

The effective of the educational program based on the theory of cognitive flexibility in the achievement of the students of the college of Education

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ABSTRACT: The research aims to find the effectiveness of using an educational program based on the theory of cognitive flexibility in the achievement of the students of the Education College. To achieve this, the researchers chose a semi-experimental design with a post. Test for two groups, one experimental and the other is the control. The sample consisted of (100) male and female students from the second grade Department of educational and psychological Sciences in the Educational College for the academic year (2019-2020). They were randomly divided into two groups with each group consisted of (50) students, one of them as experimental group, which was taught through the program based on the theory of cognitive flexibility and the second as a control group was taught in the traditional way. The two groups were rewarded in (age, academic level, previous information and the intelligence). And the educational program and the research tool (achievement test) were prepared and its validity and reliability were verified. The research experiment was implemented. Among the most important results that were reached in the post application of the research tool is the presence of statistically significant differences in favor of the experimental group students in their academic achievement, and in light of Research results The researchers made some recommendations, including the affirmation on the importance of using educational programs because they contribute to raising student achievement and encouraging teachers to use modern teaching strategies to help students work on the mind and reconsider teacher preparation programs in their comprehensive meaning and various aspects and develop them to suit the requirements of the twenty-first century. And the researchers made suggestions including conducting a similar study to use the educational program based on the theory of cognitive flexibility on dependent variables such as (motivation, scientific orientations, productive thinking.)

Key words: Effectiveness, Educational program, Cognitive flexibility theory, Achievement.

I INTROUDUCATION The current research deals with teaching an important course in the College of Education, which is the curriculum and textbook course, which works to expand and develop the capabilities of learners, provide them with knowledge and culture, and help them acquire the educational experiences they need in their daily or professional life in the future. The current research targeted an important group, which are the students of the college of education, being the closest to the practice of the teaching profession, as it is possible for them to employ the experiences they gain during their future experiences in the teaching process and it is possible to benefit from the educational program if it is proven effective in teaching, through its use by the professor in university teaching of various stages and disciplines and the possibility Benefiting from the results of the current research in developing teaching methods and in preparing teachers and training them on modern methods and strategies as an educational program based on the theory of cognitive flexibility, and also the field reality reveals the existence of deficiencies in our educational method and a clear defect in our educational

institutions, there is a significant shortage in employing modern methods that would make the learner an effective element in the classroom, Because the focus is still limited to the use of traditional teaching methods that are concerned with the theoretical subject more than its concern for the learner, his abilities, needs and inclinations, which results in the lack of achievement of the educational goals they aim to achieve (Al-Masry, 2017: 262) and because researchers are teaching staff in the college of Education and for more than Fifteen years old, they noticed the students' reliance on memorization and indoctrination and its reflection on their academic achievement. They resort to traditional solutions when confronting situations and problems, as there is no criticism and creativity in their solutions, And this was confirmed by a group of university professors after their discussion in order to seek their views on improving the used teaching methods.

Therefore, the urgent need appeared to use teaching strategies, methods and ways that support modern approaches to education that emphasize the role of the learner. Therefore, researchers sought to build an educational program based on the theory of cognitive flexibility as an attempt to experimentally verify it in raising the level of achievement of students of the College of Education, by answering the following question:

How effective is an educational program based on the theory of cognitive flexibility in the achievement of students of the College of Education?

The Objectives and The Hypothesis of the Research

The current research aims to:

- 1) Building an educational program based on the theory of cognitive flexibility for students of the College of Education at the University of Qadisiyah
- 2) Identify the effectiveness of the educational program based on the theory of cognitive flexibility in the achievement of students of the College of Education.

The following hypothesis emerged from the objectives of the research: There is no statistically significant difference at the level of significance (0.05) between the average scores of the experimental group students who are studying according to the proposed educational program based on the theory of cognitive flexibility and the average scores of the control group students who study in the traditional way in the achievement test of the curriculum and the textbook.

Research Limitation: The current research is limited to:

- 1) Human borders: a number of students in the second stage / College of Education / morning study.
- 2) Spatial boundaries: Department of Educational and Psychological Sciences / College of Education / University of Al-Qadisiyah.
- 3) Temporal boundaries: the first course for the academic year 2019-2020.
- 4) Limits of knowledge: a number of subjects of the curriculum and textbook to be taught in the Department of Educational and Psychological Sciences in the first course.

