Impact of Geographical Circle strategy and Learning Triangle on the Generative Thinking and Geographic Drawing of College Level Students

Rana Ghanim Hamid Al-Taee[a], [a]Department of Geography, College of Education for Humanities, University of Mosul, Iraq,

The aim of the research is to find out the impact of the strategy of the geographical circle ((7Es) Learning Cycle Strategy) and the learning triangle (express-planning-evaluate) in the development of generative thinking and geographical drawing in a sample of fourth-grade students in the department of geography in the College of Education for Humanities at Mosul University. The null hypotheses were developed and the sample was selected intentionally and consisted of (54 students) divided into three equal groups (each group 18 students), a first experimental group taught according to the strategy of the geographical circle and a second taught according to the strategy of learning triangle and a control group taught according to the usual method, the research has used the experimental method and semi-experimental design involving three groups, the research tools were the test of generative thinking and the test of geographical drawing, the research tools stability and validity were confirmed by appropriate means, as was the preparation of a teacher's guide and a booklet for activities in the teaching of the subject of geographical thought according to the two strategies mentioned, and after the application of the posttests the data was collected and analyzed and the use of statistical methods to identify differences of statistical significance.

Key words: Geographical Circle strategy, Learning Triangle, Geographic Drawing

Introduction

The research has reached several conclusions, most notably:

1. There are statistically significant differences between the averages of the grades of the first experimental group taught in accordance with the strategy of the geographical circle and the control group taught in the usual manner at the level of significance (0.05) in the generative thinking test and the geographical drawing test for the experimental group,
2. There are statistically significant differences between the averages of the degrees of the second experimental group taught according to the learning triangle and the grades of the control group taught according to the usual method in generative thinking and geographical drawing tests at the level of significance (0.05) for the experimental group.
3 Statistically significant differences between the averages of the first experimental group taught according to the strategy of the geographical circle and the second experimental group taught according to the learning triangle in the generative thinking test in favor of the first group taught in the geographical circle.
 4. There are no statistical differences between the averages of the two experimental groups in the geographic drawing test. In the light of the results, the study recommended the need to review the geography curricula and teaching methods and the need to activate modern strategies that support the thinking and drawing skills of students.

Research Problem

Despite the advent of the second decade of the second millennium, which involved many changes accompanied by a change in students 'thinking and methods of their search for knowledge and information, the reality still reflects following traditional methods of teaching, especially in literary nature materials such as geography, which is inconsistent with current global trends, Here emerge the research problem, where many studies have proven that the reason for the low levels of geography students is teaching in ways that do not develop their thinking, especially generative thinking, including the study (Hama Abdel Rahman, 2013) and Saleha Kharaza (2016) and others, and this is a serious matter as by studying the positive relationship between the nature of geography and generative thinking, one can realize that it helps to understand geography concepts, generate solutions to their issues, and discover ideas about them (Fathi Al-Zayat, 2001, 31). This confirms the necessity of applying modern learning strategies, especially those that derive their foundations from constructive learning, where constructive learning looks at Learning process as an effective and active process centered on the learner who practices activities on his own, identifies the problem, searches for its solutions , collects information, and tests those solutions (Mahmoud Bargouth, 2008, 11) which the researcher consider from the reality of her specialization as the principles that may facilitate the difficulty of the material and the intensity of its content and

Jamel (2002, p. 30) points out the focus of the general objectives of social studies on geographical drawing skills such as mapping and coloring and preparing statistical tables, and tracking natural phenomena in the environment and skills of preparing graphs, and here also appears one of the research problems which is the need for strategies that support these skills among students especially among the university students, where the curriculum is difficult and becomes more extensive and many studies indicate that problem, stressing the need to update teaching methods to develop that skill, such as the study of Mahmoud (2003) and Faris (2009) Al-Masoudi (2013) (Majdi Khairuddin, 2013). Other studies also indicated poor skill level among students in geographical drawing, which reflects negatively on their acquisition of geographical information (Al-Masoudi, 2013) and Falcon owners (2018).

The problem of research is also manifested in its efforts to answer the following questions:

Research Questions

Q1: What is the impact of the Geographical Circle strategy in the development of generative thinking among fourth-grade students in the department of geography?
Q2: What is the impact of the Geographical Circle strategy in the development of geography among fourth-grade students in the department of geography?
Q3: What is the effect of the learning triangle in the development of generative thinking among fourth-grade students in the department of geography?
Q4: What is the effect of the learning triangle in the development of geography among fourth-grade students in the department of geography?

The Importance of Research

First: The theoretical importance of research:
- The theoretical importance of research is that it enriches educational literature with recent strategies, especially for geography.
- Research derives its importance from the importance of geography, which is a rich material and related to daily life and what is going on on earth
- Highlights the principles of student-centered structural learning, rejection of indoctrination and information stuffing

Second: The Applied Importance of Research

- The research contributes to providing a guide for the teacher and another for the student according to the strategies of the geographical circle and the leaning triangle containing teaching plans and activities that teachers can benefit from in geography or other subjects.

