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RESEARCH ARTICLE

The effect of visual thinking strategy on the achievement of history department students and their academic self-efficacy

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ABSTRACT

The current research aims to identify the effect of the visual thinking strategy on the achievement and academic self-efficacy of history department students. To achieve the research objectives, two null hypotheses were formulated that "there are no statistically significant differences at a significance level of (0.05) between the average scores of students in the experimental group who study the subject according to the visual thinking strategy, and the average scores of the control group who study the same subject using the traditional method, on the achievement test", and "there are no statistically significant differences at the level of (0.05) between the average scores of the students in the experimental group who study the subject according to the (visual thinking) strategy and the average scores of the students in the control group who study the same subject in the usual way in the academic self-efficacy test."

The research involved third-year students from the History Department at the College of Education at Al-Qadisiyah University for the first semester of the 2024-2025 academic year. The sample consisted of 65 male and female students, with 32 in the experimental group and 33 in the control group. The study used two research tools: an achievement test and an academic self-efficacy test. The results showed that students in the experimental group who used the visual thinking strategy outperformed those in the control group who used the traditional method. The researchers recommend adopting the visual thinking strategy in teaching Iraqi Regional Geography due to its positive impact on academic achievement and self-efficacy among students.

Keywords: visual thinking strategy; academic self-efficacy; History department students

1. Introduction

1.1. Research problem

One of the reasons for students' poor understanding of scientific subjects is that "the majority of students view the learning process as boring. This may be due to stereotypical teaching methods that often lack excitement and arouse students' desire and curiosity for learning, which weakens their engagement in the educational situation. The teaching strategies used by professors with their students can break the routine

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and boredom that many students experience, compared to the traditional method, which centers around the professor and neglects the role of the student as an active element in the educational process. Meanwhile, modern trends emphasize the student as the focus of the learning and teaching process and must be empowered to play the greatest role in this process [1]. In the same context, Bryan & Fallon (2002) confirm that the problem of weak academic level is one of the global problems that hardly any society is free of (, and that twenty students out of a hundred have weak academic level, and this percentage was confirmed by taking random samples from different and diverse societies [2]. In light of the above, the research problem lies in the fact that despite the importance of visual thinking networks in raising the level of achievement of students, it was noted that there is a weakness in interest in them within educational situations, as a survey was conducted (Iraq's regional geography) for the third stage - History Department, and it became clear that there is a weakness in the objectives and activities related to developing habits of mind and visual thinking networks. The researchers also noted the presence of a group of shortcomings represented by students' acceptance of initial solutions without perseverance, and it was noted that there is no communication between them, and this was confirmed by some Arab and foreign studies that dealt with visual thinking networks". Therefore, the idea of this research came to be a new addition to studies and research in the field of teaching methods. Through the above, the researchers defined the problem in the following main question which is "Does the visual thinking strategy have an effect on the achievement of history department students and their academic self-efficacy?"

1.2. Research aims

In the modern era, the term visual thinking appeared explicitly in educational circles in the late 1980s, when Abigail Housen and art teacher Philip Yenawine invented visual thinking strategies for use in curricula such as visual arts programs. The researchers used a method that focused on the student and taught him thinking and communication skills using pictures, drawings, and visual arts. The researchers also used the Internet to develop computer skills among learners and in preparing teachers. psychologists were among the pioneers in exploring visual thinking through both application and research during the twentieth century. Their work focused on how individuals visually perceive entire objects, recognize forms, and determine spatial relationships. Visual thinking is regarded as one of the most significant types of cognition, as it relies on visual stimuli and the subsequent mental processes such as analysis, comparison, and imagination. These processes contribute to deeper cognitive impact and longer retention in memory compared to other thinking modalities. Research suggests that over 75% of the information acquired by individuals is received through vision, making visual representation a fundamental method for forming and processing mental imagery in everyday life. According to Jean Piaget, visual thinking is a cognitive ability intrinsically linked to visual sensory input. It occurs when there is a harmonious integration between what the learner perceives visually—such as shapes, diagrams, and spatial relationships—and the mental connections and interpretations derived from them. Visual thinking thus reflects an individual's capacity to conceptualize and convey ideas or information through imagery and visual formats, rather than through conventional verbal or textual communication. Visual thinking is a non-analytical, non-algorithmic mode of thinking, consisting of the interplay of three strategies: design thinking, vision thinking, and conceptual thinking [3]. The importance of the current research is evident in its theoretical and practical significance. This study has both theoretical and applied significance. On the theoretical side, it is one of the few studies that has addressed the impact of the visual thinking strategy on achievement and academic self-efficacy. To the best of the researcher's knowledge and insight, there has been no previous study that has addressed these variables. This study may contribute to enriching learning and teaching with related thinking, and it may also enhance and develop teaching and learning methods. The practical significance of this study lies in its ability to draw the attention

of researchers and guide them to conduct future studies on visual thinking and academic self-efficacy. These concepts stem from a contemporary approach to teaching history, emphasizing learners' self-confidence through the use of modern strategies in the educational process. It may also raise students' academic achievement.

1.3. Limitations of the study

The study was restricted to a relatively small sample of 65 students from one Iraqi university, which may limit the ability to generalize the results. In addition, the intervention was confined to a single course, Iraq's Regional Geography, and covered only one academic semester, reducing the breadth of its application. The research also focused solely on third-year history students, without considering other levels or fields. Future investigations are recommended to include larger and more varied samples across multiple institutions and to extend the duration of the intervention in order to confirm and broaden the findings.

