

The Effectiveness of Teaching Reading Using the Needham Model in Improving the Reflective Thinking Skills of Tenth Grade Students in Jordan

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Abstract

The research aimed to determine if tenth-grade teachers who were using the Needham approach had improved their reflective thinking skills (visual vision, detection of fallacies, reaching conclusions, giving convincing explanations, and developing proposed solutions). Also, Analyzing the Needham model's effectiveness after a month of involvement in terms of helping students with their reflective thinking. The study used a quasi-experimental design, including pre-post-follow-up assessments, to accomplish the objectives. 28 teachers of 10th grade were selected for the study's sample in a practical way. Data comparing pre- and post-Needham model assessments of reflective thinking skills (visual vision, detection of fallacies, reaching conclusions, giving convincing explanations, and developing proposed solutions) showed statistically significant improvements for the post-test. Furthermore, there are no statistically significant changes in reflective thinking abilities between the post-and follow-up -tests.

Keywords: Teaching reading, Needham model, Reflective thinking skills, Tenth grade students, Jordan.

Introduction

The cognitive acceleration of the modern era has rendered new information obsolete in a brief time. This necessitated a reevaluation of the foundations of selecting, planning, and constructing curricula and instructional strategies in order to corroborate the importance of realizing the mind and expanding the horizons of knowledge (Lee et al., 2019). In addition to preparing individuals who can keep pace with this acceleration and the qualitative transformation of education from quantitative education to qualitative education, which compels them to produce knowledge and advance their society (Fadhil, 2020).

Regarding current trends and international development movements in scientific teaching curriculum and methodologies, this has an influence on science education. At the same time, it is seen as a tool for directing and carrying out those movements by achieving teaching strategies and models based on learning theories that seek to describe and analyze the teaching and learning processes in order to create an educational environment that produces the desired educational outcomes in the learner's personality in terms of cognitive, emotional, and skillful abilities (Abu Shama, 2017). All of these approaches stressed that the learner is the center of the educational process and that the teacher's role is minimized to the greatest extent possible so that the student engages in educational

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activities, discovers knowledge on his own, and is able to understand the connections and generate meanings between the information he learns, thereby confirming the role of earlier knowledge in establishing new learning (Al-Ashqar, 2018).

Despite this interest, there is a disconnect between the substance of scientific education research and the recommendations made by all scientific conferences, as well as between the present real practices in education in schools (Jalehem, 2018). It keeps track on the state of teaching at the various levels of general education, which has several flaws, including its incapacity to produce creative graduates who can express and shape knowledge (Alfarhan, 2020). In addition to the fact that conventional education is still widely practiced in schools, evaluation processes are still restricted to counting the number of repeated experiences and partial information that students have, which is a sign of learning difficulties (Radwan & Al-Ayasra, 2023).

According to Al-Saud et al. (2023), one of the challenges facing the educational process is the use of traditional teaching methods, which continue to dominate in-classroom instruction. These methods made education theoretical and discouraged students from studying it because they made it seem negative and difficult (Mahdi, 2022). Teaching plays a crucial role in expanding scientific knowledge and providing the foundations and rules for technological advancement, as it includes a great deal of information about phenomena that causes the learner to pause and ask numerous questions, some of which he poses to the teacher and others that remain subjective and require self-interpretation (Abd & Hussein, 2020). Regardless of the query type, the learner must exert mental effort during the teaching and learning processes. This mental exertion represents the thinking processes that must be prioritized and developed by the learner, which necessitates the search for new strategies that transform the student into a knowledge producer rather than a consumer (Al Amoudi, 2019).

Education for thinking is becoming more important as a fundamental prerequisite for the success of the learner and the growth of society since thinking in its different forms is the skill that the learner must possess and be educated to utilize in order to be able to deal with information successfully (Choy et al., 2019). Reflective thinking is one of the thinking patterns that allow the student to evaluate the information at his disposal, monitor his approach and the steps he takes to deal with various ideas and situations, and then come to the proper conclusion regarding them. This applies to how the person deals with life situations in general (Al-Katheri & Al-Shboul, 2023). As a result, the learner has a significant learning effect since the knowledge was acquired via conscious mental effort.

