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Research Article

The Effect of Using The ASSURE Model in The Complex Thinking Skills of Intermediate Stage students in mathematics

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Abstract:

The aim of the current research is to know the effect of using the ASSURE model on the complex thinking skills of middle school students, and to achieve the objectives of the research, the researchers adopted the experimental design with the post-test to test the complex thinking skills. The second average in the Rafidain Land Intermediate School for Boys in the Third Karkh Education Directorate of Baghdad, the experimental group (30) students who studied using the ASSURE model (30) students who studied mathematics according to the usual method. Udel Daniels test of intelligence, the scientific material and behavioral goals were determined according to Bloom's cognitive levels and the preparation of teaching plans for the two research groups, as well as complex thinking skills: - Consists of (18) paragraphs of both types (objective and articles) distributed into (3) skills (critical thinking - reflective thinking - creative thinking), and using the appropriate statistical means and the SPSS program, the results showed that there were statistically significant differences at the level (0.05) in favor of the experimental group.

Introduction

It will tackle the research problem:

First: The Research Problem

Mathematics is still one of the subjects in which students encounter difficulties during their studies. Rather, it is considered one of the most difficult subjects to learn and teach, due to its logical sequence, abstraction and accumulation of its tightly structured topics, as it is difficult to reach a level without passing through the levels that precede it. (Al-Obaidi, (2:2015)

Some mathematics teachers do a lot of solving routine exercises, and they have a clear lack of knowledge of the extent to which students use thinking in general and complex thinking skills in particular as a scientific method, as relying on memorization as a method of teaching eliminates many types of thinking among students, and that mathematics does not Presenting them appropriately raises their thinking skills, as well as the insistence of some teachers on solving problems and exercises in certain ways that do not encourage thinking. This research

came to answer the following question: What is the effect of using the ASSURE model on the complex thinking skills of middle school students?

Second: The Importance of Research

1-The possibility of benefiting from the results of this research in applying the ASSURE model to middle school students, as an initial experiment that can be considered for the possibility of generalizing it later on to the rest of the stages.

2-Providing educational libraries and the educational field with a test of complex thinking skills, as the researcher prepared a test of complex thinking skills with his skills (critical thinking skills, reflective thinking skills, and creative thinking skills), which may help researchers and those interested in this concept.

3- The study is the first in this stage according to the knowledge of the researchers.

Third: The Aim of the Research

The current research aims to know: What is the effect of using the ASSURE model on the complex thinking skills of middle school students?

Fourth: The Research Hypothesis

There is no statistically significant difference at the significance level (0.05) between the average scores of the experimental group who will study mathematics on the ASSURE model and the average scores of the control group who will study mathematics according to the usual method in the complex thinking skills test.

Fifth: Research Limits

The current research is limited to (the first semester of the academic year 2021-2020 and to the students of the second intermediate grade in the government's basic day-to-day middle schools in the General Directorate of Education in Baghdad, the third Karkh district, and on topics from the first course mathematics course, which includes the complex thinking skills represented by (critical thinking skills - reflective thinking skills - creative thinking skills)

Sixth: Defining terms

Model ASSURE: It defines the procedures that the teacher undertakes to plan and communicate students' educational activities through the effective use of educational aids (Al-Hela, 2002: 352).

Procedural definition:

A model adopted by the researcher for teaching the students of the experimental group from the research sample is based on six steps that begin with analyzing the characteristics of the learners (students), defining objectives, selecting strategies and teaching aids to be used in the educational situation, with the active participation of the learners, as well as evaluation and revision according to the plans prepared by the researchers for this purpose.

The Complex Thinking Skills

(Newman, 1990) "that: the use of higher mental processes, and this determines when the individual answers a question, or solves a problem that cannot be solved through the routine use of the information he learned previously and falls within this pattern, critical thinking, reflective thinking and creative thinking".(Newman, 1990: 324).

Procedural Definition:

It is the total score that students of the experimental and control group obtain through their answers to the complex thinking skills test prepared by the researcher, which includes critical thinking skills, reflective thinking skills, and creative thinking skills.