- The research tools, which are the tests of generative thinking and geography drawing skill testing, are tools that measure the extent to which students possess these skills which make these tests rich measuring tools that may benefit other researchers as well as the steps of their preparation.
- Research can contribute to the development of geography approaches and activate the development of thinking skills through the application of modern strategies
- Research is a starting point for researchers specializing in geography in broader studies based on research strategies among other variables
- The results of the research contribute to the knowledge of the reality of generative thinking and the skill of geography drawing among the students of the Department of Geography

Objectives: Current Research Aims To

1- Identify the impact of the geographical circle strategy in the development of generative thinking among fourth-grade students in the department of geography
2- Identify the impact of the geographical circle strategy in the development of geography among fourth-grade students in the geography department
3- Identify the effect of the learning triangle in the development of generative thinking among fourth-grade students in the geography department
4- Identify the impact of the learning triangle in the development of geography among fourth-grade students in the geography department
5- Identify the differences between the first experimental group taught according to the geographical circle and the second experimental group taught according to the learning triangle in the generative thinking test
6- Identify the differences between the first experimental group taught according to the geographical circle and the second experimental group taught according to the learning triangle in the geographical drawing test

Hypotheses: Research Seeks to Verify the Following Hypotheses

The First Hypothesis: There are no statistically significant differences between the averages of the first experimental group taught by applying the strategy of the geographical circle and the control group that was taught in the usual way in the generative thinking test among university students
The Second Hypothesis: There are no statistically significant differences between the averages of the first experimental group taught by applying the strategy of the geographical circle and the control group that taught in the usual way at the level of significance (0.05) in the geographical drawing test among university students.
The Third Hypothesis: There are no statistically significant differences between the averages of the second experimental group taught by applying the learning triangle and the

control group that taught in the usual way at the level of significance (0.05) in the generative thinking test in university students.

The Fourth Hypothesis: There are no statistically significant differences between the averages of the second experimental group taught by applying the learning triangle and the control group that taught in the usual way at the level of significance (0.05) in the geographical drawing test among university students.

The Fifth Hypothesis: There is no statistically significant difference at the level of significance (0.05) between the average grades of the first experimental group taught according to the strategy of the geographical circle and the second experimental group taught according to the strategy of the learning triangle in the test of generative thinking.

The Sixth Hypothesis: There is no statistically significant difference at the level of significance (0.05) between the average grades of the first experimental group taught according to the strategy of the geographical circle and the second experimental group taught according to the strategy of the learning triangle in the geographical drawing test.

Research Limitation

Time Limit: First semester of the school year 2019∨2020
Spatial Limit: fourth-grade students in the department of geography in the College of Education for Humanities at Mosul University.
Human Limit: A random sample of fourth-grade students in the department of geography in the College of Education for Humanities at Mosul University.
Cognitive Limitation: The five chapters of the subject of geographical thought in the fourth-grade students in the department of geography in the College of Education for Humanities at Mosul University.

Definition of Terms

Geographical circle strategy (Seven E's): It is a learning model derived from the fivefold learning course by adding two stages and aims to help the student to form new geographic knowledge and concepts based on his previous knowledge and experiences and the application of learning in new situations through the passage of the learner in seven stages that are sequentially:

Excitement, exploration, interpretation, expansion, extension, exchange, evaluate (Walid Faraj Allah, 2018, p. 60). It is an educational strategy that helps the student to activate his previous knowledge in forming and infer new knowledge and consists of seven stages (Hamdan Al-Agha, 2012, p. 55). The geographical circle defined procedural in this research as 'an educational learning role based on constructive learning in terms of focusing the learning process on the student and aims to build geographic concepts and information

through the student's passage in seven stages, which includes learning and evaluation together.

Learning Triangle Strategy (express-Planning - evaluate):
It is an educational strategy that includes three main stages, namely, identifying the educational needs of students in the lesson to be learned, based on the expression of the students themselves about those needs, and then planning the appropriate activities for them, and then these students are divided into small groups based on their common educational needs and measuring their level Study through calendar activities (Karm Abu Athera, 2010, p. 12). It is a strategy that directly depends on defining the educational needs of each student about the lesson, giving learners the opportunity to express those needs personally, and then choosing the appropriate activities in light of those needs, then dividing the learners into small groups according to their specific needs (Afaneh and the army, 2008, 170)

And procedurally defined in this research as 'a strategy based on constructive learning and consists of three steps that students take with the help of the teacher, which is defining learning needs, planning activities according to needs, and evaluation'

Generative Thinking

A set of mental skills that help the learner to access new and unconventional information and ideas and develop modern results in light of the information available to him previously and through which this learner arrives to develop multiple alternatives and responses to a specific problem (Ahmed Al-Najdi and his colleagues, 2007, 472)

It is 'a set of skills that helps the learner to analyze data and information reach new concepts which indicates the ability of this learner to use his previous ideas and knowledge for the purpose of generating new knowledge, and is measured by the degree the student gets in the test of generative thinking skills' (Hama Mansour, 2012, 761). It is procedurally defined in the current research as 'an individual's mental skills that enable him to retrieve his previous ideas and relate them to the taught topic to reach the generation of new ideas or alternatives to an urgent problem'

