supports conclusion in a high and efficient manner. This type of thinking creates a different aspect of bias in belief in every process of research and inference. It allows for new possibilities or capabilities, new goals, and evidence against possibilities that already seem strong. It is active and effective because it does not look at these things only, but rather searches for them outside, and this type helps individuals to become broad-minded, as it confronts the basic bias in thinking. It is a reminder of the normative theory and represents an important part of a new model in thinking that consists of inference and judgment (Ayash and Saif, 2018, 5). The cognitive ability of thinking is by considering all the positions of the issue at hand in order to issue a judgment about it, as it represents flexibility in thinking to the opinions and beliefs of others, and the tendency to generate and discover unfamiliar things (productive thinking) and conflicting alternatives in thinking (Judith, 2009: 5). Practitioners of open thinking are more willing to open-mindedly, and their viewpoints may be correct. In the event that their viewpoints may be incorrect, we do not rule that out sometimes, so we provide them with evidence for that, as it is a challenge to their beliefs. It is highly likely that their views are separate from the views and beliefs of others. The individual with active open-mindedness cares about the points of view of others far from his point of view. Therefore, his/her thinking is in a dialogical manner with them and takes a position and changes the position when the evidence and reasons s/he possesses are not sufficient to do so. On the other hand, the readiness of people with a closed mind deals with a set of beliefs and opinions in a rigid manner, and this makes them

less ready to accept different points of view from others. Two important ones are the cognitive ability and the appropriate readiness that may be associated with fanaticism in individuals, as it does not differ between individuals who adopt proficiency against the performance goals issued by them. Thus, individuals who have high cognitive ability realize high experiences and self-efficacy, especially when the emphasis is on the mastery system. This differs with individuals whose ability to think is less, their proficiency is less. In addition, the cognitive ability may be part of outside showing readiness and in active open thinking in particular (Stanovich & West, 2007: p.222).

Previous Studies:

- **Studies that have dealt with the cognitive load:**
 - 1- **Hassan (2010):** The study aims to know the cognitive load and its relationship to early and late voluntary attention among middle school students in mathematics. The study sample consisted of (120) male and female students, and the researcher used the attention scale. The statistical methods employed are: (arithmetic mean, standard deviation, percentage, repetitions) The study concluded that students have delayed voluntary attention.
 - 2- **Ajaj (2016):** The study aimed to know the effectiveness of an educational program based on the theory of cognitive load in developing the problem-solving skill for people with learning difficulties. The study sample consisted of (16) students. The researcher used a mathematical problem-solving skill test with the statistical methods: (t-test for two independent samples, Cronbach's alpha equation). The study concluded that the students of the experimental group outperformed the students of the control group.
 - 3- **Al-Rawahy (2009):** The study sought to identify the impact of using the Web Quest on developing effective open-minded thinking skills among tenth grade students in the Sultanate of Oman. The sample consisted of (60) students from the tenth grade. The sample underwent a test of open-thinking skills in the content of statistics in the basic tenth grade curriculum as a pre and post - test measurement. The results of the study showed that there were statistically significant differences in favor of the experimental group that used the Web Quest compared to the performance of students in the control group.
- **Aspects of benefiting from previous studies:**
 1. References which can be used for benefit.
 2. Identifying research procedures related to building educational programs, and adopting appropriate procedures to measure the effectiveness of the program.

3. Supporting the theoretical aspects of the current research.
4. The statistical methods used, and what is suitable for the current study.

METHODOLOGY

Experimental design: The researcher adopted the experimental design with partial control for two equal groups, one experimental and the other a control, according to the following table:

Table 1: Experimental design

Group	Pre-test	Independent variable	Dependent variable	Post-test
Experimental	Open- minded thinking test	educational-learning program	Open minded thinking achievement	Achievement test
Control		usual		Open minded thinking test

Research Community and Sample:

- A- **Research community:** The current research community included fifth grade middle school students in Baiji for the academic year 2022-2023.
- B- **Research sample:** The researcher chose one sector intentionally, i.e. Saad Secondary School for Boys for the purpose of conducting the experiment,

being close to the researcher's residence and the administration's cooperation with him. These all maintain the confidentiality of the experiment. The school consists of three class divisions, and the number of students in both groups reached (60) students, after excluding the students who failed, as shown in the following:

Table 2: The number of students for the experimental and control research groups before and after exclusion

Group	Number of students before exclusion	Number of excluded students	Number of students after exclusion
Experimental	31	30	30
Control	33	30	30
Total	64	30	60

Equivalence of the two research groups: The researcher was keen before starting the experiment regarding the equivalence of the experimental and

control groups in some of the variables that are believed to affect the results of the experiment:

