

The Efficacy of a Proposed Program Based on Employing Visual Thinking in the Achievement of Teaching Thinking Subject for Students of Faculties of Education

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Article History: Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 4 June 2021

Abstract: Adopting a proposed program based on employing visual thinking for teaching thinking for students of the fourth stage in the departments of educational and psychological sciences in the college of education and identifying its effectiveness are the key objective of the current research. The researcher chose a sample consisting of (41) male and female students from the department of Educational and Psychological Sciences at the College of Education Ibn Rushd / University of Baghdad. After preparing the required tools and applying the experiment, he reached to a result that the students of the experimental group are superior over the students of the control group in the post-achievement test. This gives an indication that the proposed program is effective. The researcher recommended a number of recommendations and suggestions.

Keywords: Visual Thinking, Teaching, psychological

1. Introduction

Research problem:

The researcher made personal interviews with a number of faculty members in Iraqi universities in the faculties of education, departments of educational and psychological sciences who teach thinking skills, to discuss the items of the subject and the methods for delivering the scientific material and by unconventional teaching methods in the teaching process. They all emphasized the strategies and methods of research about modern teaching that is compatible with the tremendous scientific progress in information and modern technological development and based on the aforementioned. The research problem emerges in the following points:

1. No clear bases for determining the levels of students when building goals.
2. Weakness of the link between the objectives and the reality of teaching thinking skills.
3. Weak positive interaction between teachers and students during the lesson.
4. Poor knowledge of a number of teachers of the educational and psychological principles on which thinking skills are based.
5. The activities do not reveal learners' abilities and do not help their development.

Based on the aforementioned, the researcher's interest in defining his research problem focused on developing the following question: What is the effectiveness of a proposed program based on visual thinking in the fourth-stage student's achievement in the educational sciences departments in the faculties of education in Iraq?

Research significance:

The researcher believes that education is a process or a comprehensive system that deals with man from all his psychological, mental, personal and behavioral aspects, way of thinking, way of life and dealings with others. Through the school and the actual procedures in it, education solves its problems or achieves its goals, because it is an important part of society or the broad social institution that works to achieve the goal of society. The progress of any country in the world is measured by the extent of its ability to develop the minds of its children and work to invest them so that they are able to deal and constructive positive interaction with the changes of the times, and in a manner that serves the developmental trends in the country. Therefore, working on developing minds has become of great importance and success in this field and a basis of progress and advancement in various countries of the developed and developing world (Al-Heila, 2001, p. 161).

The development of students' thinking was a clear goal in American education for many decades, and more than (100 years) ago. Ball College expressed this goal by devoting efforts to teach adolescent students to think. The process of education in 1960 had a great impact on American educational ideas (Bruner, 1960, P:2). Tayler indicates that environmental influences have an impact on thinking which include factors related to educational conditions and the educational climate as well as on the educational programs offered by the school (Taylor, 1970, p73). Piajette indicates that the main goal of education is to create individuals who are able to do new things and to come up with non-repetitive ideas and to create individuals who are distinguished by creativity and discovery (Zayer and Enas, 2019) It develops by providing an appropriate atmosphere and respect for students' ideas to enable them to positively express their ideas through problem solving (Callahan: 1978: P412). Debono's studies also indicated that teaching thinking does not mean including the issue of interest in the development of thinking among students within the educational goals and the text that all of this is necessary, and claiming that the curricula take into account some of the thinking skills only. (De Bono: 1969 P78:). The research presented by (Fisher: 1991) also confirmed that thinking enables students to meet the requirements of the future, which will not be in acquiring a huge amount of facts that should be learned and taught, but in acquiring logical and creative methods in deducing and interpreting ideas (Fisher: 1991 P:215).

The need to develop visual thinking skills has become urgent, as it is thinking that combines synthetic thinking and analytical thinking, and this happens by analyzing any situation into its basic elements and then re-installing the elements into a system that gives qualitative functions or offers a solution. The main purpose of visual thinking is that everything interacts with the things around it affects them and is affected by them. When the individual is exposed to a situation or a problem, he cannot deal with the components of the system only, but also on how they affect and synthesize them with each other (Hamadat, 2009, pp. 28-9). The faculties of education are among the important and basic university institutions in the process of construction and development that prepare specializations and scientific cadres and prepare them according to the latest modern scientific methods for secondary education (Hammadi, 2021, p. 301). This preparation is to enable students to absorb knowledge and be able to make change and progress in its delicate fields through possessing the necessary scientific information, general theories, and good specialization. (Al-Rubaie, 2001, p. 145)

The researcher believes that the university develops the skills that enable them to acquire knowledge on their own. Therefore, it is necessary to modify or develop its programs to achieve a balance between the theoretical and applied aspects for the purpose of unleashing energy, thought and imagination to work and creativity. The educational stagnation and stereotypes are exposed, because this issue makes students with a high level of preparation qualifying them to face the developments taking place in the world.