1.4. Definition of terms

- Visual Thinking Strategy: A pedagogical approach utilising visual stimuli and systematic questioning to enhance observation, interpretation, and critical thinking skills in learners.
- Achievement: It is a tool for judging what has been taught to students regarding topics related to a specific subject in itself, and not what is expected or anticipated to be taught to them [4].
- Academic Self-Efficacy: It is an individual's belief or perception of the level of competence or effectiveness of their potential, or their personal and academic abilities that help them master academic tasks and successfully perform their academic tasks to address academic situations, tasks, problems, or goals [5].

2. Literature review

2.1. Visual thinking strategy

Çiftçi and Ünal (2020) point out that Visual Thinking Strategy is an educational model based on managing discussions and the method of asking questions, consisting of five developmental stages (questioning, construction, classification, interpretation, and re-creation). Each stage is distinguished by ideal behavior, ways of thinking, and organizing students' views in the limit [6].

2.1.1. Origins of the concept

The Visual Thinking Strategy (VTS) was developed in the United States during the mid-1970s by cognitive psychologist Abigail Housen and art educator Philip Yenawine. Their collaborative research aimed to explore how individuals interpret and respond to meaningful works of art, focusing on the variations in their theoretical understandings. Drawing on aesthetic development theory, their studies examined observable behavioral patterns and grounded their interpretations in empirical observation [7]. VTS is structured around a set of systematic procedures intended to enhance learners' interpretive and reflective abilities. It also includes a professional development component designed to support classroom teachers in implementing the strategy effectively. At its core, VTS relies on experimental research that investigates how individuals think, specifically by strengthening their capacity to convert visual input into verbal or written expression. The main goals of the strategy include fostering communication skills, enhancing both creative and critical thinking, and helping students build confidence in navigating complex, ambiguous, and diverse perspectives [8].

2.1.2. Key principles and steps

The Visual Thinking Strategy (VTS) involves actively engaging learners in observation and interpretation through systematic procedures. This technique prioritises dialogue, inquiry, and visual examination to cultivate profound comprehension. The key steps of VTS are as follows:

1. Presenting the model that expresses the task and its contents after defining the task data and requirements.
2. Analyzing the relationships depicted within the model or figure and identifying their nature—whether logical or causal—in order to define their boundaries and make effective use of them.
3. Establishing connections among the existing relationships illustrated in the figure and deriving new ones based on the available data, while considering the possibility that some of the information may be redundant or lacking.
4. Detecting ambiguity or gaps within the figure by critically examining the relationships inferred in the previous steps, thereby allowing for a deeper understanding of the structure and integrity of the presented information.
5. In visual thinking, identifying areas of ambiguity or gaps, and attempting to utilize previous concepts, laws, or theories to eliminate the ambiguity or gaps identified, bridge the gap between the problem and its solution. Imagine the solution from the figure presented, taking into account the inclusion of the previous steps [9].

2.1.3. Theoretical foundations of visual thinking strategy (Piaget's theory)

The Swiss psychologist "Jean Piaget (1896-1980), who is considered one of the most prominent figures in contemporary psychology, presented this theory, which is considered one of the important theories in cognitive and intellectual development. The bulk of his studies were about cognitive growth. This theory was based on determining the nature of the intellectual stage that human intellectual development goes through according to logical, interconnected and consistent methods. We cannot separate one stage from another, and that cognitive growth occurs through the change that occurs in cognitive structures and that qualitative structural changes are changes in the intellectual function. The adoption of Piaget's theory of the development of visual thinking in the change of mental processes is considered an important point in its adoption of the cognitive structure that contributes to determining the level of long-term and short-term memory, and his description of the method of logical reasoning that individuals use in linking causes to effects, interpretation and analysis [10].

2.2. Academic self-efficacy

2.2.1. Definition

It is an individual's belief or perception of the level of competence or effectiveness of their potential, or their personal and academic abilities that help them master academic tasks and successfully perform their academic tasks to address academic situations, tasks, problems, or goals" [11].

2.2.2. Determinants and role in learning

Many psychological and social elements influence the development of academic self-efficacy. These factors are crucial in shaping students' self-esteem and academic achievement, as stated by Bandura's social cognitive theory. Bandura's social cognitive theory suggests that self-efficacy develops through the following:

- Mastery experiences: Repeated success in tasks increases self-efficacy.

- Verbal persuasion: Through those around the individual, who convince them that they will succeed if they exert adequate effort.
- Substitution experiences: Through the individual observing other individuals who have successfully performed a task.
- Emotional and physiological states: The more intense the emotion, the more negatively it affects the individual's sense of self-efficacy. However, if it is moderate, it motivates them to perform the task with a high level of success, which in turn positively impacts the individual's sense of self-efficacy [12]. Self-efficacy has effective determinants on an individual's behavioral motivation, as follows:

1-Activity Selection: Individuals tend to choose activities in which they have previously experienced success, as such success reinforces their sense of self-efficacy. Conversely, they tend to avoid tasks associated with failure. Students, in particular, are more likely to engage in activities they can successfully adapt to and avoid those perceived as beyond their capabilities.

