

## **The Effectiveness of an Electronic Model Based on the Theory of Brain-Based Learning in the Efficiency of the Cognitive Representation of Information for the Subject of Curricula and Teaching Methods among Students of the College of Education.**

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### **Abstract**

The research aims to know the effectiveness of an electronic model based on the theory of brain-based learning in the efficiency of the cognitive representation of information for the subject of curricula and teaching methods among students of the College of Education. To achieve this, the researchers chose a quasi-experimental design for the same pre- and post-test for two groups, one experimental and the other controlling, and the research sample consisted of (70) male and female students from the Department of Educational and Psychological Sciences - College of Education for the academic year (2019-2020). They were divided into two groups randomly, each group of (35) male and female students, one as an experimental group that was taught through an electronic model based on the theory of brain-based learning, and the other as a control group that was taught in the traditional way. The researchers rewarded between the two groups in (age, academic level) efficiency of cognitive representation of information, intelligence), The electronic model and the search tool (a measure of the efficiency of cognitive representation of information) were built, and its validity and reliability were verified. The research experiment was implemented, and one of the most important results reached in the post application of the search tool There are statistically significant differences in favor of the experimental group students in the level of efficiency of cognitive representation of information, and in light of the results of the research, the researchers recommended recommendations, including emphasizing the importance of using electronic and modern models and strategies because they contribute to the development of cognitive representation of information among students Encouraging teachers to use modern electronic teaching models and strategies and reconsidering building teaching models and strategies and developing them to suit the requirements of the current situation and what education is going through. The researchers suggested several proposals, including conducting a similar study to use an electronic model based on the theory of brain-based learning to develop thinking.

**Keywords:** An electronic model, the theory of brain-based learning, the efficiency of cognitive representation of information.

The Effectiveness of an Electronic Model Based on the Theory of Brain-Based Learning in the Efficiency of the Cognitive Representation of Information for the Subject of Curricula and Teaching Methods among Students of the College of Education.

**The problem of the research**

Higher education suffers from systems dictated by the harsh conditions that our country has experienced during the past periods of wars and political and economic fluctuations that have left negative effects on all fields of life, including the education and higher education sector. These crises included all the components of higher education, including the professor, the curricula and the student, the educational system, its means and study requirements, as one of the manifestations of this crisis is the weak qualifications of university students. Because of the obvious imbalance in primary and secondary education on the one hand, and on the other hand, the lack of motivation for education and an education system based on the principle of indoctrination and the accumulation of information in the minds of students without engaging them in dialogue and discussion and arousing the desire for education while relying on ineffective educational means. These are some of the aspects that higher education suffers from. and universities. Therefore, there is an urgent need to use teaching strategies and models that support the modern trends of education and that emphasize the role of the learner as a main focus in the educational process.

Hence the main problem of this research emerges:

**The effectiveness of an electronic model based on the theory of brain-based learning in the efficiency of cognitive representation of information for the subject, curricula and teaching methods among students of faculties of education.**

**Third: The aim of the study**

The current study aims to:

1. Building an electronic model according to the theory of brain-based learning for the teaching methods subject.
2. Knowing the effectiveness of the electronic model according to the theory of brain-based education on the efficiency of the cognitive representation of information.

**Fourth: The hypotheses of the study**

For the purpose of investigating the second and third objectives of the study, the following two hypotheses were formulated:

1. There is no statistically significant difference at the significance level (0.05) between the average scores of the experimental group students who study according to the electronic model based on the theory of brain-based learning and the average scores of the control group students who study according to the usual method in the cognitive representation efficiency scale of information.

**Fifth: The limitations of the study**

The current study is determined by:

1. Spatial boundaries: Iraq - University of Qadisiyah - College of Education - Department of Educational and Psychological Sciences.
2. Human limits: a sample of students from the College of Education - Department - Department of Educational and Psychological Sciences - Morning Studies.
3. Time limits: the academic year (2020-2021).
4. Scientific limits: the vocabulary of the subject (curricula and teaching methods) as stated by the Sectoral Committee.

## **Defining Terms**

### **First: The model**

1- (Al-Fatli) "as a simplified conception that clarifies and summarizes the nature of teaching, its elements, the relationships between those elements, and the processes of building, designing and implementing teaching according to sequential and similar steps to achieve the desired goals". (Al-Fatli, p. 346, 2016).

2- (Zayer and Jerry) "as the process of organizing educational experiences and making them logically arranged, ensuring the course of the lesson according to what is correct and planned in advance, to reach the final goal in the educational process". (Zayer and Jerry, p. 61, 2015).

3- (Al-Bawi and Thani) "It is steps based on the theories of educators, psychologists, philosophers and others, who are looking at how the individual learns". (Al-Bawi & Thani, p. 67, 2020).