Therefore, educators advise that thinking skills be included in the curriculum while also creating an environment that fosters thinking, giving students a proactive and useful role in learning circumstances, and allowing them the flexibility to reflect, critique, and inquire (Salido & Dasari, 2019). Many studies have stressed the importance of developing students' critical and reflective thinking skills by highlighting the presence of these abilities in course materials, as well as by creating learning environments and exercises in which they can put these abilities to use (Nuraini et al., 2020; Hidayat, 2022). The investigators have always been interested in reflective thought. Many studies, including one by Akdemir (2018) and Kablan & Günen (2021), have determined the relevance of reflective thinking in the classroom. This is because the capacity to think reflectively is correlated with the cognitive structure and its organization. There is also some reflective contemplation on your own constructivist experiences (Gürbüz, 2018).

Yaacob (2021) argued that one cannot have an experience outside of one's sensory perceptions and one's own mental constructs. According to Noer (2020), the scientific sense is an explanation of the phenomena through the congruence of knowledge with empirical data. In order to enhance students' capacity for critical thought, it is necessary to provide instruction in this skill and to instruct them on how to use it in a variety of

contexts (Lui et al., 2019). To achieve this, it is important for teachers and students to work together to develop a shared understanding of scientific concepts and enhance the student's performance in classes (Kholid et al., 2020). Students' scientific senses can be uncovered through reflective appraisal of their own work.

On the basis of this, it is necessary to direct students to use their senses and mind in the conscious and careful awareness of the observed phenomena, to reflect on what they learn and examine it, and to process the information provided to them and connect it to their prior experiences in order to generate new contexts in learning to develop their knowledge structure (Ali et al., 2019). This confirms the functional aspect of the individual's information and life experiences, confirming the need for teaching models that facilitate the practice of various thinking skills (Ouni et al., 2019). This is consistent with the constructivist theory, which is considered a reference and framework for educators to invoke and adopt in order to improve teaching methods and strategies so that it provides a greater range of movement as opposed to teaching methods that are difficult to implement due to multiple factors such as the curriculum, the school environment, and the external environment (Noer, 2020). Constructivism is a reception process that entails rebuilding learners for new meanings within the context of their prior knowledge and the learning environment, as real-world experiences and prior knowledge, as well as the learning environment, constitute constructivism's pillars (Lee et al., 2019).

Despite the significance of thinking and the emphasis of studies on skill acquisition, one who reflects on the current teaching practices in schools realizes that they do not provide the learner with the opportunity to exercise higher-order thinking skills. In addition to the lack of educational activities that facilitate the development of the learner's capacity to process ideas, present them, diversify them, and reflect on them, it is necessary to search for instructional models that address this deficiency and meet these needs (Kholid et al., 2020).

The nature of the current learning environment renders the learner passive; he or she receives information without the mind's awareness, then memorizes and regurgitates it for examination purposes; this makes the information less amenable to storage in the cognitive structure and the collection temporary and not permanent. This is supported by numerous prior studies in the field of education, such as the inability of learners to exercise reflective thinking and possess its skills (Muhammad, 2020; Hussein, 202). This demonstrates the inadequacy of current teaching practices in attaining these objectives, which necessitates the use of other models, such as the Needham constructivist model, to train students to construct meaning and practice thinking. Despite the significance of this model, as reflected in its five phases, there is a paucity of research concluding that this model is effective for accomplishing a number of teaching objectives. This prompted the researcher to employ this model to enhance reflective thinking among tenth-graders in Jordan.

Research Question

Based on the aforementioned, this study aims to answer the following questions:

1. Is the application of the Needham constructivist model associated with improvements in pre-and post-test scores on measures of reflective thinking (visual vision, detection of fallacies, reaching conclusions, giving convincing explanations, and developing proposed solutions) among tenth-grade teachers?
2. Is there a statistically significant effect of the application of the Needham constructivist model in improving reflective thinking skills in the follow-up measurement (visual vision, detection of fallacies, reaching conclusions, giving convincing explanations, and developing proposed solutions) among tenth-grade teachers?