A Theoretical Framework and Previous Studies:

First: A Theoretical Framework

Planning is the best method towards creating an integrated system according to interconnected elements of objectives, in order to achieve a work or task and others in the shortest possible time, and with less effort and price. Therefore, we find that there is no fruitful and successful work unless it is in accordance with organized planning, as is the case for lesson planning. The teacher needs goals, teaching aids and other technological advances. The teacher can only face this development through careful planning. (Kasabreh, 2015).

ASSURE MODEL:

The word ASSURE came from the initials of the Instructional Design Model that was devised by Robert Henesch and Michel Mulanda of Indiana University and James D. Russell from Predew University This model is based on six tasks for the use of technology in education, and the name of the model (ASSURE) includes letter introductions to these tasks, meaning that each letter of the model name is the beginning of each task:

A- The letter (A) is the beginning of the word (Analyze Learners), which means analyzing the characteristics of learners.

B - The letter (S) is the beginning of the word (State Objectives), which means setting and formulating goals.

C- The letter (S) is the beginning of the (select instructional methods, media, and materials) selection of the educational method and materials.

D- The letter (U) is the beginning of (Utility media and materials), that is, the use of the educational medium.

c- The letter (R) is the beginning of the (Require Learner Participation), ie the learner's response.

H- The letter (E) is the beginning of (Evaluate and Revise), meaning evaluation and revision.(Hiench, 1999)

Chart (1-1) showing the stages of the ASSURE model steps (designed by the researcher)

Complex thinking concept:

Some scholars consider complex thinking as one of the forms of advanced thinking, such as critical and creative thinking and metacognitive thinking, while others look at complex thinking as a mixture of several forms of advanced thinking that appears in the form of a set of detailed mental activities that require trial. A mentality, an analysis of complex situations according to multiple criteria and includes multiple solutions, and avoids simple solutions and formulations, and that the task of the thinker is to create meaning, that is, to reach meaning despite the lack of clarity of experience or situation.

(Beshara et al., 2004: 33)

Newman (1991) indicates that complex thinking is the ability to make extensive use of mental processes, and this occurs when the individual interprets, analyzes and processes information to answer a question, or solve a problem that cannot be solved through the

routine use of previously taught information, and falls within this pattern. of thinking critical, creative, and reflective thinking skills, and others.

(Newman, 1991).

Complex thinking skills:

Most specialized sources agree on five basic components that fall under the umbrella of complex thinking skills:

1- Creative Thinking.

2- Critical Thinking.

3- Contemplative thinking.

4- Problem solving.

5- Decision making . (Ibrahim, 2005: 369)

The current research will address three components of complex thinking skills: critical thinking skills, reflective thinking skills, and creative thinking skills.

A- Critical thinking skills enable learners to face the requirements of the future, which will not only focus on acquiring a huge amount of facts that should be taught and learned, but also on acquiring logical and rational methods in deducing, eliciting and interpreting ideas. (Ali, 2008: 20)

B - Reflective thinking skills help learners to think well that is necessary to solve problems and the steps involved in them. It also gives students a sense of control over their thinking and use it successfully, and develops a sense of self-confidence in facing school and life tasks.

(Abu Bashir, 2012: 70)

C - Creative thinking skills encourage students to create different and strange ideas and ask questions about the information and ideas presented, and help them to teach undefined assumptions, and build or put forward and defend many ideas and opinions, and explore the relationships between different incidents and ideas.(1997: Downing)

Second: Previous Studies

1- Study (Al-Atabi, 2012)

The study aimed to find out the effect of the Assyrian model on the acquisition of historical concepts for the fifth grade students in Iraq.

The researcher put one null hypothesis, and to verify it he applied the experiment one semester.

He formulated the behavioral goals, as there were (60) goals that worked on measuring the processes of concept acquisition for the three levels (knowledge, discrimination, application). primary school, which are (22) daily teaching plans. In his experiment, the researcher used

the t-test in statistical treatments to find out the significance of the differences for the two research groups and concluded: (The experimental group who studied history according to the Assyrian model outperformed the control group who studied history (in the usual way) in the test of acquiring historical concepts.(Al-Atabi, 2012) .