**Theoretically:** the researcher agrees with the definition of (Zerogri)

**Procedurally:** It is a set of teaching steps that the teacher teaches in the electronic educational situation in order to achieve educational outcomes for students in the subject of teaching methods based on the principles of the theory of brain-based learning.

### **3- Brain-based learning theory**

1- (Al-Salti) as "a comprehensive method of teaching and learning based on the assumptions of modern neuroscience that explain how the brain works normally and based on what is currently known about the anatomical structure of the human brain and its functional performance in its various stages of development." (Al-Salti, p. 108, 2009).

2\_ (Connel) as "techniques or strategies that have been derived from cognitive neuroscience research and have been used to support the teacher's teaching and to increase the learner's ability to use certain ways in which he feels comfortable". (Connel, p. 339, 2009).

3- (Levine) as "a theory that includes the design of teaching and learning situations according to the rules and principles that the brain works with to achieve meaningful learning" (Levine, p. 193, 2018).

**Theoretically:** the researcher agrees with the definition of (Levine, 2018).

The Effectiveness of an Electronic Model Based on the Theory of Brain-Based Learning in the Efficiency of the Cognitive Representation of Information for the Subject of Curricula and Teaching Methods among Students of the College of Education.

**Procedurally:** A theory that indicates the importance of understanding the structure, structure, and functions of the human brain. It aims to enhance learning through the application of a set of principles that represents the human understanding of how the brain works in the context of learning.

### **The efficiency of the cognitive representation of information**

2- (Muhammad) as "the individual's competence in processing the information received (linguistic, symbolic, spatial) from its raw image to many meanings, ideas, and derived or composed developments that are kept in memory and assimilation, and creating connections and integrations between them and the previous information in constructing knowledge of the student". (Mohammed, p. 23, 2016).

3- Makki) as "a mental process that includes organizing and treating stimuli, whether they are visual or visual, or coding them, either in a picture or in a word, so that they have meaning that helps the individual to adjust and direct from time to time and to interact with everyday situations and try to successfully overcome any situation." (Makki, p. 221, 2017).

**Theoretically,** it is "the assimilation, storage and organization of educational experiences in their various forms, linking them, synthesizing them, and matching them with what he has in the knowledge structure so that he has a scientific background through which he can face different situations."

**As for procedurally,** it is the "total score obtained by students through their answers on the scale of the efficiency of cognitive representation of information prepared for this study.

### **Second: Teaching models**

One of the conditions for the qualitative development of the educational and teaching process is the use of applied teaching models in the classroom, as the vital pillars in the teaching sector require the development of the internal teaching system of teaching methods, strategies and models. And how to apply its steps in a sequential, organized and coherent manner so that students obtain ideas from them, develop their knowledge and concepts about teaching a subject, whether it is in the curriculum, teaching and assessment.

This requires the use of modern teaching models that rise to the level of the labor market, whether in schools and universities. They are educational units that guarantee the community with all social and economic aspects, especially since the main task in using modern teaching models is to address the largest possible number of variables of the educational process. Which helps the professor to design effective teaching experiences, which in turn contributes to raising the level of students' ideas and employing their creative skills according to an integrated framework for acceptance in the process of memorizing and memorizing information. (Al-Masudi, 2018).

The purpose of using teaching models is to treat the teaching as a teacher that benefits from the findings of studies and research in the psychology of learning and its theories of principles, generalizations and theories and their use in classroom teaching. Teaching models are important in teaching methods, because the characteristics of abstract objective presentation and independent study methods often exceed the student's direct contact with the professor. Therefore, when securing some

opportunities for confrontational relations between the professor and the student, it is necessary to benefit from the teaching model that achieves interaction between learners. (Zayer & Jerry, p. 93-94, 2015).

### **Theoretical foundations of teaching design models**

Teaching models are abstract developments that express relationships and interactions among the components of the educational situation in a format that reflects philosophical visions that seek to clarify how, how much, and the type of targeted learning within its framework. Hence, teaching models can be viewed as:

- 1- An action plan based on scientific foundations and educational theories.
- 2- An abstract development that reflects a special philosophical vision that resonates with the model.
- 3- An interactive coordinator directed to achieve a set of intended goals.
- 4- A structure that contains a set of interconnected components.
- 5- A guide that can be used as a guide for planning the amount of educational experiences in light of how a particular person seeks to achieve an abstract type of student. (Al-Adwan, & Al-Hawamdeh, p. 92, 2010).