The Terms of Definition

First: The Effectiveness, which is known by:

- Dives (2014): "The magnitude of the effect that the independent variable has on the dependent variable". (Dives, 2014: 26)
- Al-Masoudi and others (2015) that it is "the achievement of the goal and the ability to accomplish, which is the measure by which we recognize the performance of both the teacher and the learner for their role in the learning and teaching processes." (Al-Masoudi et al., 2015: 55)

The researchers agree with the definition of (Dives, 2014) because it expresses their research objectives.

And they know it procedurally: the doing effect expected to occur of the educational program based on the theory of cognitive flexibility on the achievement variable, which is measured by the average achievement test scores of the experimental group students compared to the average scores of their peers with the control group.

Second: The Instructional Program was defined by: -

- Karawan (2012) that it is "a set of educational experiences and activities designed in the form of a study system, prepared in a coherent and organized manner in light of the logical and

psychological organization, so that we define for the program the objectives, content, activities and educational aids, teaching methods and evaluation." (Carawan, 2012: 8)

- Zayer and Inside (2015) that it is "a set of coherent and structured lessons, teaching models, resources and lessons, whose goal is to achieve the required knowledge and skills." (Zayer and Inside, 2012: 130)

The researchers adopt the definition (Carawan, 2012) theoretically, because it expresses the objectives of their research.

And they know it procedurally: It is an educational plan prepared and organized according to the theory of cognitive flexibility to teach the students of the experimental group, the subjects of the curriculum and the textbook, and it includes objectives, content, activities, teaching methods, and the mechanism of implementation and evaluation.

Third: The Cognitive Flexibility defined by:

- (Johnson, 2016) as "the ability of the individual to rebuild his knowledge automatically to generate new ideas and provide alternative perspectives in order to adapt to the changing conditions of the environment and respond to its requirements." (Johnson, 2016: 301)

- (Rhoder & Rozell, 2017) as "the ability to assimilate previously learned information and concepts to generate new solutions to new problems." (Rhoder & Rozell, 2017: 375)

The researchers agree with the definition (Johnson, 2016) because it expresses their research goals.

And they define it procedurally as: set of cognitive assumptions and educational applications in the light of which the educational program that was applied during the research experiment is built to teach the curriculum material and the textbook for the sample of research.

Fourth: Achievement known by:

- Abu Allam (2013) as "the degree of acquisition that a learner attains or the level of success that he attains in a specific subject, educational or training field." (Abu Allam, 2013: 305)

- Abu Jadu (2015) as "the outcome of what the learner learns after a specific period of time has passed, and it can be measured by the degree he obtains in an achievement test and the knowledge the learner attains that translates into degrees." (Abu Jadu, 2015: 425)

The researchers adopt the definition (Abu Jadu, 2015) theoretically because it expresses the objectives of their research.

And they know it procedurally: the cognitive achievement achieved by students of the second stage of the College of Education with its control and experimental group, measured by the degrees they obtain in their response to the achievement test prepared by the researchers, which is applied at the end of the research experiment in the curriculum material and the textbook.

2 Theoretical framework The first axis: the educational program: The educational programs represent a plan and procedures that include different practices, activities and methods that work to achieve the set goals. The program consists of a set of components including goal specifying, organization methods, content justifications, methods constituents, and evaluation procedures. (Shehata et al., 2003: 169), and the program is a systematic educational method based on experimental foundations aimed at establishing a system for presenting information and concepts while providing appropriate activities to ensure the success of the program (Magdy, 2009: 196), and in light of the results and recommendations of the educational program, preparing an action plan that is presented to the concerned parties, as it clarifies requirements and decisions related to the budget and policy directions, and the progress of the program. (Al-Azzawi, 2007: 38-40)

Tutorial steps: The process of building the educational program is one of the most important stages of the educational process and the success of the educational program depends mainly on its accurate construction, so the program must consist of a set of steps as determined (Al-Heela, 1999), namely:

- 1) Defining the topics or research and elaborating the general objective for each of them.
- 2) Determine the important characteristics of students for whom the program will be built
- 3) Defining the learning objectives that will be achieved in terms of the student's behavioral results that can be measured.
- 4) Develop the content of the subjects.