2-Effort and Persistence: Individuals with a strong sense of self-efficacy demonstrate greater perseverance when facing challenges. Despite difficulties, they remain committed to overcoming obstacles and strive toward high achievement by maintaining sustained effort.

3-Learning and Achievement: Those who recognize and develop their self-efficacy are more likely to attain advanced levels of learning and academic achievement, as they believe in their ability to succeed.

4-Thinking and Decision-Making: People who possess confidence in their problem-solving abilities tend to think more clearly and make effective decisions when dealing with complex tasks. In contrast, individuals with low self-efficacy may struggle with decision-making and doubt their capabilities.

5-Emotional Responses: High self-efficacy is associated with focusing on task demands and challenges. These individuals are more resilient and better equipped to cope with stress. On the other hand, those with low self-efficacy often experience anxiety, frustration, pessimism, and feelings of inferiority, which hinder their academic performance. Academic self-efficacy is commonly assessed through self-report measures using verbal items presented in the form of scales or questionnaires [13].

2.3. Related studies

Mohammed (2015) conducted a study titled “Some Visual Thinking Skills Among Third-Year Female Students Majoring in Art Education at the Faculty of Specific Education”, which examined the impact of mind maps on students’ academic performance and visual thinking abilities. The research targeted third-year female students specializing in art education and utilized tools such as an achievement test and a visual thinking skills test within the design course. Findings revealed statistically significant differences in favor of the experimental group over the control group in both achievement and visual thinking skills. Moreover, there were significant improvements between pre- and post-test scores within the experimental group, again favoring the post-test results [14].

Another study focused on “academic self-efficacy and was titled *“*The Effect of Parenting Styles*,* Academic Self-Efficacy, and Achievement Motivation on Academic Achievement Among University Students in Ethiopia*”* by Abesha (2012). This study sought to examine how parenting styles, academic self-efficacy, and motivation toward achievement influence academic performance among Ethiopian university students. The sample included 2,116 male and female participants. Results indicated that the authoritarian parenting style was the most prevalent. Specifically, females experienced more authoritarian parenting from fathers, whereas males were more often subjected to neglect. The findings also demonstrated that parenting

styles had a direct impact on students' academic self-efficacy, motivation, and overall academic success. Students who reported experiencing authoritarian parenting exhibited higher levels of academic self-efficacy compared to those who did not. Additionally, female students who perceived their fathers as authoritarian showed greater motivation to succeed academically [15].

2.4. Research gap

Although there are a number of studies that have addressed the impact of the Visual Thinking Strategy (VTS) on the development of visual thinking skills and academic self-efficacy, such as the study of Muhammad (2015), Absha (2012), and Zhang and Cheng (2022), most of these studies were conducted in fields such as art education or in educational environments outside Iraq. These studies also did not focus on the combined effect of the strategy on both academic achievement and self-efficacy in history. To date, there is no experimental study addressing this topic among history students at Iraqi universities. Hence, the importance of this research to bridge this gap by studying the impact of the visual thinking strategy on academic achievement and academic self-efficacy among third-year students in the History Department at Al-Qadisiyah University. Hence, the importance of this research to bridge this gap by studying the impact of the visual thinking strategy on academic achievement and academic self-efficacy among third-year students in the History Department at Al-Qadisiyah University.

3. Materials and methods

3.1. Research method

The researchers followed the experimental method because it was appropriate for achieving the research objectives. The researchers adopted a partially controlled experimental design consisting of two equivalent groups: an experimental group taught using the visual thinking strategy, and a control group taught using the traditional method as **Table 1** illustrates this.

Table 1. Experimental design adopted in the study

Group	Equivlance	Independent Variable	Dependent Variable	Post-test
Experimental	Intelligence Academic Self-Efficacy	Visual thinking strategy	Academic self-efficacy	Academic Self-Efficacy Test
Controlling		Normal Strategy [1]		

3.2. Research sample of the study

The current research community consists of students from the History Department at Al-Qadisiyah University, affiliated with the Diwaniyah Governorate, which was selected and from which the sample was drawn. The researcher randomly selected two classes for the fourth stage, one experimental and the other a control group. The department head was also willing to cooperate with the researcher and provide the necessary equipment for the experiment. Class (A) represented the experimental group, whose students were exposed to the independent variable, the visual thinking strategy, in teaching history. Class (B) represented the control group, whose students studied history without being exposed to the independent variable. The number of students in both classes reached (70), with (35) for the experimental group and (35) for the controlgroup. Five students were statistically excluded, as shown in **Table 2**.