Hence, the importance of the research can be highlighted through:

- 1- Developing students' visual thinking skills so that the student is able to see a comprehensive and integrated future vision for any topic without losing its parts.
- 2- The importance of the university stage as it is an important stage in which the student learns modern and new information, concepts and methods related to a later stage of the graduate's life.
- 3- The importance of teaching thinking skills as a means of intellectual and social communication.
- 4- This research is in line with recent trends in the field of developing thinking-based teaching methods and programs that call for the use of modern educational strategies.
- 5- It is considered a breakthrough for researchers and their graduate student application after completing it and adopting it and employing it later in future research.

Research objective and hypotheses:

The current research aims at:

- 1- Building a proposed program based on the use of visual thinking for the subject of teaching thinking for fourth stage students in the departments of educational and psychological sciences in the college of education.
- 2- Knowing the effectiveness of the proposed program in the achievement of the subject of teaching thinking among students of the fourth stage in the departments of educational and psychological sciences in the faculties of education.

In order to verify the second objective, the researcher formulated the following null hypothesis:

(There is no statistically significant difference at the 0.05 level between the average scores of the students of the experimental group who studies the subject of teaching thinking using the proposed program and the average scores of the students of the control group who teach the same subject in the usual way in the achievement test).

Research limits:

The current search is limited to:

- 1- Faculties of education in Iraqi government universities that include departments of educational and psychological sciences.
- 2- The fourth grade student in the educational and psychological sciences departments for the academic year 2020-2021.
- 3- The first semester of the academic year 2020-2021.
- 4- Teaching thinking for the fourth stage.

Defining terms:**Visual Thinking:**

- Piaget defined visual thinking as a mental ability that is directly related to the sensory-visual aspects, as this thinking occurs when there is a mutual consistency between what the learner sees of forms, drawings and relationships, and what occurs in terms of connections and mental products based on the vision and the displayed drawing (Al-Afoun, and Muntaha, 1998 : 83).

Thinking skills:

Abu Jada and Muhammad defined visual thinking as “precise and arithmetical mental processes that overlap each other when we start thinking”. It is the basis on which effective and influential thinking is based on (Abu Jada and Muhammad, 2007, p. 76).

Definition of thinking skills theoretically: They are the set of mental processes that we practice and that enable us to think effectively, quickly and mastery to carry out tasks and thinking processes aimed at reaching meaning or knowledge.

Procedural definition: They are multiple skills adopted by the researcher in teaching thinking skills for students in the research sample.

2. Theoretical Background

Visual reasoning:**Visual thinking methods:**

After reviewing the scientific studies by Furth, Diezmann, (1997), eg Gleick, (1987), Cunningham, (1994), Klotz, (1994), Wileman, (1993), and Wachs, (1974), the researcher came up with three methods of visual thinking:

- Thinking through the bodies around us.
- Thinking through imagination while reading a book.
- Thinking in writing or drawing.

Humans who are not blind have many different skills that are related to the three types of visual thinking, for example, a photographer may be effective in representing his opinion in a graphic form. While we find that the artist is more able to translate a summary he imagines into a discussion that carries meaning in a symbolic way. Those examples require interacting between the three types of visual thinking.

Features of visual thinking:

1. It improves the quality of learning and speeds up interaction among students.
2. It increases commitment among students.
3. It supports new ways of exchanging ideas.
4. It facilitates the management of the educational situation.
5. It contributes to resolving outstanding issues by providing many options for resolving them.
6. It deepens thinking and builds new perspectives.
7. It develops students' problem-solving skills.

Visual Thinking Tools:

The visual form can be represented by three tools: (Wileman.1993

- Icons.
- Diagrams.
- Pictures.

Pictures: the most accurate way to communicate but most of the time they are the expensive, time consuming and most difficult to get them.

Symbols: represented by words only and are the most common and used in communication, although they are more abstract.

Diagrams: they are used by the graphic artist to visualize ideas and visualize the ideal solution, including graphics related to the image, graphics related to a concept, and graphics. Image-related drawings are easily recognizable intercepts of an object or idea and use these objects as silhouettes on which a glimpse of the body can be written in detail using printed or computer cut-outs.