### **Components of the teaching model**

There is agreement among most educators on the basic components of the teaching model, and it includes the following:

- 1- The title: it should be clear, specific, or embody the main idea of the model, and it should be suitable for the learner.
- 2- Justification: The goal is to point out the learners and encourage them to read, or give a clear general idea about the topic of the model and what is required of the learners.
- 3- Objectives: They are clear, brief, and clarification of the expected behavior after completing the study of the model, and the number of objectives is proportional to the time specified for the model, and the general objectives are divided into behavioral objectives in each model.
- 4- Activities: The model plans to enable learners to learn through a set of activities, and these activities are consistent with the objectives and seek to achieve them.
- 5- Evaluation: It includes how to measure the extent to which the objectives have been achieved. Evaluation questions are objective for correction, such as privileges (test, multiple, complement, right and wrong) (Jami, p. 20, 2009).

### **Third: the efficiency of the cognitive representation of information**

The cognitive representation of the basic practical information through which new ideas are stored in associative relationships with those ideas that exist in the cognitive structure of the individual. (Al-Shibli, 2001) indicates that the cognitive representation is the introduction, assimilation, and pacification of the meanings of ideas to be retained to become part of the human cognitive structure, which represents a superimposed structure in which the individual's information and knowledge interact with his direct and indirect experiences, which provides him with a good base for processing methods, which supports his ability to create events. Good and efficient integration of categories of information, and then compete with its ability to produce knowledge, and it becomes distinctive and

The Effectiveness of an Electronic Model Based on the Theory of Brain-Based Learning in the Efficiency of the Cognitive Representation of Information for the Subject of Curricula and Teaching Methods among Students of the College of Education.

unique that cognitive representation is a mental process and an essential component of information processing and processing, that is, the formation of connections between new acquired information and previous information in the cognitive structure of the individual or his memory (Dennis & Sachiko, p. 434, 2008).

Therefore, (Al-Zayyat, 2001) considers that the ability of the inputs is a presumption that depends on the extent of

- 1- Its seriousness, as it relates to what is present in the student's cognitive structure.
  - 2- Its ability to be understood, its cohesion, its integration, its relation to each other.
  - 3- The ability to classify or distinguish.
  - 4- Its consistency, logicity, its relation to reality, and its generalizability. (Al-Zayyat, 2001, 584)
- Therefore, the human being is an active, active object during the learning process, where he does not wait for information to reach him, but rather seeks to search for it, and works on processing it and extracting the appropriate ones after conducting many cognitive treatments for it, taking advantage of his previous experiences, which enables him to produce certain cognitive representations determine the patterns of his behavior towards the stimulating situations he faces (Zagoul, p. 48, 2003).

The researcher believes that the process of cognitive representation of information is of great importance to the success of the process. And his ability to express it in the form of graphs, conceptual maps, summaries, diagrams, or other things, and employing them in solving different problems, and this is evidence of the student's appreciation of the value of the information provided to him and his classification according to its importance.

### **Characteristics of an efficient cognitive representation of information**

The way in which knowledge is represented greatly affects the efficiency or effectiveness of retrieving that knowledge and remembering it. The sequence and succession through which information items are received and stored as elements or units of knowledge within knowledge systems affect the characteristics of the structure and structures of knowledge. The efficiency of knowledge representation depends on several The properties are as follows:

- 1- Retention feature: It is the intentional retention of information and knowledge based on the awareness of the importance of this information, whether it is inserted or derived for use or subsequent employment.
- 2- Meaning property: It is intended to settle in the individual's awareness of the meanings expressed or targeted by the cognitive content that is the subject of treatment.
- 3- The derivation characteristic: It is intended that the student's cognitive structure and the forms of expression of it reflect a class of new information that differs in quantity and quality from the raw elements included in it.
- 4- Characteristic of synthesis: It is intended to employ and use elements by modification or deletion to formulate different cognitive outcomes, but they reflect the same taste of those elements or units.
- 5- The characteristic of the multiplicity of forms of cognitive representation: it means the multiplicity of vessels, frameworks, and strategies upon which the cognitive representation is based, horizontally or vertically, simultaneously or sequentially, depending on self-organization or display organization.

6- Cognitive mental flexibility: It means the multiplicity of visions and formulas to address the cognitive approach to the inferred or derived cognitive inputs and not to rely on the plastic forms of cognitive representation.

7- The dynamic characteristic of cognitive representation: it means the cognitive relationship based on the generation, synthesis and derivation of information. (Al-Zayyat, p. 552, 2001).

### **Patterns and methods of cognitive representation of information**

The cognitive representation is a complex process that consists of a series of operations and takes place with change and instability. Brunner refers to three types of cognitive representation of information, which are as follows:

1- Symbolic style: In this style, information is represented using symbols, i.e. using language or words, and this style includes rules for constructing sentences and transforming them in ways that may completely change the truth, but what distinguishes this style is the liberation of the individual from the constraints of sensory experience.

2- The iconographic style: this style prevails in the acquisition of knowledge by relying on visual organization and other types of sensory representation.