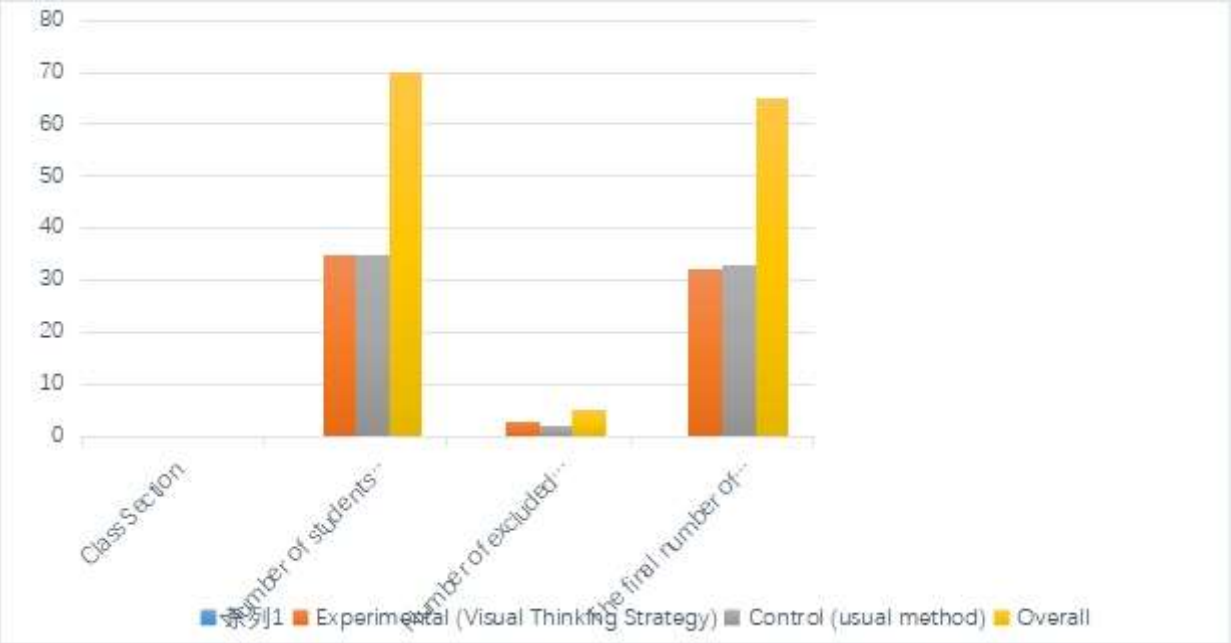

Figure 1. Distribution of students in experimental and control groups before and after exclusion

Table 2. Distribution of the research sample students into two groups (experimental and control)

Group	Class Section	Number of students sample	Number of excluded students	The final number of students in the sample
Experimental (Visual Thinking Strategy)	A	35	3	32
Control (usual method)	B	35	2	33
Overall		70	5	65

3.3. Intervention procedures

The experimental treatment lasted for eight weeks, with two sessions per week, each lasting (90) minutes. The experimental group was taught using the Visual Thinking Strategy (VTS), while the control group followed the traditional lecture-based method. VTS sessions were built on guided discussions using historical maps, photos, and visual aids related to the subject of Iraq's regional geography. The instructor posed open-ended questions such as:

- What do you see in this image?
- What makes you say that?
- What more can we find?

Students were encouraged to observe closely, share interpretations, and support their ideas with visual evidence. They also created visual concept maps to summarize lessons. In contrast, the control group received the same content through traditional teacher-led instruction without any visual interaction. Both groups completed an achievement test and an academic self-efficacy scale before and after the intervention to measure learning gains.

3.4. Equivalence of the two research groups

One of the requirements of research procedures is to form equivalent groups with respect to the variables that are related to the research if the researcher in the experiment is keen to ensure that the experimental and control research groups are statistically equivalent in some variables that he believes may

affect the results of the research, and the researcher obtained information through the department head for each of the equivalence variables and to know the effect of the independent variable on the dependent variable, therefore the internal integrity and external integrity of the experimental design must be verified, as the researcher worked to control or identify the extraneous factors that may affect the results of the experiment, as follows:

1- Chronological age in months

2- Intelligence scores

3- Academic self-efficacy

Regarding the Chronological age in months, the researchers obtained information for this variable from the registration department within the college, and entered their ages. When analyzing it, he found that the two groups were equivalent, and **Table 3** clarifies this.

Table 3. Chronological age of the students.

Group	Number	Mean	Std Dev.	FD	Calculated value	Tabulated value	Significance
Experimental	32	129,69	5,67	63	0,891	2,00	Not Significant
Controlling	33	128,55	4,63				

As for the Intelligence scores, the Mann-Whitney test was used to calculate the significance of the difference between the means of the experimental and control groups. It became clear that there was no statistically significant difference, as the minimum calculated Mann-Whitney value was (128.500), which is greater than the tabular value (1.83). In another way, the researcher relied on the statistical value (the probability P value) as a cut-off point for statistical significance. The p value is a probability value used to interpret inferential statistical measures, and whether the difference is due to chance or is a significant difference [16]. It is the approved (default) formula for calculating statistical significance in the SPSS program. Since the probability p-value of (0.785) is greater than the significance level value (0.05), we accept the null hypothesis". This indicates that the two research groups are equivalent in the average of students' scores in the intelligence test.

As far as the academic self-efficacy is concerned, the average academic self-efficacy of the experimental group students was (15.07), while the average intelligence of the control group students was (16.86). When using the t-test for two independent samples to determine the significance of the statistical difference between the two research groups, it became clear that the difference was not statistically significant at the level of (0.05), as the calculated t-value of (1.902) was smaller than the tabular t-value of (2), and also the probability p-value of (0.062) was greater than the significance level value of (0.05), so we accept the null hypothesis, and this indicates that the two research groups are equivalent in the average scores of students in academic self-efficacy.

3.5. Preparing research requirements

The current research requires the preparation of a set of requirements for the purpose of implementing the research procedures, including:

1. Determining the academic material: The academic material consisted of (Regional Geography of Iraq) which is scheduled to be taught for the third stage in the first semester, which includes three semesters (first, second, third) of the academic year (2024-2025).