Literature Review

The study of how learning occurs is central to the constructivist theory. Based on the premise that the learner develops understanding and knowledge of the world around him through interaction with objects and reflection on those interactions (Lee et al., 2019). Therefore, the constructivist theory is one of the cognitive theories that are concerned with the learner's internal cognitive processes and emphasizes the need to create a learning environment that enables the learner to construct his own knowledge through a variety of intended experiences, leading to the development of self-knowledge (Fadhil, 2020). In order to accomplish this, the teacher assists the student in thinking about the information, classifying it, re-adapting it, or modifying it in order to link it with its related counterparts in his knowledge structure, once the information has reached him. And so forth, until what is learned becomes increasingly significant (Abu Shama, 2017). Consequently, constructivism is predicated on the transition from external to internal factors of learning.

Therefore, teaching and learning processes based on constructivism seek to enhance comprehension and provide the learner with opportunities to exercise and develop his critical thinking skills (Al-Ashqar, 2018). Thus, the constructivist theory considers the learner to be the focal point of both the learning process and the teaching practices (Jalehem, 2018). According to the aforementioned, the Needham constructivist model encourages the learner to link new knowledge with what is already present in his knowledge structure of information and experiences in order to help him develop the knowledge structure, facilitate the retrieval of information, and lengthen the retention period (Alfarhan, 2020). Whereas the Needham model includes five progressive stages that reflect the logical sequence of learning according to constructivism and explain the procedures that the teacher must employ to develop learners' thinking in order to build knowledge and meaningfully connect new learning to previous learning, these stages are as follows:

- Orientation stage: provides students with psychological preparation for the subject matter of the lesson. It seeks to pique the learner's interest and motivate him to continue and maintain his interest. By utilizing visual educational materials (videos, images, and illustrations) depicting real-world situations, phenomena, or problems, students are required to exercise their critical thinking skills by generating preliminary hypotheses to explain the phenomenon, clarify the situation, or solve the problem (Radwan & Al-Ayasra, 2023).
- The idea generation stage: aims to increase learners' awareness of their prior information and knowledge by recording their predictions from the previous stage, asking problem-related questions, allowing them to respond, discussing their answers in small groups, and writing down their responses. It may require the creation of concept maps or presentations to summarize ideas (Al-Saud et al., 2023).
- Restructuring of ideas :this stage consists of four sub-procedures; interpretation of ideas, presentation of contradictory ideas, creation of new ideas, and evaluation of learning. It aims to reach the correct ideas through the students' practice of educational activities in small groups of (3-6) students, while taking notes, conclusions, and interpretations that have been reached in order to attain new knowledge related to the content of the questions posed in the previous stage, while writing a detailed report on each activity, whether it was individual or group-based. After completing these activities, each group compares their results to their initial hypotheses, and then presents their correct ideas to the other groups. At the conclusion of this phase, the final ideas are summarized and recorded on the whiteboard (Mahdi, 2022).
- Application of ideas: it strives for the learner to implement newly acquired knowledge in various contexts Abd & Hussein, 2020).

- Reflection stage: In this stage, the learners are given the opportunity to reconsider their ideas and ensure that they have been modified, to review the thought processes in the worked-on concepts and compare them to the information presented in the guidance stage, and to review the correlations between new learning and previous learning. In addition to writing a group report on a work assignment, students are required to compose an individual report that includes their own observations and a summary of the group discussion (Al Amoudi, 2019).

Examining these phases reveals that they involve the learners' reconstruction of new meanings in the context of their current knowledge, prior experiences, and the learning environment (Al-Saud et al., 2023). Real-world experiences and prior knowledge serve as the basis upon which new learning is constructed. There are a number of considerations that must be met in each stage, which are outlined in the introduction to the teacher's guide. Additionally, the teaching moves included in each of these stages are outlined in each lesson of the guide in order to achieve sequence and interdependence between the stages (Al Amoudi, 2019).

Reflective thought is one of the instruments for an individual's sustainable development because it represents the zenith of mental processes. Therefore, educators must make an effort to develop it, as it enables the individual to plan and evaluate his manner for the decision-making steps and procedures he follows (Al-Katheri & Al-Shboul, 2023). Reflective thinking is dependent on problem-solving skills, and a reflective person is able to discern relationships, create summaries, use the information to justify his point of view, analyze premises, and review and seek alternatives (Salido & Dasari, 2019). Thus, the individual is better able to direct his life and is less empathetic toward others. This provides the individual with a sense of control over his reasoning, which he employs successfully, and a sense of self-confidence when confronting tasks (Choy et al., 2019).