3- The Practical or Performing Pattern: It is the pattern in which the acquisition of knowledge and the issuance of responses through work or performance prevail, i.e. without words, and the individual learns here as he learns the motor skills that he must learn Although there are no words, symbols or pictures to express it. (Niels, p. 565, 2008).

### **Research procedures**

The experimental method was adopted to achieve the objectives of the research, as follows:

**1. Research community:** It is represented by all third-year students in the Department of Educational and Psychological Sciences in the College of Education for the academic year 2020-2021 AD, morning shifts, which study curricula and methods for teaching the general public.

**2. Research sample:** The research sample was chosen in an intentional way, as the research sample was chosen (70) male and female students from the third stage in the Department of Educational and Psychological Sciences / College of Education / University of Al-Qadisiyah - the morning study, and by random assignment method, the group was divided to represent (35) Male and female students as control group and (35) male and female students as experimental group.

**3. Experimental design:** It is intended to establish a basic structure for the experiment, which includes placing the experimental groups and determining the methods of their selection and clarifying the variables of the experiment. (Raouf, p. 152, 2001) and the researchers adopted a partial-adjusted experimental design for the two equivalent groups with post-test and plotted (1) illustrates this.

Scheme (1) The experimental design used in the research.

No	group	Equivalence	Independent variable	Dependent variable
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The Effectiveness of an Electronic Model Based on the Theory of Brain-Based Learning in the Efficiency of the Cognitive Representation of Information for the Subject of Curricula and Teaching Methods among Students of the College of Education.

1	Excremental	*Chronological age in months *intelligence *academic level	An electronic model based on the theory of brain-based learning	cognitive representation of information scale
	Control	*cognitive representation of information	The traditional way	

**The equality of the two research groups:** The researchers conducted a statistical equivalence between the two research groups before starting the experiment in some variables that may affect the results of the experiment (chronological age of students calculated in months, academic level of students in the previous year (second stage), intelligence level, prior knowledge test, safety control Externalities (adjusting extraneous variables), as the results of equivalence between the research groups showed that the two groups are equivalent with the variables mentioned.

**Preparing the research requirements:** The research requirements are among the basic matters on which the research is based and according to which the research procedures are implemented, which is (the scientific material that is taught to the two research groups during the experiment period (the second course) of the academic year 2020-2021 AD, and the scientific material included Curriculum subjects and general teaching methods. Behavioral objectives were formulated (200) behavioral objectives According to Bloom's classification in the field of knowledge distributed on the six levels, and the preparation of teaching plans for the topics that were studied during the period of the experiment and were presented to a group of experts and specialists in teaching methods, to express their views on the safety of their formulation.

**A measure of the efficiency of cognitive representation of information:** After reviewing the literature and previous studies that examined this subject, the researcher adopted the Muhammad Scale (2008) to measure the efficiency of the cognitive representation of information among university students. (Mohammed, 2008, <http://ibrahim1952.jeeran.com/archive/2008/6/604897.html>)

The researcher adopted this scale for the following considerations:

- 1- The modernity of the scale, which was prepared by Muhammad (2008).
- 2- The diversity of its sub-fields and paragraphs, both quantitatively and qualitatively, which keeps the respondent away from boredom and boredom.

The scale consists of (85) items, which are divided into positive and negative items, for which three response alternatives have been developed (always, sometimes, never).

**Statistical means:** To process the data and extract the results, the t-test for two independent samples was used, the difficulty coefficient, the power of item discrimination, the equation for the effectiveness of the wrong alternatives, the Pearson correlation coefficient and the effect size equation.



**Results:** The students of the experimental group who studied the scientific subject using the electronic model outperformed the students of the control group who studied the same subject in the usual way in the achievement test, the subject of curricula and general teaching methods.

### Conclusions

In light of the research results, the researchers reached the following conclusions:

- 1- Teaching using this model makes the student the focus of the teaching process, and this is in line with what modern trends in teaching call for.
- 2- Using the electronic model in teaching helps develop their thinking levels.

### Recommendations

1. Urging teachers to apply the principles and stages of brain-based learning theory in university teaching, because of their positive impact on developing the efficiency of cognitive representation of information, thinking and motivation.
2. Organizing training workshops for university teachers on how to build teaching models and how to apply them in teaching different subjects.

### Suggestions

1. Conducting more research similar to research on other educational stages (primary - intermediate - preparatory).
2. Conducting studies that reveal the effectiveness of an electronic model based on the theory of brain-based learning in developing all kinds of thinking.

### Resources

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The Effectiveness of an Electronic Model Based on the Theory of Brain-Based Learning in the Efficiency of the Cognitive Representation of Information for the Subject of Curricula and Teaching Methods among Students of the College of Education.

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