2. Behavioral objectives: The researcher formulated a number of behavioral objectives according to the specified material, amounting to (102) objectives in the six Bloom levels (knowledge, understanding, application, analysis, synthesis, evaluation). They were presented to a number of arbitrators to state their opinion on their suitability, and the objectives were modified according to the observations made by the arbitrators, which were agreed upon at a rate of (80%).

3.6. Preparing teaching plans

The researchers prepared a total of 16 teaching plans for the subjects that were studied during the experiment. Sample plans were presented to a group of experts in psychology and teaching methods, and necessary adjustments were made based on their feedback.

3.7. Steps to prepare the achievement test

1. Determining the objective of the test: The objective of the test is to measure the achievement of fourth-grade students in the experimental and control groups in the content of the history subject for the academic year (2024-2025) for the first semester, which consists of three terms (first, second, third, fourth).
2. Determining the number of items: The number of test items is determined in accordance with the content of the subject and the behavioral objectives, as it includes (40) items. 2- Formulating the Test Items: The researcher prepared the items for the achievement test based on the specifications table. The test included (40) objective multiple-choice items with four alternatives to measure Bloom's cognitive levels (knowledge, understanding, application, analysis, synthesis, and evaluation).
3. Test Validity: This means that the test measures what it was designed to measure. To verify the validity of the test, apparent validity was adopted. This means that the test's appearance indicates that it measures a certain trait, or that its title and the conformity of its items to this title measure that trait. The researcher presented the test in its initial form, consisting of (40) items, to a group of specialists to verify the test's validity. The agreement rate reached (80%).

3.7.1. Preparing the test map

The researcher prepared a test map that included the research topics and “behavioral objectives, according to the levels (knowledge, understanding, application, analysis, synthesis, and evaluation).

Table 4. Distribution of test items by chapter and bloom’s cognitive levels

No	Chapters	No. of Objectives	Relative Importance of Objectives	Knowledge	Understanding	Application	Analysis	Synthesis	Evaluation	Total Test Items
1	Chapter One	35	34.3%	3.4 (3)	2.8 (3)	2.4 (2)	1.9 (2)	1.9 (2)	1.6 (2)	14
2	Chapter Two	25	24%	2.4 (2)	1.7 (2)	1.3 (1)	1.3 (1)	1.1 (1)	1.1 (1)	9
3	Chapter Three	23	22.1%	2.2 (2)	1.8 (2)	1.5 (2)	1.2 (1)	1.2 (1)	1.0 (1)	9
4	Chapter Four	21	20.1%	2.0 (2)	1.6 (2)	1.4 (1)	1.1 (1)	1.1 (1)	0.96 (1)	8
	Total	102	100%	9	9	7	5	5	5	40

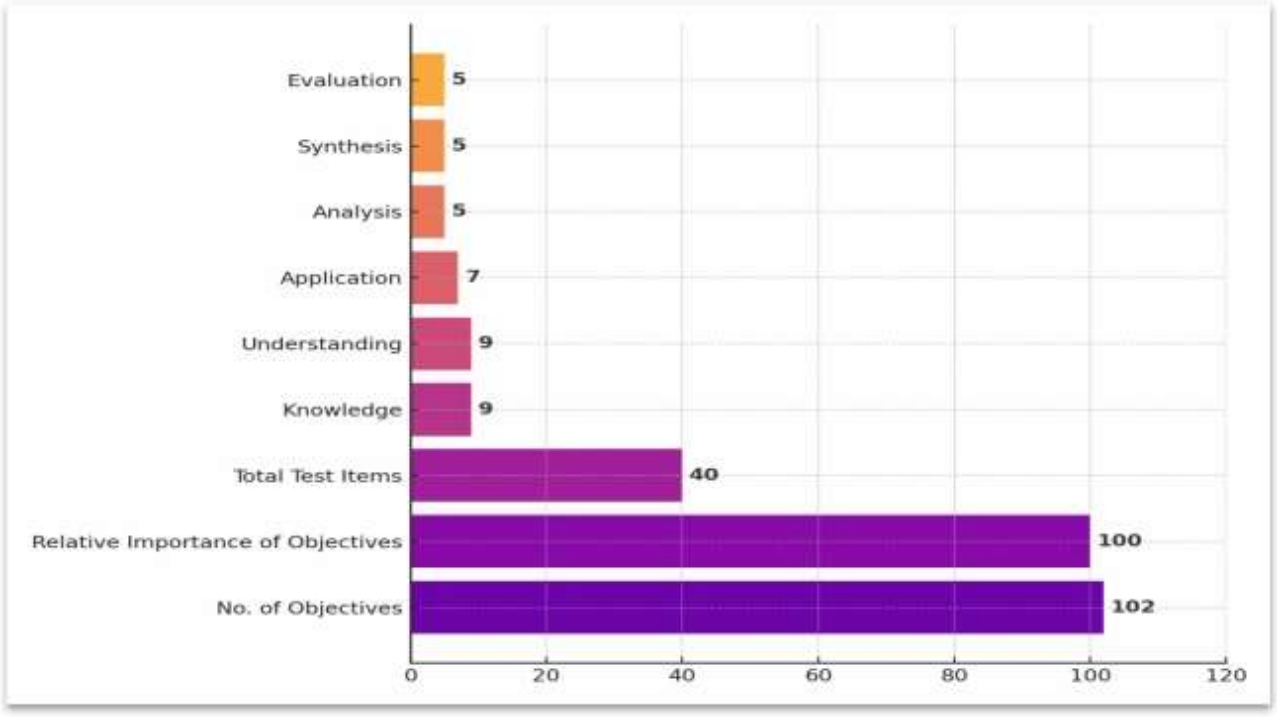

Figure 2. Distribution of objectives and test items across Bloom's cognitive levels

3.7.2. Content validity

According to Alam (2000), content validity refers to the extent to which the test content represents the comprehensive behavioral range of the trait to be inferred, as the content must be a good representation of the range of vocabulary that is determined in advance.

