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The effectiveness of a teaching -learning program according to the seven-cognitive model in the mathematical literacy among the fifth grade preparatory students

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Abstract:
The aim of the current research is to identify the effectiveness of an educational program _Learn according to the cognitive model in the mathematical culture of the scientific fifth-grade students, as the research was limited to students of the fifth grade of the applied branch for the academic year 2020-2021, and the research sample consisted of (21) students for the experimental group, and (21) A student for the control group, and parity between the two groups was conducted in a number of variables, the researcher taught the experimental group according to the educational _ learning program, and the control group is taught in the usual way, and for the purpose of measuring the effectiveness of the educational program on the mathematical culture, the mathematical culture scale was built and consists of (40) A paragraph in four areas, and the results showed a clear effect of the educational program - the learning on the mathematical culture of the experimental group students who were taught according to the program.

Key words: educational - learning program, cognitive model, mathematical culture

1. RESEARCH PROBLEM

Mathematics is the basis of knowledge and the basic element of various scientific developments, such as in nature, biology, society, or art, and in this era or in the foreseeable future, there is no field that does not depend on mathematics, and therefore mathematics requires great attention in the methods and methods of teaching it to achieve this goal, and he sees The researchers said that the trends when teaching most school subjects, including mathematics, depend on indoctrination and giving ready-made ideas, not accustoming students to using their minds, moving forward in the development of science and technology that the world is witnessing, and the lack of use of modern educational-learning programs that center around the learner, so from The important thing is to use modern teaching models centered around the learner and educational procedures to activate their role as the focus of

the educational process and get rid of the traditional methods because they are no longer able to meet the requirements of modern life, and the researcher met with a number of mathematics teachers during her field visit to view and apply in schools because she is a teacher. That the traditional teaching method is followed in schools without adopting modern methods of teaching, either The sports culture was of great importance and it was covered by the study of (Al-Ta'i, 2016) and (Jassim, 2019) and that the problem of the student's sports culture is that students have a base of mathematical facts and suffer from a weakness in expressing mathematical ideas and converting terms into mathematical expressions, symbols and perception. The relationships and interrelationships between mathematics and its branches on the one hand, and mathematics and the rest of the sciences on the other hand, from here emerges the problem of the current research in the urgent need to use a model in teaching and the two researchers chose (the seven-year cognitive model) in developing mathematical culture because it is a teaching model that has not been presented in the field. In the field of teaching mathematics, the two researchers can therefore put the current research problem with the following question: "Does the educational program based on the seven-year cognitive model have efficacy in the mathematical culture of the fifth-grade scientific students? "

2. RESEARCH IMPORTANCE

Teaching is a joint process between the teacher and the student, so they must be involved and assisted in acquiring the analytical methods and skills necessary to see things as they should, and encourage them to distinguished scientific production and make the learning process more enjoyable by linking subject matters to practical life and local and international issues, on the other hand, a successful educational process requires technical tools. And scientific and educational institutions must possess, especially those related to modern technology, as it enables students to interact and think correctly, and this was confirmed by a number of local conferences such as the Seventh Higher Education Conference on 9/22/23/2004 and the first conference held by the Ministry of Education bearing the slogan "Supporting the development of education quality in Iraq / Schools Project" held in Erbil on 9/27/2011, and the International Scientific Conference entitled Curriculum Development in Light of Modern Education Philosophy sponsored by the Araqah Foundation for Culture and Development held at the College of Education - Maysan University, which was organized by the General Directorate To educate Al-Qadisiyah, in cooperation with the University of Al-Qadisiyah, on 22-24 / 5/2019, and to achieve these developments, it is necessary to diversify teaching methods and use procedures and strategies And educational models that contribute to improving learning and teaching, that is, continuing to use various modern programs and models regardless of the diversity of teaching models, their importance lies in developing the cognitive and psychological aspects of learners, developing their knowledge structure, and increasing their learning through interaction with the educational environment prepared for them and providing them with the pillar The main ones for development are to provide a good educational environment and use appropriate strategies to stimulate their thinking and help them to conduct the study and conclusion. (Ministry of Education, 2003: 2). Mathematics occupies an important place in all stages of education and among all academic