Table 3: Chronological age equivalence, average previous year of the subject, and the pre-test for open-minded thinking

Equivalence	Group	Number of the sample	Arithmetic mean	Standard deviation	Degree of freedom	Calculated t-value	Tabular value	Significance level
chronological age	experimental	30	170	12.310	58	0.27	2.00	No-significant
	control	30	169	12.311				
rate of the previous year	Experimental	30	74.43	12.42		0.267		
	control	30	76.82	12.91				
The thinking pre-test	Experimental	30	92.53	6.12		0.267		
	Control	30	52.31	5.21				

Controlling the extraneous variables: In order to control the extraneous variables that can affect the experiment variables, the researcher has attempted to control them in order to reduce their impact on the results of the experiment.

Research Tool:

- **Achievement Test:**

- A- **Preparing the test:** To prepare the test tool, the researcher, through familiarizing himself with a number of educators specialized in the fields of building educational standards and similar studies, prepared an achievement test consisting of 30 test items.

B- **Validity:** To ensure the appropriateness of the test, it was presented to a group of experts and arbitrators in the fields of teaching methods and measurement and evaluation, where (6) items were modified.

C- **Application to the exploratory sample:** The scale was applied to a sample of (50) students from the Al-Taakhi and Al-Mansoor schools, during which the average response time was calculated, the incomprehensible (ambiguous) items were revealed, and the instructions were made clear.

D- **Calculating the coefficient of ease and difficulty.** The coefficient of ease and

difficulty was calculated for the items reaching (0.29 - 0.62), while the discrimination was (2.52 - 9.51).

E- **Stability:** The researcher made sure of the stability of his test by using the method of re-testing more than once under similar conditions, as the stability coefficient reached (0.79).

• **Open Thinking Test:**

A. **Preparation of the test:** To prepare the test, the researcher prepared an open thinking test consisting of (20) items.

B. **Validity:** To ensure the suitability of the test for the research sample, the researcher presented it to a group of experts and arbitrators in the fields of teaching methods and measurement and evaluation, where (5) items were modified.

C. **Application to the exploratory sample:** The test was applied to a sample of (50) students from Al-Taakhi and Al-Mansour schools, during which the average response time was calculated.

D. **Calculation of the ease and difficulty coefficients:** these were calculated for the test items, as they amounted to (0.30 - 0.63), while discrimination was (2.52 - 9.51).

E. **Reliability:** The researcher made sure of the reliability of his test by using the method of re-testing more than once under similar conditions, as the reliability coefficient reached (0.81).

Sixth: Experiment application procedures

1. Completing all research requirements, defining the scientific material, organizing the weekly lesson schedule for the material, and allocating two days of each week for teaching the two research groups.
2. The researcher began applying the experiment to the research sample on Monday 11/21/2022 and taught them himself according to the teaching plans that he had prepared. He taught

the experimental group according to the educational - learning program, while the control group were taught according to the usual traditional method.

3. Applying the Pre- Open Minded Thinking Test: The researcher applied the Pre- Open Minded Thinking Test to the students of the two research groups on Tuesday 22/11//2022.
4. Applying the achievement test: The researcher applied the achievement test to the students of the two research groups on Sunday 11/1/2023.
5. Applying the dimensional open-mindedness test: The researcher applied the dimensional open minded thinking test to the students of the two research groups on Monday 12/1/2023.

Statistical Methods: The researcher used the following statistical methods in the research procedures and analysis of its results:

1. The t-test for two independent samples.
2. chi-square (χ^2).
3. The Alpha-Cronbach equation.

Presentation and interpretation of the results: This chapter includes a comprehensive presentation of the research results that were reached, their analysis and interpretation, and a statement of the conclusions reached by the researcher and a number of recommendations and suggestions as follows:

First: Presenting the results:

The First Hypothesis: There is no statistically significant difference at the level of significance (0.05) between the mean scores of the students of the experimental group who will study the Islamic education subject in the (educational-learning) program according to the cognitive load strategies, and the students of the control group who will study the same subject in the usual way in the achievement test in Islamic education. To verify this hypothesis, the researcher extracted the arithmetic mean and standard deviation of the two research groups in the achievement variable, and then used the t-test for two independent samples, and the results are listed in Table (4).

Table 4: The computed and tabulated t-value for the experimental and control research groups in the achievement test

equivalence	Group	Number of the sample	Arithmetic mean	Standard deviation	Degree of freedom	t-value		Significance level
						Calculated t-value	Tabular value	
chronological age	experimental	30	69.65	6.62	58	76.6	2.00	Statistically significant
	control	30	60.37	5.13				

In order to identify the significance of the difference between the above two means, the researcher used the t-test for two independent samples to find out the significance of the statistical differences at the level of significance (0.05). The calculated t-value (6.76) is higher than the tabular t-value (2.00) with the degree of freedom (58). It is concluded that there is a statistically

significant difference between the means of the two research groups in achievement, in favor of the experimental group.