3.7.3. Items statistical analysis

The test was administered to a sample of (65) students to verify the psychometric properties, which include:

A. Difficulty of the test items: The researcher calculated the difficulty coefficient for each item in the test (the objective items), and found it to range between (0.31-0.65), as shown in **Table 4**. As for the essay items, it

B. ranged between (0.40-0.67), and this is considered a good difficulty coefficient, as (Alam, 2015) believes that the degree of difficulty coefficient should not be less than (0.30) and not more than (0.65) [17].

C. Item discrimination coefficient: The item discrimination coefficient is an indicator of correct discrimination among examinees in a specific behavioral area [18]. When calculating the discriminating power of each item, The test (objective items) was found to range between (0.31-0.52), while the discriminating power of the essay items was limited to (0.32-0.53), and thus all items are considered acceptable since the item whose discrimination coefficient is between (0.20-0.39) to be acceptable, and the item whose discrimination coefficient is higher than (0.39) is considered good [19].

3.7.4. The effectiveness of the false alternatives

The effectiveness of the wrong alternatives was calculated for each item of the achievement test and was found to range between (-0.26 and -0.4).

3.7.5. Test consistency

The researcher relied on the split-half method to extract the reliability of the achievement test for the objective items. This method is represented by dividing the test items into two parts, the first part includes the scores of the individual items, and the second part includes the scores of the even items for the students of the survey sample. The reliability between the two halves of the test was extracted using the Pearson correlation coefficient, which reached (0.83). It was corrected using the Spearman-Brown equation, which reached (0.91), and is considered a good reliability coefficient. Abu Alam (2004) believes that if the reliability coefficient for the test reaches (0.67) or above, the reliability is considered good [20]. As for the essay test items, the researcher prepared a standard for correction and presented it to a group of experts and specialists in teaching methods, measurement, and evaluation, and their agreement rate was (80%). Therefore, the researcher relied on correction according to this standard, so the total score for the essay items was (two marks) for each essay item.

3.8. Academic self-efficacy test

The test aims to measure the level of academic self-efficacy among third-year students in the History Department. (15) items were formulated, and the test items were chosen from the (multiple choice) type, as the researcher saw when formulating the items that the mental level of the students, linguistic and scientific accuracy, and that the item should address one main idea, as well as the clarity of the item so that it does not allow for interpretation, and the balance between the alternatives in order to reduce the chances of guessing.

Apparent validity was estimated through qualitative assessment of the test items and their representation of the concept to be measured. This was supported by calculating the arbitrators' assessments of the validity of the items and their representation of the concept and its dimensions. A test was presented for arbitration to a number of arbitrators, and the arbitration showed that all test items enjoyed an agreement rate of (87%) among the arbitrators, which indicates that the test enjoyed a high degree of apparent validity. In light of the previous procedures and amendments, the test became ready in its initial form for application to the first exploratory sample.

Regarding the pilot application of the test, t researchers applied a test on a number of students, numbering (65) students from the third year of the history department. After completing the correction of the students' answers, the researcher arranged the scores into two groups, upper and lower, in descending order, with each group having a percentage of (27%), to find the difficulty factor and the discriminating power of the items and the effectiveness of the alternatives for each item of the academic self-efficacy test.

3.9. Statistical analysis of the items of the academic self-efficacy test

3.9.1 Difficulty coefficient

The researcher applied the difficulty coefficient to the items, and the results showed that no item was eliminated. The coefficient ranged between 0.321 and 0.544, which is considered acceptable.

3.9.2. Item discrimination coefficient

The results of the discrimination coefficient for the academic self-efficacy items showed a range of 0.310 and 0.655, indicating that no item was eliminated. A discrimination coefficient value equal to or greater than 0.30 is considered acceptable [21].

3.9.3. Effectiveness of alternatives for items

The false alternatives effectiveness equation was used for all items in the test, as it is an objective item. The false alternatives effectiveness coefficients were found to be effective.

3.9.4. Construct Validity

Construct validity was confirmed through internal consistency and discriminatory power of the academic self-efficacy test items.

3.9.5. Finding the correlation coefficient of each item with the total test score

The correlation coefficient between the scores of each item on the test and the total test scores was extracted. The results showed that all items were statistically significant, with correlation coefficient values ranging from (0.433-0.622), a good indicator of the construct validity of the academic self-efficacy test.

3.9.6. Test reliability

The researcher used the Kuder-Richard equation (20) to extract reliability. The test was administered to the second exploratory sample of (65) students, and the reliability coefficient reached (0.85). This indicates that the test has a good degree of reliability.