2- The study of the league (2017)

The study was conducted in Iraq in Iraq and the study aimed to know (the effect of the similarities strategy in developing complex thinking among students of the second intermediate grade in the subject of geography). (30) students study the prescribed subject according to the strategy of analogies, and the control group is (30) students study the prescribed subject according to the traditional method. The data was analyzed statistically by using the t-test, the study reached the following results: There is a statistically significant difference at the level of significance (0.05) between the average scores of the experimental group students who study geography according to the similarities strategy in the test of pre and post composite thinking. . (The League: 2017, 2-68).

Research Methodology and Procedures:

Research Methodology: The researchers adopted the (experimental method) in this research to achieve its objectives and to study the impact of the independent variable (ASSURE model) on the dependent variable (complex thinking skills).

First: the experimental design

Appropriate experimental design is used in every experimental research because it helps in obtaining answers to research questions. (Obaidat et al., 1982: 247) The researchers chose to design equivalent groups with partial control, the post test to measure the effect of the dependent variable (ASSURE) model on the dependent variable (complex thinking skills) because it fits with this research and achieves its objectives as shown in Table (1)

Table (1)

Experimental design for research

Post-test	Dependent variable	Independent variable	Equivalence of two groups	Statistical parameters / Group
A test of Complex thinking skills	Complex thinking skills	ASSURE MODEL	Intelligence Chronological age Previous achievement Previous knowledge	Experimental
				Controlled

Second: - The Research Community

The research community consisted of all students of the second intermediate grade in government secondary schools affiliated to the Directorate of Education in Baghdad, Karkh III) who are studying mathematics for the academic year (2020-2021).

The Research Sample

It is part of the community in which the phenomenon is studied through the information on this sample, in order to be able to generalize the results to the community. (Hassan, 2011: 104), and the researchers intentionally chose (Medium of Rafidain Land for Boys) of the Baghdad Education Directorate, Karkh third to be their research sample.

Third: Control Procedures

Table (2)

Sig. Type	value (T) tabular	Value (T) computed	Degree of freedom	standard deviation	arithmetic mean	Number of the sample	group	Variables
Non-Sig.	2	0,750	58	11,734	169,10	30	Experim-ental	Chronolo-gical age
				11,321	171,33	30	Contro-lled	
Non-Sig.	2	0,720	58	4,032	8,47	30	Experim-ental	Previous achieve-ment
				3,030	11,70	30	Contro-lled	
Non-Sig.	2	0.615	58	5.874	10.33	30	Experim-ental	Intellig-ence
				5.456	9.43	30	Contro-lled	
Non-Sig.	2	1,072	58	11,967	66,97	30	Experim-ental	Previous know-ledge
				12,588	63,57	30	Contro-lled	

External integrity of the experimental design

1-Math's teacher,

The experimental and control groups were taught by the researcher to maintain this variable.

2-The place of the experiment,

In cooperation with the school principal, the computer lab was set up inside the school as a classroom to conduct the experiment in.

3-Scientific material,

It was standardized for the experimental and control groups.

4-Distribution of weekly rations,

The researchers kept the equal distribution of the lessons for the two groups, the experimental and control, which were set at 5 lessons per week for each group.

5-Duration,

The time period for applying the experiment was equal for the experimental and control groups, which is the first semester of the academic year (2020-2021) from to (12/14/2020) to (19/2/2021).

6-Maturity

The maturity factor had no effect on the research experience because the time period for its application was for the same two groups.

Fourth: - Research Requirements

A- Determining the scientific material

The educational material was determined according to the curriculum content from the mathematics book for the second intermediate grade of the first course (the second chapter (real numbers), the third chapter (borderlines), the fourth chapter (equations and inequalities).

B- Defining behavioral goals

(221) cognitive behavioral objectives distributed on the six levels according to (Bloom) classification, with (48) objectives for the level of knowledge, (44) objectives for the level of comprehension, (62) objectives for the level of application, (23) objectives for the level of analysis, and (22) objectives for the installation level and (21) purposes for the calendar level. Annex (9), and it was presented to a group of arbitrators in mathematics and its teaching methods.

Fifthly: - The search tool

The research tool is the means through which data is collected to answer the test of research hypotheses and answer its questions, and it is called by means of measurement such as questionnaire, observation, interview and tests. (Hassan, 2011: 54), the researchers used (complex thinking skills) to verify the hypothesis of their research.

Complex thinking skills test

The researchers prepared a test to measure the complex thinking skills test by following the following steps:

1- Determining the objective of the test The current test aims to measure the complex thinking skills of second-grade intermediate students.