The Second Hypothesis: There is no statistically significant difference at the level of significance (0.05) between the mean scores of the students of the

experimental group who will study the Islamic education subject using the (educational-learning) program according to the cognitive load strategies and the students of the control group who will study the

same subject in the usual way in the open thinking test. To verify this hypothesis, the t-test was used for two independent samples (t-test), and the results were as listed in Table (5).

Table 5: The calculated and tabulated t-value for the experimental and control research groups in the open-mindedness test

Equivalence	Group	Number of the sample	Arithmetic mean	Standard deviation	Degree of freedom	t-value		Significance level
						Calculated t-value	Tabular value	
chronological age	experimental	30	66.36	6.61	58		2.00	Statistically significant
	control	30	61.34	5.19				

The researcher used the t-test for two independent samples to find out the significance of the statistical differences at the level of significance (0.05), as the calculated t-value (5.82) is higher than the tabular t-value of (2.00) and the degree of freedom is (58). This means that there is a statistically significant difference between the means of the two research groups for the development of open-mindedness.

The third hypothesis: There is no statistically significant difference at the level of significance (0.05) between the mean scores of the students of the experimental group who will study Islamic education using the (educational-learning) program according to the cognitive load strategies in the test of open-minded thinking pre and post -tests. To verify this hypothesis, the t-test was used for two related samples (t-test), and the results were as listed in Table (6).

Table 6: The results of the pre and post test for the students of the two research groups in open-mindedness

Group	Arithmetic mean	Standard deviation	Mean difference	Deviation of variances	t-value		Significance
					calculated	Tabular	
Pre-experimental	92.53	02.6	6.99	76.3	8.29	2.00	Statistically significant
Post-experimental	53.61	78.9					

In order to identify the significance of the difference between the two means, the researcher used the t-test for two interrelated samples to find out the significance of the statistical differences at the level of significance (0.05). The calculated t-value of (8.29) is higher than the tabular t-value of (2.00), which means there is a statistically significant difference between the means of the two research groups in the pre and post-test in the open-mindedness test, in favor of the post-test.

Through the results of the current study, the students of the experimental group which studied according to the impact of cognitive load strategies, showed superiority over the students of the control group, which studied using the traditional method. This result can be attributed to the following: -

- A. The inclusion of the educational-learning program based on cognitive load strategies on more than one sub-strategy and skill to achieve a specific educational goal, as it represents a homogeneous mixture that flows into one of the cognitive learning methods.
- B. Teaching according to the educational-learning program based on cognitive load strategies is more effective than the usual method, as it is one of the modern teaching methods and approaches that students have not known before. It opens the way for male and female teachers to detail the scientific material and link it to the previous information, and

the use of this method requires multiple cognitive and mental procedures and skills, and this is what increases the ability of students to organize information and integrate it into their knowledge structure.

- C. Students in modern teaching methods represent an axis of the educational process, which requires them to launch the activation of their prior knowledge, to reach a state in which the cognitive schemes available to them before meet the new knowledge presented to them. In this case, these methods address the thinking errors that are among the obstacles that lead to defining understanding for the students during their learning of the scientific concepts in their study of the material and Islamic education.

CONCLUSIONS

The researcher has concluded the following:

- 1- The benefit of the educational-learning program based on cognitive load strategies decreases if the group expands to more than eight individuals, and the benefit increases if its number is reduced, and the best is when the number is 4-5 individuals.
- 2- The of the educational-learning program method which is based on cognitive load strategies depends on the students' activity and works to increase their achievement.

SUGGESTIONS

The researcher suggests the following:

- 1- Evaluating the Islamic Education book for the fifth literary grade in the light of productive thinking skills.
- 2- The effectiveness of a training program based on cognitive load strategies in developing the communication skills of Islamic education teachers.

RECOMMENDATIONS

Based on the results, the researcher recommends the following:

- 1- The use of the educational-learning program based on cognitive load strategies by members of the teaching staff, in all our educational institutions, which contributes to the development of their open thinking.
- 2- The Iraqi Ministry of Education should train its teaching staff on how to use cognitive load strategies by organizing training courses that are evaluated by its preparation and training directorates.

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Cite This Article: Jalal Mizher Mohammed (2023). The Effectiveness of a Teaching-Learning Program Based on Cognitive Load Strategies in the Achievement of the Fifth Literary Students of the Subject of Islamic Education and the Development of Their Open Thinking. *EAS J PsycholBehavSci*, 5(4), 89-99.