courses. The study of mathematics helps learners develop their mental abilities and equips them. He has many mathematical skills needed to learn other subjects, as well as direct applications of mathematics. In the daily conditions that make it have an important impact on individuals and society. Therefore, the importance of teaching mathematics in different stages and the interest in teaching and learning for the individual and how to master the use of mathematics skills in daily life (Al-Kubaisi and Abdullah, 2015: 11), in addition, it is impossible to teach students without starting from their local environment and culture, and preparing students based on the situation that They direct it in the environment in which they live. And since every society has its own knowledge, and mathematics is part of this knowledge and an essential element in any social culture, mathematics has become a cultural product. Therefore, the age has passed in which mathematics has become an element far from social culture, and we have entered a new era In it, mathematics is considered a cultural product, (Hussein, 2010: 6). The role of the teacher is dedicated to teaching and has played an effective role in helping students develop the mathematical culture. He cannot contribute to spreading the mathematical culture unless he is a mathematical teacher and a sports educator. (Jimeno and Ricardo, 1986: 30), and the importance of the research can be summarized in the following points:

1. The study is the first, according to the knowledge of the researchers at the local level, which dealt with the seven-year cognitive model, as the two researchers made great efforts in presenting the frameworks related to the research axes.
2. Building a scale of sports culture.
3. Focusing on mathematics and presenting it in a modern and unconventional way.
4. The importance of the fifth grade stage of applied science and the necessity of introducing educational programs in the middle school stage.

The goal of the research

The current research aims to achieve the following:

a. Identify the effectiveness of the educational-learning program according to the cognitive model in the mathematical culture of the fifth grade students of applied science

To achieve the second research goal, the researchers formulated the following null hypothesis:

• There is no statistically significant difference at the level of (0.05) between the mean scores of the experimental group students who studied according to the teaching-learning program, and the grades of the students who studied in the usual way in the mathematical culture scale of mathematics.

search limits

3. THE RESEARCH IS DETERMINED BY:

1- Subject: Chapters (first, second, third, and fourth) from the mathematics textbook for the fifth grade of applied science.

2- Variables: the seven-year cognitive model, mathematical culture.

3- Spatial: Fifth grade students of applied science in one of the governmental preparatory schools for boys affiliated with the General Director of Salah al-Din Education

4- Temporal: the first course, for the academic year 2020-2021 AD

Define terminology

Effectiveness was defined by:

(Sabry, 2011): The ability of any treatment to achieve specific educational goals and achieve desired cognitive outputs. ”(Sabry, 2011: 401)

Tutorial - Learning was defined by:

(Al-Ta’i and Al-Sulayfani, 2014): that it “is an organized plan based on creating a learning environment that includes a set of teaching procedures with organized steps, in order to achieve the desired educational and educational goals” (Al-Ta'i and Al-Sulayfani, 2014: 131)

Definition of the educational-learning program procedurally: a set of teaching procedures that the researcher can carry out during the course of the experiment to create an educational _ learning environment and provide them with educational experiences and activities based on the seven-year cognitive model and aims to achieve the ability to mathematical culture of the fifth-grade applied scientific student

The seven-year cognitive model for cognitive competence was defined by:

(Al-Zayat, 2001): "The model is based on three basic dimensions: The first dimension: cognitive input in seven characteristics, namely: the cognitive quantum characteristic - the cognitive quality characteristic - the cognitive accumulation characteristic in terms of quantity and quality - in particular the coherence of the inputs - the property of the vertical and horizontal integration of the inputs. - The characteristic of organizing and classifying the inputs - the characteristic of the differentiation of the inputs and the differentiation of their content and the second dimension: the efficiency of cognitive representation in seven characteristics, namely: retention - meaning and significance derivation - synthesis - multiple forms of cognitive representation - cognitive flexibility - dynamism of cognitive representation and the third dimension: - abundance and abundance - efficiency and control - Meaning, function and continuity of impact - Productive cognitive flexibility - Comprehensiveness or cognitive encyclopedia - Self-counseling of cognitive mental activity - novelty and originality

(Al-Zayat, 2001: 558).

Procedural definition of the seventh cognitive model: a set of educational procedures in preparing the teaching plans that the researcher implements in the classroom, which begins with (cognitive inputs and their seven characteristics, the efficiency of cognitive representation and its seven characteristics, the cognitive outputs and their seven characteristics) and the extent of achieving the educational goals can be measured by the degree to which they are achieved. It is obtained by fifth-grade students of applied science (experimental group) in the mathematical culture scale.