Concept graphics remove as much detail and often novelty as an easily recognizable object. Arbitrary graphics are abstract symbols that are carried in a coach's imagination as a way to see relationships between ideas. Arbitrary layouts are called verbal pictures that summarize the main ideas of a paragraph. Arbitrary graphics include geometric shapes, flowcharts, and network maps, etc.

Visual form:

The visual form is a schematic image consisting of the main concepts and ideas derived from the patterns of organizing the lecture, the clues, phrases and the most important concepts in books or dialogues, and it gives valuable ideas to the level of importance of the content. The visual form can use a variety of graphics (pictures - clippings - geometric shapes - colors and words Indicators - numbers - silhouettes - lines - any symbolic technique to represent a concept or idea).

We also use in the schematic visual form: keywords for brevity of words, and geometric nodes to link ideas and concepts using arrows and lines.

Uses of the components of the schematic visual form:

The keywords and phrases included in the geometric shapes were linked to the lines and arrows to see the relationships between the ideas. Any line in the drawing indicates the type of relationship or communication, as the lines can also indicate examples or a main idea. Arrows mean a cause, a product, a result, or lead to it. A node can contain keywords or phrases.

How does visual thinking work?

Visual thinking depends on the shapes, graphics, and images displayed in the situation and the real relationships contained in them, as these shapes, graphics and images fall into the hands of the learner and he tries to find meaning for the contents in front of him. (Campbell, 1995:180) Thus, the principle of visual thinking is very simple and the application of its components takes place strongly in an effective dynamic medium, which leads to better thinking, where visual thinking is carried out with the help of tools that take geometric shapes and plans to make the current thinking clear, presented with flexible presentation methods that help us to work with our ideas creatively, which activates We have new visualizations and achieve pre-determined goals that lead to better thinking through the use of charts, flowcharts, timelines, images, films, visualizations...etc. For example: when you are driving your car on a highway and you are surprised by a stop sign of the same shape and color, you stop automatically, even though the word stop is not written on the sign and thus a kind of insight occurred to you through the drawing. Another example is that when meeting several executive managers of a company, everyone is trying to think of a logically complex marketing situation. After several hours of frustration, someone presents a flowchart on a whiteboard, showing the problem and a workable solution then suddenly everyone relaxes.

3. Research Procedures:

Research procedures include: building and implementing the proposed program.

Program building procedures:

After identifying the visual thinking skills that are most suitable for his students in the fourth stage in the department of educational and psychological sciences, the program will be built by going through three basic stages: analysis, installation, and evaluation. These are the justifications for the proposed program, the foundations on which the researcher relied to build it, and then clarifying the criteria for building the program.

Program building stages:

In order to build the program, the researcher reviewed a set of literature and previous studies that dealt with building programs of all kinds. He found that the programs begin with the analysis of the educational process, the installation stage, then the evaluation stage, the feedback is based on the following:

The first stage: Analysis stage:

This stage included the following:

- 1- An analysis of the general objectives of teaching thinking skills.
- 2- Choosing the content of the educational material.
- 3- Content analysis in terms of visual thinking skills.
- 4- Analyzing students' characteristics.
- 5- Analysis of the classroom environment.

The second stage: Installation:

This stage included a number of procedures on which the analysis process is based, namely:

- 1- Formulating behavioral goals.
- 2- Organizing educational content.
- 3- Determining teaching methods and strategies.
- 4- Determine the activities.
- 5- Determining the teaching aids.

The third stage: Evaluation

The evaluation process is important for any educational program. Accordingly, the researcher relied on three types of evaluation:

- Pre-evaluation: This type of evaluation takes place before the start of the educational process, that is, before the program is implemented.
- Constructive evaluation: This type of evaluation takes place during the educational process, that is, during the application of the program.
- Final (concluding) evaluation: This evaluation is carried out after the implementation of the proposed program, i.e. at the end of the experiment, and this is due to identifying the extent of progress and improvement in the educational level of students after the application of the program.

Program feedback:

It is what results from the process of evaluating the outputs and analyzing them from the results, in light of the objectives set for the program. It gives indications of the extent to which the objectives have been achieved and accomplished, and shows the strengths and weaknesses of any of the other parts of the program, on the basis of modified, changed, added or deleted thing within the program (Ibrahim, 2007: 63).

Procedures to verify the program validity:

After designing the educational program and verifying its validity and initial image, it was presented to experienced arbitrators in the field of curricula, teaching methods, and educational and psychological sciences, with the aim of extracting the arbitrators' sincerity of the program, and expressing their opinions on the following:

- Suitability of the program for the purpose of the research.
- Appropriate organization of the educational content of the lesson material.
- Appropriateness of the strategies used in the program.
- Allowing them to add what is appropriate to the program.