2-Presenting the classifications of complex thinking skills After the researchers reviewed the previous literature for the skills of complex thinking, their classifications were presented to a group of arbitrators in the field of education and methods of teaching mathematics.

3-Determining the complex thinking skills due to the differences in the opinions of experts in determining the classification of the appropriate complex thinking skills for the current research and its sample. It was relied on to identify the skills that fit the current research, namely (critical thinking skills - reflective thinking skills - creative thinking skills(

4- Formulation of the test paragraphs After the complex thinking skills were determined, and reviewing previous studies that dealt with the skills of complex thinking in their various classifications, the test paragraphs for each skill were formulated in accordance with the theoretical definition of each of them, so the test consisted of (18) items that included (5) Paragraphs for critical and reflective thinking skill, and (8) for creative thinking skills.

Table (3)

Distribution of complex thinking skills to test items

paragraphs represented by	Skill
5-4-3-2- 1	critical thinking skill
10-9-8-7-6	reflective thinking skill
15-14-13-12-11 **18-17-16**	Creative thinking skill

Sixth:

Procedures for applying the experiment

•The two researchers started applying the experiment on Tuesday (2020/12/14) in the first semester of the academic year (2021-2020) with 5lessons per week for both the experimental group and the control group.

•The two researchers studied the experimental and control groups by themselves, as the experimental group was taught using the ASSURE model, and the control group was taught in the usual way.

• The complex thinking skills test was applied to the experimental and control groups on February 19, 2021, to the two research groups.

Seventh: - Statistical means

Appropriate statistical methods were used for the research.

Presentation and interpretation of results will be seen.

First: - View the results

Results related to the hypothesis (there is no statistically significant difference at the level of significance (0.05) between the average scores of the experimental group students who studied according to the ASSURE model and the average scores of the control group students who studied according to the usual method in the complex thinking skills test).

Table (4)

The results of the t-test to determine the significance of the difference between the averages of the two research groups in the test of complex thinking skills

Statistic-al significa-nce	Value of (t-test)		degree of freedo-m	standard deviation	arithmetic mean	No. of student-s	section	Statistical parameter-s group
	Tabular	Calculated						
Sig.	**2,00**	**2, 826**	**58**	**5,199**	**18,07**	**30**	**A**	Experimen-tal
				5,397	**14,20**	**30**	**B**	controlled

According to the results, the null hypothesis is rejected:

(There is a statistically significant difference at the significance level (0.05) between the average scores of the experimental group who will study mathematics on the ASSURE model and the average scores of the control group who will study mathematics according to the usual method in the complex thinking skills test).

Second: Interpretation of the results

The result of the superiority of the students of the experimental group over their peers of the control group in the complex thinking skills test is attributed to the effect of the independent variable (ASSURE model), where teaching using modern technology is characterized by making the classroom environment rich in stimuli. Learners, including complex thinking skills

Third: Conclusions

Based on the results of the current research, the researchers reached the following conclusions:

A - Teaching according to the ASSURE model has a positive impact on the complex thinking skills of second-grade students in the middle school in mathematics.

B - The use of the ASSURE model in teaching helped in the emergence of desirable behaviors among students, including attention during the lesson and interest in mathematics, and arousing students' eagerness to follow it and to study it.

Fourth: Recommendations

Based on the results of the current research, the researchers recommend the following:

A - Working on developing students' complex thinking skills by providing enrichment activities based on the dimensions of complex thinking skills and at all educational levels. Reconsidering mathematics curricula and introducing technological means within the curricula to help the teacher and student move well towards using the means.

b- Paying attention to the prior preparation of educational staff in all stages of education, especially in the intermediate stage, so that the focus is on the aspects of thinking, especially the skills of complex thinking and how to include them in the prescribed mathematics books.

Fifth: Suggestions

Based on the research results, the researchers suggest conducting the following studies and research:

A - Conducting a study similar to the current research aims to identify the impact of the ASSURE model on the achievement of middle school students in mathematics and their complex thinking skills.

B- Conducting a study similar to the current research with other variables for different types of thinking (deductive thinking, systemic thinking, such as tactical thinking, divergent thinking) according to the gender variable.

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