The educators explained that there is a lack of teachers' role in developing themselves and resolving the problems of their students and that this is due to their lack of reflective thought and lack of professional development use (Nuraini et al., 2020). Numerous accreditation and academic quality authorities within the faculties of education emphasize the significance of teachers engaging in reflective thinking and view it as a crucial criterion for their preparation (Hidayat, 2022). Because of its role in the professional development of the teacher, on the one hand, and in gaining a better understanding of students' learning patterns, on the other, and the resulting diversity of teaching methods, evaluation and improvement of teaching methods, and then the teacher's exercise of his responsibilities with a high level of professionalism, on the other (Akdemir, 2018).

Reflective thought is a crucial characteristic of a professional educator. John Dewey defines reflective thinking as a process of meticulous deliberation and conscious consideration of any educational practice, whereby the individual responds to problem-solving from multiple perspectives and takes into account all possibilities (Kablan & Günen, 2021). Teachers engage in reflective thinking when they actively, consciously, and carefully examine their beliefs, experiences, and conceptual and procedural knowledge in light of the reality in which they live (Gürbüz, 2018). It enables him to solve the teaching and learning problems he confronts and to demonstrate the tacit knowledge in a new sense, which aids him in deriving inferences from his sensory experiences and leads him to the future practices he desires (Yaacob, 2021).

Therefore, reflective thinking is considered one of the most important patterns of thought because it reduces haste in making judgments and increases the individual's capacity to see aspects of matters and work deliberately to achieve specific goals by setting the consequences based on the mind's realization (Noer, 2020). Therefore, the practice of reflective thinking transforms a person from a knowledge consumer to a knowledge producer through mental effort (Lui et al., 2019). There is a set of fundamental abilities

for this kind of thinking that have been endorsed by several earlier studies, including the studies of Ali et al. (2019), Ouni et al. (2019), and Kholid et al. (2020), are as follows:

- **Visual vision:** It encompasses the individual's visual ability to locate the existing relationship between the subject's dimensions, and its constituent elements, or a drawing or illustrative form that displays the subject's characteristics and identifies its components.
- **Detection of fallacies:** By distinguishing erroneous, illogical, or uncommon relationships, the learner is able to identify voids in the presented subject matter.
- **Reaching conclusions:** It consists of the learner's ability to draw the correct conclusions for a given problem by identifying the appropriate relationship and examining the topic's content closely.
- **Giving convincing explanations:** It encompasses the individual's ability to solve a problem by providing a logical interpretation of the outcomes based on past experiences and the nature and characteristics of the issue.
- **Developing proposed solutions:** It incorporates the learner's ability to construct logical steps to solve a problem, based on anticipated mental perceptions of the problem.

In the Needham constructivist paradigm, scientific content is presented in the form of perplexing problems or queries that induce cognitive dissonance in the student (Fadhil, 2020). Which prompts him to reflect on the circumstance or problem, seek a solution, and use a diversity of sources from his activities to prove or disprove the accuracy of his predictions (Al-Ashqar, 2018). Which equips him with the abilities of reflective thought through visual perception and the discovery of fallacies in an effort to find the most appropriate solutions and reach scientific conclusions (Abu Shama, 2017). Then, evaluate these conclusions by comparing them to the initial forecasts in order to correct these errors. In addition, through the phases of the Needham constructivist model, the student's practice of reflective thinking skills affords him ample space (Radwan & Al-Ayasra, 2023). The ability to provide convincing explanations and propose solutions to perplexing problems and situations can be honed during the stages of idea reconstruction and application. In addition, the student's visual vision skill of observing, pondering, and identifying relationships between parts of a problem or situation is emphasized during the guidance stage, which includes presenting situations to students in various formats, such as pictures, shapes, videos, or practical demonstrations (Al-Saud et al., 2023). In order to provide convincing explanations, the student can also identify erroneous relationships and fallacies between the problem's components during the stage of idea reconstruction (Mahdi, 2022). We also find that the Needham constructive model allows for self-reflection and collective reflection on the situation and the issues addressed, as well as evaluating ideas to find a solution, which paves the way for the development of the skills of meditation and observation (Abd & Hussein, 2020).