5) Developing an initial test to determine the student's background and current level of knowledge of the topic.

6) Choosing educational learning activities and identifying the necessary educational and learning resources that the content of the topic addresses in order to achieve the objectives.

7) Evaluating students' learning in terms of achieving goals, taking into account the review or re-evaluation of aspects that need improvement.

8) Creating the program materials and facilities. (The Resourceful, 1999: 104)

The second axis: Cognitive Flexibility theory :The theory of cognitive flexibility arose as one of the constructive theories in teaching and learning, and it is a meta theory that links the different theories in different school subjects, thanks to the emergence of this theory to Spero, Feltovich, and (Coulson) and that in the mid-eighties of the last century, and many researches appeared on the effectiveness of this theory in the United States of America, and various places of the world, and it was finally presented as an integrated theory in (1991). (Carvalho & Moreira, 2005: 1-26)

The principles of the theory are as follows:

- Presenting the content through several main examples that reflect the many faces of the concept, so that learners can gain a deep understanding of the concepts. (Spiro, et, al, 2003, 5-7)

- Avoiding excessive simplification in teaching advanced knowledge, so that the concept allows it to take more than one meaning, which leads to a better understanding. (Jonassen, 1992,386)

- Building knowledge instead of imparting it, and this is done by allowing learners to develop their own mental representations, to suit the various and different uses of knowledge. Learners must change the way they treat concepts.

- The use of practical applications that allow generalizing theories to dynamic situations (John, et. Al, 1994, 36)

- Paying attention to participation and transfer of knowledge in an effective way to learners in the non-structured field, by using the educational program that is based on this theory. (Rouet & Levonen, 1996, 17)

Designing education according to the theory of cognitive flexibility

First: The goals

(1) The goals are formulated in the form of intended learning goals (2) The goals are characterized by cognitive flexibility in moderation, that is, appropriate to the already existing knowledge of the learners (3) it is graded in complexity to allow the formation of a former experience. (Barbey & Grafman, 2013, 547)

Second: the content

(1) The content focuses on real and complex concepts and tasks related to the goals (2) The content helps build research conceptual structures for the learner that encourage research and investigation (3) it provides multidimensional examples that clarify the concept so that it is easy to apply (4) It tries to attract learners' attention through tasks. A fact related to educational goals and activities and that these tasks are commensurate with the level of maturity of the learners. (Konik & Crawford, 2004, 254)

Third: Teaching Strategies

(1) Adopting teaching methods that help students to plan and de-complicate the concepts they are studying by formulating them, sequencing and building them on their existing former knowledge (2) Teaching strategies are flexible in a flexible environment (3) Using strategies that encourage learners to understand the complex nature of knowledge and discover Concept from multiple angles. (Spiro et al., 1988, 445)

Teaching according to the theory of cognitive flexibility

First: The teacher's role:

(1) The teacher must understand the environment on which cognitive flexibility is built (2) He is able to guide his learners, so that he realizes the moment in which the learners must stop and the moment in which they advance (3) He diversifies the teaching methods and strategies used with the learners (4) encourages Learners to understand the complex nature of concepts (Razuki et al., 2019: 192)

Second: the role of the learner:

(1) Uses various sources of information (2) Produces solutions and conclusions related to abstract and complex concepts (3) He is able to relate former knowledge to knowledge provided by means of cognitive support (4) Be positive in solving the problematic situation and transferring experience to other situations. (Ionescu, 2010, 190) previous studies: Al-Tamimi Study (2019) The research aims to find out the effectiveness of using an educational program based on the theory of cognitive flexibility in the achievement of the measurement and evaluation material among the students of the college of basic education

To achieve this, the researchers chose a semi—experimental design with a post-test for two groups, one experimental and the other one. The sample consisted of (80) male and female students from the first grade teacher's department in the Basic Education College for the academic year (2018—2019) And they were randomly divided into 40 groups, One of them as experimental group. which “as taught through the program based on the theory of cognitive flexibility and the second as a control group was taught in

the traditional way. The researchers were rewarded between the two groups of research in (age, intelligence and previous information) The results of the research were found to be statistically significant for the benefit of the students in the experimental group. Recommendations to emphasize the importance of the use of educational programs because they contribute to raising the achievement of students and encourage teachers to use modern teaching strategies to help students to implement the mind and reconsider the programs of teacher preparation in its comprehensive sense and various aspects and developed to fit the The researchers proposed several proposals, including a study similar to the use of the educational program based on the theory of cognitive flexibility in the “development of thinking of all kinds (creative, explanatory, critical, logical, etc..)