3.9.7. Academic self-efficacy test application

The researcher applied the test in its final form to third-year history department students for the purpose of equivalence. After a period of time, it was applied to the two research groups.

4. Results

There are no statistically significant differences at a significance level of (0.05) between the average scores of the students in the experimental group who study according to the visual thinking strategy, and the scores of the control group who study according to the traditional method of achievement.

Table 5. Achievement test for the experimental and control research groups

Group	Number	Mean	Std Dev.	FD	Calculated value	Tabulated value	Effect Size (d)	CI 95%	Significance
Experimental	32	34.04	4.07	63	9.25	2	2.35	[12.82, 8.35]	Significant
Controlling	33	23.46	4.91						

It is clear from **Table 3.** and **Figure 3.** that there are statistically significant differences between the average scores of the students of the experimental group and the average scores of the control group in the achievement test for the subject (Iraq's Regional Geography) in favor of the experimental group. The researcher extracted the arithmetic mean and standard deviation of the scores of the students of the two research groups (experimental and control) in the achievement test, as the arithmetic mean of the students of the experimental group was (34.04), with a standard deviation of (4.07), while the arithmetic mean of the students of the control group was (23.46), with a standard deviation of (4.91). In order to know the significance of the difference between the averages of the two groups, the researcher used the t-test for two independent samples (test), as the calculated t-value reached (9.25), which is greater than the tabular t-value of (2) at a degree of freedom of (64) and a significance level of (0.05). In another way, the statistical value (P) can be relied upon as a cut-off point for statistical significance, and the value is a probability value used to interpret the measures of inferential statistics, and whether the difference is consistent with truth or is a significant difference.

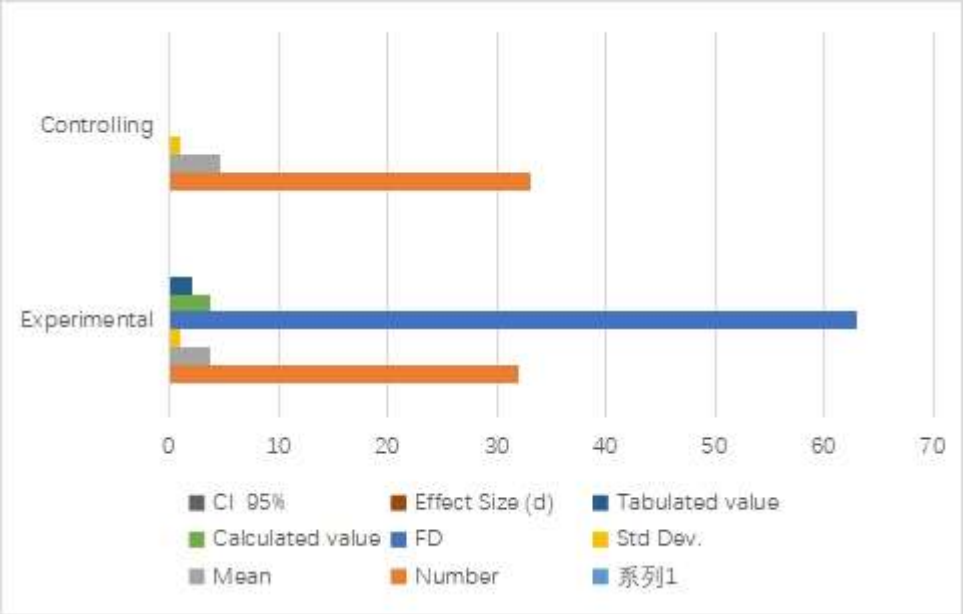

Figure 3. Statistical comparison between experimental and control groups

There were no statistically significant differences at a significance level of (0.05) between the average scores of students in the experimental group who studied according to the (visual thinking) strategy and the average scores of students in the control group who studied according to the traditional method on the academic self-efficacy test".

To verify this hypothesis, the researcher extracted the arithmetic mean and standard deviation of the scores of the two research groups on the achievement test, then applied the t-test for two independent samples, as shown in **Table 6**. below:

Table 6. Academic self-efficacy test for the experimental and control research groups

Group	Number	Mean	Std Dev.	FD	Calculated value	Tabulated value	Effect Size (d)	CI 95%	Significance
Experimental	32	3.678	0.954	63	3.672	2	0.88-	[-1.32, -0.37]	Significant
Controlling	33	4.522	0.974						

It is clear from the table and the figure above that the calculated t-value for the experimental group reached (3.672), which is greater than the tabular t-value of (2) at a significance level of (0.05) and a degree of freedom of (63). This means that there are statistically significant differences between the experimental group that studies according to the strategy (visual thinking) and the control group that studies according to the usual method in the academic self-efficacy test, in favor of the experimental group.