Previous Studies

Al Amoudi (2019) Determined the extent to which chemistry teachers in Mecca's second-year high schools implemented Needham's five-phase constructivism model when instructing their students, assessed the depth of their own reflective thinking, and explored the connections between these two variables. This was accomplished by testing the hypotheses and answering the research questions using the analytical descriptive methodology. The study's participants were a random sample of thirty chemistry instructors from Mecca. The researcher also made a notecard outlining Needham's five phases of constructivism (orientation, idea generation, idea restructuring, idea application, and reflection), as well as teaching practices at each stage, and a reflective thinking scale for the following abilities (visual perception, visual discrimination, visual perception, and

visual discrimination). Identifying fallacies, drawing inferences, making convincing arguments, and coming up with workable solutions. The results indicated that chemistry educators practiced the Needham constructivist model to an average degree of 53.1% (range: 43-71%), and that they engaged in reflective thinking at a rate of 36-68.2% (range: 47.73%). In addition, the degree to which chemistry educators engage in reflective thinking is correlated with their adoption of the constructivist pedagogical framework.

Abd and Hussein (2020) the purpose of this study was to determine whether or not teaching reflective thinking using the Needham constructivist paradigm is beneficial among children in the fourth grade. The research was based on an experimental design, which included a control group and an experimental group with equal numbers of participants, as well as a pre-test and a post-test. The research sample included a total of seventy-five pupils. On the test of reflective thinking, the results showed that there are statistically significant differences between the students in the experimental group and the students in the control group, with the experimental group students performing much better.

Alfarhan (2020) determined if sixth-grade students' scientific knowledge and ability to think critically improves when taught using the Needham constructivist paradigm. The research used a quasi-experimental methodology to get the job done. Tests of analytical thinking and intellectual depth are examples of useful study aids. Sixth-graders from two Abha, Saudi Arabia, schools were chosen at random to participate in the study. In order to distinguish between the experimental and control groups in the second semester, the research instruments have been administered to both groups both before and after the semester began. Students in the experimental group outperformed those in the control group in terms of post-test scores on both the depth knowledge test and the critical thinking skills test, providing further evidence that the Needham constructivist approach to teaching science is effective in fostering the development of higher-order cognitive processes.

Al Saud et al. (2022) determined if teaching science using the constructivist Needham model was successful in increasing students' scientific literacy in Gaza's ninth grade. The researchers adopted a descriptive-analytical strategy and a quasi-experimental design, with 82 students serving as the study sample split evenly between two groups. There were a total of (41) students split evenly between an experimental group and a control group. The pre-and post-study scientific knowledge exams served as the research instruments. The most striking finding of the study was that the experimental group's mean scores on a cognitive aspect test of the levels of depth of scientific knowledge were significantly higher than the control group's mean scores on the same test.

Radwan and Al-Ayasra (2023) Analyzed the efficacy of Needham's constructivism paradigm for developing inferential reasoning skills in 10th-grade female physics students. Al Qweismeh Secondary School for Girls tenth-grade female pupils comprised the participants. The sample has been separated into experimental and control groups. After confirming its validity and dependability, a test of (20) multiple-choice questions measuring inferential reasoning skills was administered. The results indicated that Needham's constructivism model has a statistically significant impact on the development of inferential reasoning skills overall, as well as inductive and deductive inferential reasoning skills, among 10th-grade female pupils.

Methodology

The quasi-experimental method was utilized (for one of the groups), and the participants in the study were required to undergo pre-measurement, continuous measurement during the training process after each step, and post-measurement. In addition, the tracer

measurement was carried out after pausing the model for four weeks after completing the most recent session.

Population and Sample

The study population consisted of all tenth-grade teachers studying in public schools in Ajloun Governorate during the second semester of 2023/2024. A random sample was selected from the study population according to the following steps:

- 1- Listing the government schools that include the tenth grade of the Ministry of Education in the city of Ajloun, where the number reached (32) schools, and the number of teachers in the tenth grade is (32).
- 2- Selection of teachers from these schools to represent the experimental and control groups. Thus, the study sample of (28) teachers, with (14) teachers for the experimental group, and (14) teachers for the control group.