3 METHODOLOGY The experimental approach was adopted in achieving the two research objectives, as follows:

1. Research community: it represents all students of the second stage in the departments of educational and psychological sciences in the College of Education for the academic year 2019-2020 AD, the morning shift, which teaches the curriculum and the textbook 1
2. The research sample: The research sample was chosen in a deliberate way. The research sample selected (100) students from the second stage in the Department of Educational and Psychological Sciences / College of Education / University of Qadisiyah - Morning Study, and by the method of random assignment, the group was divided to represent (50) Male and female students as a control group, and (50) male and female students as an experimental group.
3. Experimental design: it means setting up a basic structure for the experiment that includes developing experimental groups, determining methods for their selection, and clarifying the experiment variables. (Raouf, 2001: 152), and the researchers approved the experimental design with partial control for the two equivalent groups with the post-test and the scheme (1) illustrates that

N	the group	parity	Independent variable	Dependent variable	Measuring tool
1	Experimental	* Chronological age *	An educational program based on the theory of cognitive flexibility	Attainment	Achievement test
2	Control	* Intelligence * * Academic level * * Previous information	traditional way		

4. Equivalence of the two research groups: The experimental and control research groups were rewarded with variables of chronological age, academic level, previous information, and intelligence, as follows: -

a. Chronological age variable in months: The chronological age of the experimental and control group students in months was extracted. The arithmetic mean and standard deviation were extracted as shown in Table (1).

Table (1) shows the arithmetic mean and standard deviation of the ages of the students of the two research groups

the group	the number	Arithmetic mean	standard deviation	Degree of freedom	The two T-values		Significance at 0.05 level
					Calculated	Tabular	
Experimental	50	245,38	4,25	98			Not a function
Control	50	244,12	3,96	98			Not a function

From Table (1), it is clear that there are no statistically significant differences between the two groups of experimental and control research for the variable of chronological age between the students of the two groups.

B. Academic level of students: - The academic level represents the student's learning outcome, and it is the extent to which the student achieves the educational goals. The grades obtained by students were approved in

The first stage in all subjects, and extracted the arithmetic mean and standard deviation, and as in Table (2)

Table (2) the arithmetic mean and standard deviation of the academic level scores for the students of the two groups

The group	The number of the sample	Arithmetic mean	standard deviation	Degree of freedom	The two T-values		Significance at 0.05 level
					Calculated	Tabular	
Experimental	50	67,44	7,07	98			Not statistically significant
Control	50	67,17	6,97	98	0,153	1,96	Not statistically significant

We notice in Table (2) that the calculated T value is smaller than the tabular T-value, and this means that there are no statistically significant differences between the two groups in the academic level of students.

C. Previous information for students in the curriculum and the textbook: For the purpose of identifying what the students of the two research groups possess from previous information in the curriculum and the textbook, the researcher prepared an objective achievement test of (30) paragraphs and was presented to a group of experts and applied to the students of the two groups as shown in Table (3)

Table (3) the arithmetic mean and standard deviation of the scores of the previous information test for the students of the two groups

The group	The number of the sample	Arithmetic mean	standard deviation	Degree of freedom	The two T-values		Significance at 0.05 level
					Calculated	Tabular	
Experimental	50	11,18	3.31	98			Not a function
Control	50	10,86,12	3,29	98	0,483	1,96	Not a function

From Table (3), we note that the calculated T value is smaller than the tabular T value. This means that there is no significant difference between the two groups in the previous information that they possess in the curriculum and the textbook.

D. Intelligence: The standardized Hamon-Nelson test was applied to Iraqi university students on the students of the two research groups, and the arithmetic mean and standard deviation were calculated, as shown in Table (4).

Table (4) the arithmetic mean and standard deviation of the IQ test scores for the students of the two groups

The group	The number of the sample	Arithmetic mean	standard deviation	Degree of freedom	The two T-values		Significance at 0.05 level
					Calculated	Tabular	
Experimental	50	40,12	38,65	98			Not statistically significant
Control	50	9,98	10,22	98	0,896	1,96	Not statistically significant

We notice in Table (4) that the calculated T-value is smaller than the tabular T-value, and this means that there is no significant difference between the two groups in the IQ test for students of the two research groups.