Sports culture is known by:

(Al-Taei, 2016): as "an intellectual entity with multiple aspects that depends on the integration of several different axes in order to develop the culture in the mathematical subject, and it branches out outside mathematics to reach the student's daily life through its life applications to finally achieve its main goal, which is learning mathematics with meaning." (Al-Taie, 2016: 43)

Physical knowledge of sports culture: The student’s awareness and understanding of the role that sports play to express different life situations, which the researcher can measure after the

course of the experiment through the degree that students of the fifth grade obtain in the applied scientific (experimental group) in the scale of sports culture

A theoretical background and previous studies

The first axis: Mathematical Literacy

Before discussing mathematical culture, culture must be clarified first: Culture is the overall way of life for society with its intellectual and material aspects, and as (MCATA, 2002) indicated that mathematical culture is the linking of mathematics with the real world, the use of mathematics in a range of diverse subjects, and communication using the language of mathematics. Analyzing and evaluating the mathematical thinking of others, appraising the usefulness and beauty of mathematics, and understanding and realizing what has been learned mathematically. ((MCATA, 2002: 2), a mathematically educated person appreciates the importance of mathematics and has positive attitudes towards it and has self-confidence about its application in surrounding situations, the use of mathematical language in communicating with others, the ability to face problems and mathematical thinking.

The fields of sports culture represent the following (sports culture related to natural language, sports culture related to real life, sports culture related to other sciences, sports culture linked to history). (Al-Tai: 2016: 53)

Search procedures

A- Building the educational program _ the learning: the two researchers relied on using the descriptive approach in order to build the educational program _ the learning according to the seven-year cognitive model in the mathematical culture and included the following stages:

The first stage: the program planning stage

The planning stage goes through two steps (analysis - design), as follows:

Analysis step: This step represents the basis for building the educational _ learning program and includes the following: (defining educational goals, identifying students' characteristics, determining educational needs, defining the subject matter, determining the educational environment)

Design step: This step represents the basis for organizing the elements of the educational _ learning program and includes the following: (analysis of academic content - organization of study content - formulation of behavioral objectives)

The second stage: Implementation of the program: For the purpose of conducting the experiment, the program is put into actual application on the sample (fifth grade students of science / Salah al-Din Education Directorate)

The second stage: the evaluation stage: for the purpose of controlling the effectiveness of the educational _ learning program, the evaluation process must be carried out, and to achieve the goal of the research, which is to measure the mathematical culture of the fifth-grade applied scientific students, and where this is done in the light of the scale of sports culture.

First: The experimental design: The two researchers choose the appropriate experimental design for the current research, which is the experimental design with partial control and (the design of the experimental and control groups with a post-test)

Second: The Research Community: The research community consists of students of the fifth grade of applied science for the academic year (2020-2021) in the General Directorate of Salah al-Din Education.

Third: The research sample: The two researchers chose the research sample intentionally to apply the experiment, which is Ibn Al-Moatam Prep for Boys, for the following reasons: -
1- The school administration cooperates with the researcher and her consent to conduct the experiment.
2- Convergence in the social, economic and cultural levels
3- There are two classes in the school for the fifth grade of applied science.
4- The proximity of the school to the researcher's residence, and Table (1) illustrates this

Table (1) The research sample for the experimental and control group

The total number of students	**class**	the group
21	**A**	Experimental
21	**B**	Control

Fourth: Equivalence of the two research groups: Before starting the experiment, the researcher was keen to establish the equivalence of the two research groups (experimental and control) for some variables that may have an impact on the validity of the research results and not the effect of the independent variable which must be controlled, including the following: -
1- Equivalence with the previous information variable: The results after applying the test to the students of the two groups showed that the difference was not statistically significant at the level of significance (0.05), when calculating the calculated T value, reaching (0.689), which is less than the tabular value of (2), Which indicates the equivalence of the two groups in the previous test of information.
2- Equivalence with the IQ variable: The results showed that after applying the test to the students of the two groups, the difference was not statistically significant at the level of significance (0.05), when calculating the calculated T value, reaching (1.133), which is less than the tabular value of (2), which It denotes the equivalence of the two groups in the IQ test.
Fifth: the search tool
1- Mathematical Culture Scale: Preparing the Mathematical Culture Scale for Mathematics by reviewing a group of studies such as (Al-Ta'i, 2017) and (Jasim, 2018), (Al-Muqbel, 2019) so that it matches the paragraphs and the level of students, and this requires the following steps:
2 - Determining the goal of the Sports Culture Scale: This scale aims to identify the level of sports education among fifth-grade students of applied science
3- Defining the fields of sports culture: After reviewing previous studies, literature and opinions of referees regarding methods of teaching mathematics, the two researchers identified four areas of sports culture, which are (mathematical culture related to natural language, mathematical culture related to real life, mathematical culture associated with other sciences, related sports culture By history), these fields are not separate, but rather interdependent and interdependent fields, which means that these fields are the main pillars that integrate all basic knowledge for the development of the mathematics culture in the subject studied by students.