Research Instruments

Two research instruments were employed to accomplish the aims of the study:

1- Design of Student Activity Booklet: The second chapter "From Childhood Memories" was selected for tenth grade students in the second semester of the academic year 2022-2023. Also, the Teacher's Guide for Chapter 1 "From Childhood Memories" was created to be taught according to the Needham constructivist model. The guide included (9) lessons with (18) lessons according to the time distribution of the Arabic language curriculum plan for the second semester of the academic year 2023/2024. The guide included an introduction explaining an overview of the constructivist theory and philosophy underlying the Needham constructivist model, a procedural definition of the reflective thinking skills of interest to the current research, and identifying the characteristics of the learning environment to implement them. Needham's constructivist model, in a manner consistent with the practice of reflective thinking. In addition to the experimental content of the second chapter of the Arabic language book and the concepts contained therein, a student activity booklet was prepared according to the Needham constructivist model, which guides the student to practice reflective thinking skills. The student's activity booklet included (15) activities that were distributed to the counseling lessons.

2- Designing a reflective thinking test: The experiment was designed to gauge the extent to which tenth graders' capacity for introspective thought had been expanded by its contents. Visual perception, fallacy identification, conclusion drawing, explanation providing, and solution development were also classified as reflective thinking skills. The test's language was crafted with care to ensure it accurately reflected its intended use and aligned with the current research's procedural description of reflective thinking abilities. Using the Needham constructive model of the multiple-choice type, the test's vocabulary was developed based on the quality of the skills to be developed among students in tenth grade; questions feature an introduction followed by four alternatives, from which students must select the correct one; and the total number of items on the test is twenty-six. The average exam time was based on how well students performed overall.

Instruments Validity and Reliability

In order to guarantee that the teacher's guide and activity brochure were developed in accordance with the Needham constructivist paradigm, they were given to a panel of arbitrators once they were completed. Furthermore, it is important to ensure that the current research's focus on encouraging reflective thinking is reflected in the design of educational activities. Changes were made after considering the arbitrators' feedback. Also, the discriminatory validity of the reflective thinking scale was examined by applying it to an exploratory sample made up of four teachers. The coefficients of (F)

values for discriminatory validity varied between 71.3 and 119.7 with a (P) value that was less than 0.05.

Data Analysis

Means and standard deviations of test scores were computed when data collection was complete. The Eta square was used to determine the impact size of the Needham constructivist model on the growth of reflective thinking among teachers of 10th grade. The degree of dissimilarity between the samples was also illustrated using the Wilcoxon test and the Z-score.

Results and Discussion

To begin answering the first question, which states "Is the application of the Needham constructivist model associated with improvements in pre-and post-test scores on measures of reflective thinking (visual vision, detection of fallacies, reaching conclusions, giving convincing explanations, and developing proposed solutions) among tenth-grade teachers?". See the results in the table below.

Table 1: Pre and Post-Measurement

Dimensions	Pre/ Post	N	Mean Rank	Sum of Ranks	Z	P
Visual vision	Negative rank	0	0.00	0.00	4.050	0.000
		14	7.50	105.00		
	Positive rank	0				
	Ties	14				
	Total					
Detection of fallacies	Negative rank	0	0.00	0.00	4.070	0.000
		14	7.50	105.00		
	Positive rank	0				
	Ties	14				
	Total					
Reaching conclusions	Negative rank	0	0.00	0.00	4.060	0.000
		14	7.50	105.00		
	Positive rank	0				
	Ties	14				
	Total					
Giving convincing explanations	Negative rank	0	0.00	0.00	4.065	0.000
		14	7.50	105.00		
	Positive rank	0				
	Ties	14				
	Total					

Developing proposed solutions	Negative rank	0	0.00	0.00	4.055	0.000
		14	7.50	105.00		
	Positive rank	0				
	Ties	14				
	Total					
Total	Negative rank	1	1.30	1.30	3.998	0.001
		13	6.37	82.81		
	Positive rank	0				
	Ties	14				
	Total					

The effectiveness of the Needham constructivist model in developing reflective thinking skills can be attributed to the stages included in the model. The model provides preparation for the student in the form of a situation or problem through which the student formulates a set of predictions in the light of his reflection on the situation or problem. Then the student, in a collaborating group, practices a set of activities related to the concept contained in the initial position presented to him. Then he comes out with conclusions that clarify the sound scientific concept and compares it with the predictions he made, and contemplates the similarities and differences between what he reached and what he made of initial predictions to correct the error in them. The model also presents a set of practical applications of the learned concept, while presenting some problems that require the student to present a logical solution to them. In addition to the discussions that take place in cooperative groups that would root the student's reflection on the opinions presented, whether from members of his group or from other groups, all of this provided the opportunity for the student to practice reflective thinking in teaching and learning situations. This result agreed with the results of Al Amoudi (2019), Abd and Hussein (2020), Alfarhan (2020), Al Saud et al. (2022), and Radwan and Al-Ayasra (2023).