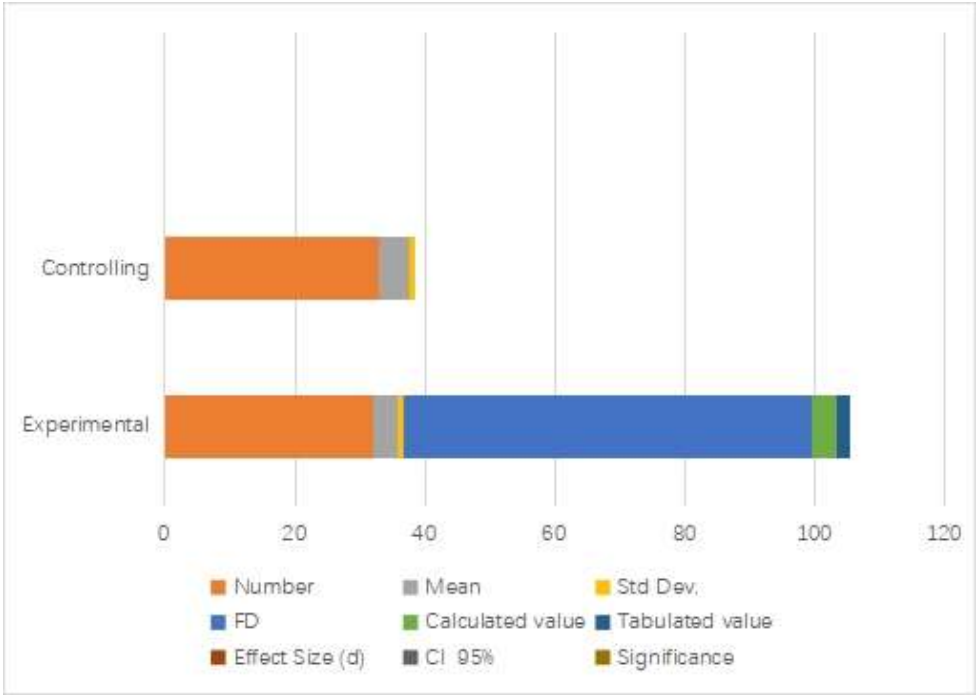

Figure 4. Comparative statistical summary of experimental and control groups including effect size and confidence interval

5. Discussion

The findings of this research indicate that students taught using the Visual Thinking Strategy (VTS) achieved significantly higher scores in both academic achievement and self-efficacy compared to those taught through traditional methods. Researchers attribute this to the fact that visual thinking combines visual and verbal forms, which enhances and matures individuals' ideas. It is also a means of communication and better understanding of complex subjects, enabling individuals to see and think about them, which allows them to connect with others. It is a type of reasoning based on the use of mental images (habits of mind) that contain information acquired from visual objects. Visual forms are no longer viewed as a medium for presenting information to students in an interesting and attractive way, but rather as a visual language and visual texts to train students to process information visually by reading visual forms. These results are consistent with the findings of Mohammed (2015), who reported similar improvements in visual thinking skills and achievement among art education students exposed to VTS. Similarly, Zhang and Zheng (2022) demonstrated a positive correlation between visual literacy and self-efficacy, which supports the current study's outcome. However, the results differ from Abesha (2012), who concluded that self-efficacy is primarily influenced by external factors such as parenting styles rather than instructional methods. This contrast may be attributed to differences in educational settings and cultural contexts. Overall, the present study provides evidence that instructional strategies emphasizing visualization and discussion can significantly enhance students' learning outcomes in history education.

As for the results related to the second null hypothesis, they could be interpreted as the follow:

Presenting lesson content through the visual thinking strategy resulted in an increase in academic self-efficacy. The researchers attribute these findings to the traditional teaching method, which did not adequately address the academic self-efficacy of students in the control group. In this traditional approach, students received information passively, memorising curriculum material and rehearsing it solely for exams. Their role was restricted to receiving and memorising information, with little opportunity to ask questions, engage in expanding their knowledge, or enhance their academic self-efficacy. In contrast, the experimental group,

taught using the visual thinking strategy, played a pivotal role in the teaching process. This approach enhanced their ability to think, analyse, and solve problems while also boosting their motivation and self-confidence, ultimately leading to increased academic efficiency.

6. Conclusion

1. Making students, through the steps of the visual thinking strategy, a central focus of the educational process has had a significant impact in reducing their cognitive failure.
2. The proposed visual thinking strategy has a significant impact, which underscores the importance of employing it in teaching social studies for the first intermediate grade.
3. Teaching using the proposed visual thinking strategy encourages students and increases their activity in asking questions and participating positively in learning. It is an indicator of internal reinforcement that motivates them to learn more.
4. The proposed visual thinking strategy places the student at the center of the learning and teaching process, requiring them to pay attention, monitor, and deduce the causes of cognitive failure in order to find correct, clear, and accurate answers to the problems presented to them.

7. Recommendations

1. Focusing on training students in certain habits of mind and problem-solving techniques using visual thinking networks to address various situations.
2. Focus on training in-service teachers on how to use visual thinking networks in teaching history, to enrich their experience with effective teaching approaches and strategies for teaching and measuring habits of mind, to raise awareness of their importance, and to train them in practicing them.
3. Focusing on habits of mind, making them a goal that requires striving to achieve them and developing a learning strategy based on them.
4. Focusing on preparing a number of model lessons that highlight how to teach history using visual activities in the form of visual networks, to equip undergraduate students with the skills to analyze, interpret, and comprehend the comprehensiveness of visual forms.

8. Suggestions for further studies

Researching the impact of using visual thinking in teaching various subjects on developing achievement motivation and visual thinking skills among different samples.

The effectiveness of a proposed history unit based on the visual thinking strategy in developing some reflective thinking skills and attitudes toward the subject among female students with learning difficulties.

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Conflict of interest

The authors declare no conflict of interest.

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