Research requirements: For the purpose of implementing the research procedures, the researcher determined the content of the course material for the curriculum and the textbook for the first semester, as well as the behavioral objectives, and the building of teaching plans for both groups in addition to building the proposed educational program based on the theory of cognitive flexibility that will be taught by the students of the experimental group.

Research tool: To measure students' achievement in the curriculum and textbook, the researcher built an achievement test of the type of objective and essay tests, where (40) paragraphs of the multiple choice type were formulated with four alternatives, and (10) essay paragraphs were also formulated and thus the test includes (50) Paragraphs including instructions on how to answer its paragraphs.

Statistical analysis of the achievement test paragraphs: The researcher applied the test to an exploratory sample in order to extract the psychometric properties of the test, as the paragraph difficulty factor was measured, the paragraph distinction coefficient, and the effectiveness of wrong alternatives for the objective paragraphs.

The validity of the test: The researcher presented the test paragraphs and the vocabulary of the content of the course material in order to ensure the validity of its paragraphs and achieve the desired goal of its construction and suitability for the studying subject. And all the paragraphs obtained the approval of the arbitrators after some modifications, and thus the test was characterized by face validity, and the researcher also verified the content validity by preparing a table of specifications that determined in its light the content elements that the test should represent and determine the relative weights for each topic.

Stability of the test: The stability of the test was verified by the half-segmentation method for the test items, as the correlation coefficient between the two halves of the test reached (0.74), and this parameter was corrected with Brown's equation, reaching (0.84), which is a good stability.

Application of the experiment: The experiment was applied at the beginning of the first semester of the 2019-2020 academic year, as the researcher taught the experimental group according to the proposed educational program based on the theory of cognitive flexibility, and the control group was studied in the traditional way.

As a result of the irregularity in the attendance, she completed her teaching of the curriculum online on the Classroom program and on the codes (5fqmdat, m4wekj7) for each of the two groups. The students were also tested on the same site and with the same codes at the end of the first semester.

Statistical treatment: The T-test was used for two independent samples, as well as the Pearson correlation coefficient to extract the stability factor.

4 THE RESULTS In order to ensure that the goal of the research is achieved, the null hypothesis must be tested, which includes that there is no statistically significant difference at the level of significance (0.05) between the average scores of the experimental group students who are studying according to the educational program based on the theory of cognitive flexibility and the average scores of the control group students who study in the traditional way in the achievement test for the curriculum and the textbook. And in order to verify the validity of this hypothesis, the researcher applied the achievement test that is prepared for this purpose on the two research groups, and the arithmetic mean of the experimental group's degree was calculated, reaching (47.30) with a standard deviation (9,56), while the arithmetic mean of the control group's scores reached (33.15) with a deviation Standard (12.55) and for comparison between the two averages, the T-test was extracted for two independent samples, as the calculated T-value of reached (5.4), which is greater than the tabular value of (1.96) at a level of significance (0.05) and a degree of freedom (98) This indicates the existence of a statistically significant difference in favor of the larger average (the experimental group). Therefore, the null hypothesis was rejected and as shown in Table (5)

Table (5) the arithmetic mean and standard deviation of the scores of the achievement test for the curriculum and the textbook

The group	The number of the sample	Arithmetic mean	standard deviation	Degree of freedom	The two T-values		Significance at 0.05 level
					Calculated	Tabular	
Experimental	50	40,12	38,65	98	5,4	1,96	Statistically functional
Control	50	9,98	10,22	98	8,96	1,96	Statistically functional

Through Table (5), we note that the calculated T value is greater than the tabular so the null hypothesis should be rejected, meaning that the educational program based on the theory of cognitive flexibility has a clear effect in raising the achievement of the experimental group students.

5 CONCLUSIONS

1- The adoption of an educational program based on the theory of cognitive flexibility in teaching contributed to the interaction of students with the scientific material which Increased their achievement of it.

2- The possibility of using the educational program based on the theory of cognitive flexibility in teaching university students in light of the current circumstances and available capabilities.

3- The use of the educational program based on the theory of cognitive flexibility makes the student the focus of the Educational process This is consistent with modern educational theories in education.

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