To begin answering the second question, which states "Is there a statistically significant effect of the application of the Needham constructivist model in improving reflective thinking skills in the follow-up measurement (visual vision, detection of fallacies, reaching conclusions, giving convincing explanations, and developing proposed solutions) among tenth-grade teachers?". See the results in the table below.

Table 2: Post and Follow-up Measurement

Dimensions	Post/ Follow	N	Mean Rank	Sum of Ranks	Z	P
Visual vision	Negative rank	10	6.50	65.00	1.250	0.177
	Positive rank	2	3.30	6.6		
	Ties	2				
	Total	14				
Detection of fallacies	Negative rank	9	6.20	55.80	1.100	0.095
	Positive rank	2	3.60	7.20		
	Ties	3				
	Total	14				
Reaching	Negative rank	7	5.40	37.80	0.805	0.750

conclusions	Positive rank	3	4.40	13.20		
	Ties	4				
	Total	14				
Giving convincing explanations	Negative rank	6	5.00	30.00	0.704	0.652
	Positive rank	5	4.80	24.00		
	Ties	3				
	Total	14				
Developing proposed solutions	Negative rank	7	5.40	37.80	0.806	0.740
	Positive rank	3	4.40	13.20		
	Ties	4				
Total	Negative rank	10	7.00	70.00	1.350	0.150
	Positive rank	4	4.80	19.20		
	Ties	0				
	Total	14				

Results of follow-up evaluations and post-hoc testing are consistent with each other (Table 2). This indicates that no relapse occurred after the end of the program and that its results persisted throughout the follow-up period. Thus, it can be said that the application of the Needham constructivist model is effective in developing and improving reflective thinking skills in follow-up measurement (visual vision, discovering fallacies, reaching conclusions, giving convincing explanations, developing proposed solutions), compared to using the regular program in teaching. The result may be due to the fact that the educational activities were carried out using the Needham constructivist model, whose advantages include improving student engagement, increasing class discussions, making them more in-depth, and investing time in a productive way during the lesson. This led to student enjoyment and satisfaction, and the classes moved away from the atmosphere of boredom that usually accompanies the study of theoretical subjects, especially since teaching of tenth grade students using Needham's constructivist model is usually little or scarce. The use of the Needham constructivist model, which focuses on the role of the student and makes him the center of the educational process, increased students' interest, which led to the formation of positive attitudes towards the Arabic language. The educational environment, using the Needham constructivist model, also provided an atmosphere of permanent student interaction during discussions, and the student's self-reliance in learning, which was reflected in his psyche and his sense of pleasure and happiness away from complexity and monotony. Needham's constructivist model also took into account the opportunities for active and positive participation on the part of students in educational situations and satisfying their desire for social interaction with their peers, which led to an increase in their attitude towards this subject.

Conclusion

This study supports the idea that the application of the Needham constructivist model is effective in developing reflective thinking skills (visual vision, detection of fallacies, reaching conclusions, giving convincing explanations, and developing proposed solutions) among tenth-grade teachers. Therefore, in line with the Needham constructivist model objectives, teachers would in developing reflective thinking skills (visual vision, detection of fallacies, reaching conclusions, giving convincing explanations, and developing proposed solutions). According to the findings, the model serves as a type of

practice for the student by posing a scenario or challenge, from which the learner draws insights and makes predictions. The student's mind and his sense of pleasure and happiness were reflected in his independence from complexity and monotony, thanks to the atmosphere of permanent student interaction during discussions and the use of the Needham constructivist model in the classroom. The Needham constructivist model also accounted for students' potential for active and positive engagement in educational circumstances, as well as their need for social connection with their peers, all of which contributed to an improved disposition toward the topic as a whole.

Acknowledgments

The authors extend their appreciation to the Deanship of Scientific Research at King Khalid University for funding this work through Small Research Groups under grant number (RGP.2 / 293 /44).

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