The experts unanimously agreed 100% to all the contents of the program.

Experimental application procedures

First, the experimental design:

Table (1) shows the experimental design of the research

Group	Dependent variable	Independent variable	Tool
Experimental	Achievement of teaching thinking skills subject	The Program	Achievement test
Discipline		-----	

Second: Research community:

One of the requirements of the current research is to define the total research community. The research community included (16) faculties of education for human sciences in Iraqi universities, which include departments of all educational and psychological sciences. These faculties were distributed among the various Iraqi universities, except for the universities of the Kurdistan region.

Third: Choosing the research sample:

The researcher chose to choose a sample that represented by its characteristics the characteristics of the original community, as the researcher chose the Ibn Rushd College of Education for Human Sciences, University of Baghdad. Choosing the sample was intentionally, because the researcher was one of his graduate students in this college, suggested by the head of the department and the material instructor to assist the researcher in conducting his experiment. Furthermore, application in this college is easy due to the procedures of the Health and Safety Cell due to Corona pandemic. Nevertheless, the college contains the department of educational and psychological sciences. The fourth stage of the academic year (2020-2021), consisting of two divisions. Division (A) was chosen to represent the experimental group, and Division (B) was chosen to be the control group to be studied in the used manner. The number of students of the experimental group was (24) male and female students. After excluding (4) students, the number of students requested by the experimental group became (20) male and female because they were teachers or teaching assistants from the previous year, while the control group was (24) male and female students, and (3) students were excluded because they were teachers or teaching assistants and because of the experience they had they were excluded. The number of students of the control group became (21) male and female students as shown in table (2).

Table (2) Shows the students sample on the two research groups

Group	Excluded	No. before excluding	No. after excluding
Experimental	4	24	20
Discipline	3	24	21
Total	7	48	41

Fourth: Equivalence of the two research groups:

Before starting the experiment, the researcher was keen to adjust a number of non-experimental variables that could affect the integrity of the experimental design and results of the research. Therefore, before starting the experiment, he was keen to equalize the two research groups and adjust these variables in order to allow the effect of the independent variable to appear in the dependent variable, despite the fact that the sample students are from one environment. These variables include:

- 1- The chronological age of the students, calculated in months.
- 2- Degrees of cognitive psychology for the previous year.
- 3- General average grades for the previous academic year.
- 4- Intelligence test.

Table (3) Equivalence of the two research groups (experimental and control)

Variable	Group	Degree of freedom	Tabular value	Calculated T- value	Standard deviation	Arithmetic mean	No	significance at the level (0,05)
Chronological age	Experimental	2.021	0.828	39	6.86	267.48	20	Statistically non-significant
	Discipline				6.8	266.80	21	
Intelligence	Experimental	2.021	0.134	39	13.062	74.14	20	Statistically non-significant
	Discipline				10.199	73.65	21	
Past average year	Experimental	2.021	0,806	39	13.069	75.10	20	Statistically non-significant
	Discipline				11.506	78.20	21	

Marks of cognitive psychology	Experimental	2.021	0.551	39	10.212	79.904	20	Statistically non-significant
	Discipline				10.750	78.10	21	

Fifth: Adjusting extraneous variables:

The experimental work is scientifically distinguished by being an exact work, and controlling the experiment is not an easy thing, as it is not only represented in the researcher’s control over one variable and its impact on another variable, but rather it is represented in the exact observation and control of other variables that may affect the dependent variable (Al-Zoba’i and et al, 1981, p. 90). In addition to the aforementioned previous equivalence procedures, the researcher tried to control some extraneous variables (internal and external) that he believed might affect the accuracy of the experiment and the safety of its procedures and results, and the following:

- 1- Experimental extinction
- 2- Associated accidents
- 3- Processes related to maturation
- 4- The research tool
- 5- Individual differences in the two groups test
- 6- The effect of the experimental procedures: Some experimental procedures that are believed to affect the conduct of the experiment have been seized and the following:
 - A. Teaching process
 - B. Determine the lesson

Sixth: Formulating Objectives:

The researcher derived behavioral objectives in light of the general objectives of the proposed program, and in light of the topics of learning to think, and then presented them to a number of arbitrators. In light of their opinions, the necessary modifications were made without deleting any of them, and thus the number of behavioral goals remained the same with (249).

Seventh: Preparing teaching plans:

The researcher prepared lessons to teach his students the experimental group according to the proposed program. The researcher also prepared lessons to teach his students to the control group, according to the traditional program established according to the usual method.