4- Drafting the paragraphs for each field: The two researchers drafted the paragraphs for each field after defining the fields of sports culture, as the number of the scale paragraphs reached (40) paragraphs, the scale included (10) paragraphs for each field, and the paragraphs were distributed equally among the fields of sports culture as shown in the table (2)

Table (2) areas of sports culture and the number of paragraphs for each field

No. of items	**items**	Areas of sports culture	**s**
10	**1,2,3,4,5,6,7,8,9,10**	Sports culture associated with natural language.	1
10	**11,12,13,14,15,16,17,19,20**	Sports culture related to the reality of life.	2
10	**21,22.23,24,25,26,27,29,30**	Sports culture associated with other sciences.	3
10	**31,32,33,34,35,36,37,38,39,40**	Sports culture linked to history.	4
40			**total**

5- Formulating the Mathematical Culture Scale Instructions: The researchers put instructions on the size and put a mark (√) in front of each paragraph on the answer sheet, and not leave any paragraph of the scale unanswered

6- The method of calculating and correcting scores: For each paragraph of the scale, the researchers put three alternatives to the answer, which are (applies a lot, and sometimes applies, and does not apply). (40-120) degrees.

7- The validity of the mathematical culture scale: The researchers presented the 40 paragraphs of the Mathematical Culture scale to a group of referees and experts in the field of methods of teaching mathematics to express their opinions, observations and suggestions regarding the validity of the paragraphs and their suitability for the field for which they were formulated. 85%) of the arbitrators' opinion.

8- The stability of the mathematical culture scale: The two researchers used the (alpha - Cronbach) equation to find the stability of the scale paragraphs, where the reliability coefficient reached (0,80), which is a good value, which indicates that the scale has a high degree of stability. Thus, the scale became in its final form.

Presentation of the results: Presentation of the result of the first null hypothesis and its interpretation (there is no statistically significant difference at the level of (0.05) between the mean scores of the experimental group students who studied according to the teaching-learning program and the grades of the students who studied in the usual way in the mathematical culture scale of mathematics) to verify This hypothesis the two researchers used to conduct the T-test for independent samples and after making sure of the test hypotheses and conditions, the results came as follows:

Table (3) the results of the T-test for the experimental and control groups in the mathematical culture scale

The significance level is at 0.05	T value calculators		standard deviation	Average	No.	The group
	tabular	calculators				
Statistically sign	2.02	12.14	2.51	32.38	21	Experimental
			3.18	21.61	21	Control

It is evident from Table (3) that the average achievement scores of the experimental group students reached a value of (32.38) with a standard deviation (2.51), which is higher than the average achievement scores for the students of the control group of (21.61) with a standard deviation (3.18). 12.14) and with a tabular value (2.02) at the level of significance (0.05). This indicates the superiority of students of the experimental group over the students of the control group, thus rejecting the null hypothesis and accepting the alternative hypothesis.
Interpretation of results: After reviewing the results of the current research, these differences between the experimental and control group and in favor of the group indicate the existence of a clear effect of the educational program _ the learning on the mathematical culture of the students of the experimental group who were taught according to the program, and the reason for this may be several factors, including :
1- Presenting information to the subjects in an unconventional manner
2- An atmosphere of fun when presenting the tutorial sessions _ learning through activities and discussions about it, which increased attention and a desire to learn.
3- Giving students an opportunity for classroom discussion between the teacher and the student, which drives them to learn and create an interactive environment.

4. CONCLUSIONS

1- The success of the educational _ learning program according to the seven-year cognitive model in influencing the mathematical culture of the fifth grade students of applied science.
2- Organizing the educational content in the form of educational - learning sessions, which was directly reflected on their sports culture.
3- The effectiveness of the teaching process for the educational program - learning from the usual traditional method, which gives students the necessary information that leads to an increase in their sports culture.

5. RECOMMENDATIONS

1- Using the seven-year cognitive model in other study subjects
2- Directing mathematics teachers to pay attention to the topic of mathematical culture at various school levels
3- Training of mathematics teachers on how to teach the educational program by holding seminars and training courses for them.

6. THE PROPOSALS

[1] Experimenting the educational _ learning program according to the seven-year cognitive model in other school stages
[2] Conducting a descriptive study to identify the level of mathematical culture in the middle school.
[3] Building a training program using the seven-year knowledge model for teachers to support their sports culture.
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