Eighth: Research tool (achievement test):

The researcher prepared an achievement test that as follows:

The first question: of the multiple choice type, and it consists of (20) paragraphs. Each paragraph follows (4) alternatives, one of which is true and the other three are false. The second question is of the type of filling in the blanks, that is, complete what you see missing in the following phrases, and it also consists of (20) paragraphs. The third question: of the type of essay questions, and it consists of (10) paragraphs. The researcher verified questions validity, objectivity, and psychometric features such as difficulty, ease, discrimination, and the effectiveness of the wrong alternatives.

Ninth: Statistical means:

The researcher used the Social Statistical Package (SPSS) to analyze the research results and extract the results.

1. The t-test of two independent samples.
2. Cronbach's alpha equation.
3. Difficulty coefficient for objective paragraphs.
4. Difficulty coefficient for essay paragraphs.
- 5 . Discrimination power factor for objective paragraphs.
- 6 . Discrimination power factor for article paragraphs.
7. Equalizing the effectiveness of the wrong alternatives.

4. Research Results

First: Presenting results.

The researcher presents the results according to the sequence of research objectives, as follows:

The first goal: to build a proposed program based on visual thinking for the subject of teaching thinking for students of educational and psychological sciences departments in the faculties of education. To achieve this goal, the program’s philosophy, its premises, the foundations of its construction, and the three procedures included in its construction stages (planning, implementation, and evaluation) were defined and detailed in the fourth chapter, and in light of these procedures, the researcher was able to build the proposed program.

The second goal: to identify the effectiveness of the proposed program based on visual thinking in the achievement of the subject of teaching thinking for fourth-year students in the departments of educational and psychological sciences in the faculties of education. In order to verify the second goal, the researcher set a null hypothesis as follows: There is no statistically significant difference at the level of 0.05 between the mean scores of the students of the experimental group who study the subject of teaching thinking using the proposed program and the average scores of the students of the control group who taught the same subject in the usual way in the test examination.

To verify the validity of this hypothesis, the researcher used the t-test for two independent samples, and the results indicated that there was a difference between the mean scores of the control group students of (30.43), and the average scores of the students in the experimental group, which amounted to (36.20). The calculated t-value of (2.614) was greater than the tabular t-value of (2,021) at the level of significance (0.05) and the degree of freedom (39). This indicates the existence of a statistically significant difference between the average scores of the students of the two research groups in the achievement test in favor of the experimental group students as shown in Table 4.

Table (4) The arithmetic mean, standard deviation, and the calculated and tabular T-value of the scores of the students of the two research groups in the achievement test

Significance level at function level ((0,05	T-Value			Standard deviation	Arithmetic mean	No. sample	Group
	Tabular	Calculated	Degree of freedom				
Significant	2,021	2.614	39	7.338	30,43	21	Discipline
				6.787	36,20	20	Experimental

Second: Interpretation of the results:

- 1- The proposed program made the students in the experimental group the focus of the educational process, which positively affected their motivation and activity towards learning. This was evident in increasing their achievement in the subject of teaching thinking.
- 2- The newness of the proposed program, and its abnormality, was in line with the students' intellectual ability and skill, with the challenges and requirements of the age, generating motivation for students to interact with its lessons effectively.
- 3- The proposed program made it possible for students in the experimental group to practice self-learning, especially since the conditions of the pandemic helped that through enrichment lessons by e-learning, and the student who takes into account self-learning achieves learning that is compatible with his abilities and self-speed in acquiring information, as well as being able to solve problems, and creating a fertile environment for creativity. This, in turn, helped the students in the experimental group to increase their achievement in the subject of teaching thinking.

Third: Conclusions

- 1- The training program proved its effectiveness in increasing student's achievement who are the research sample in the college of education. Accordingly, the achievement can be increased through the appropriate programs.
- 2- The validity of the literature and previous studies on the effectiveness of programs based on thinking skills.
- 3- There is an urgent need among students in the department of educational and psychological sciences for modern training methods to develop their educational skills before engaging in active service, including the program based on visual thinking.

Fourth: Recommendations

In light of the results and conclusions reached by the researcher, the following recommendations can be made:

- 1- Adopting the proposed program based on visual thinking for teaching thinking in the departments of educational and psychological sciences.
- 2- Adopting students in the fourth stage in the departments of educational and psychological sciences / in the faculties of education, because of its effectiveness in increasing their achievement.
- 3- The necessity of activating the application aspect and including it in the teaching courses in the colleges of education in Iraq.

Fifth: Suggestions:

2. Building a training program based on visual thinking to develop the teaching skills of students of the fourth stage in the faculties of education in the subject of practical education.
3. Building a training program based on visual thinking skills and knowing its impact on other dependent variables such as: (attitude towards the profession, teaching practices).

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