Geographical Drawing

Mahmoud (2005) defines geographical drawing as 'a set of capabilities necessary to learn the skill of geographic mapping and mastery of that skill, such as determining the reason for drawing it and distributing data on it (Mahmoud, 2005, 237)

Khair al-Din (2013) defines it as 'cognitive and performance skills available to the learner and enables him to draw geographical maps that include the foundations of drawing and coloring, writing data, distributing symbols, and resizing the map by miniaturizing or enlarging' (Khair al-Din, 2013, p. 95)

The current research defines geographical drawing as 'converting geographic information and data into drawings, diagrams, shapes, and drawing of natural and human phenomena. It includes several skills, the most important of which is linking information or content to drawing, coding, drawing scale, data distribution, and setting a key for the map'

Theoretical Framework and Previous Studies
Constructivism Theory

The strategies chosen in this research are based on the principles of constructivism theory which are based on observation and scientific study of how individuals learn. The main theme is the need for learning to become an active process in which learners build new ideas or concepts based on their current or past knowledge (Brandon & Anita, 2010, 89)

The constructivism has principles of learning summarized by Honben, 1996 in what he called the seven educational objectives of constructivism learning environments as follows:

1) Provide the necessary expertise for the knowledge-building process (students determine how they will learn).
2) Provide expertise with an appreciation of multiple perspectives (assessment of alternative solutions).
3) Establish learning through realistic contexts (realistic tasks).
4) Encourage intellectual property and expression in the learning process (student-centered learning).
5) Establish learning through social experiences (collaboration).
6) Encourage the use of multiple modes of presentations (video, audio text, etc.).
7) Encourage awareness about the process of building knowledge (reflection, beyond knowledge). (Honben, 1996, 19)

In the light of the above, it is possible to ascertain the importance of learning strategies based on the principles of constructivism theory, especially the student-centered learning and partnership in the educational process, including:

First, the Geographical Circle Strategy

The geography circle strategy is one of constructive learning strategies and it corresponds to 7e's strategy, which is an advanced learning role from the 3E's three-stage three-cycle learning course presented by Atkins & Karplus (1967) and passes through (exploration - interpretation of the concept - application of the concept) and then evolved into four 4E's (Exploration - Interpretation – Application, evaluation) After that, the course expanded to reach five stages presented by Bybee (Bybee, 1997) which are represented in (Excitement - Exploration - Interpretation - Expansion - evaluation) and then developed by (Eisenkraft, 2003) into seven stages which are excitement, Exploration, interpretation, expansion, extension, exchange, evaluation (Balta, 2016, p16)

Geographical Circle Strategy Concept (7E Cycle)

It is a developed and hierarchical educational model that revolves around discovering the concept and expanding it and helps students to build their knowledge on a regular basis and develops some methods of thinking (Kursat & Mehmet, 2008, 50) and it is a constructive educational strategy consisting of seven procedural stages used by the teacher in the class and aims to build the student's knowledge of himself On the one hand, and the development of concepts and learning skills on the other hand (Zeitoun, 2007, 455).

Stages of the Geographical Circle

The geographical circle goes through seven stages according to the (7Es) Learning Cycle Strategy, which according to many literatures

(1) Preoccupation or excitement: students' curiosity about a particular topic is aroused by generating curiosity and raising questions in order to explore previous experiences.
(2) Exploration: At this stage the experiment and cooperation are presented together, where probing and activities processes lead to ideas related to the subject of the study and the role of the teacher here is facilitated, motivated, and participated in exploration, mentor and assistant.
(3) Explanation: In which explanations and definitions are provided and the previous experiences are retrieved to build new concepts, the role of the teacher here is encouraging and cooperative and helps students to provide explanations and evidence of the results.
(4) Extension, which aims to apply the concept to other positions, in which the teacher discusses and investigates, gives examples and encourages students to research and use the significance of concepts.

(5) Extend: Aims to clarify the relationship between the concept and related concepts and in which the learner connects the concept with other new topics and the role of the teacher help students and ask interesting questions

(6) Elicit information exchange: in which ideas are exchanged or modified, it is an extension of the previous stages with the opportunity for students to conclude relationships and in which the teacher explains the relationship between the concept with larger topics and involves interesting participation and cooperation.

(7) Evaluation: In which students' understanding of what they have learned is assessed, which is a stage that enters all previous stages and continues throughout the duration of education and involves important skills such as classification, measurement, and forecasting. (Raghad alsaira, 2017, 521-522), Al-Fatlawi, 2010, 298-299 and Walid Farajallah, 2018,61-63

Second: Learning Triangle Strategy

As we have already pointed out, learning strategies based on the constructivism theory are many and multiple, including the learning triangle strategy, which is concerned with identifying the needs of students in order to facilitate the learning process and make it more focused on those needs which are skills, knowledge and concepts, as well as considering it as one of the strategies of collaborative learning, (Obeid, 2011, p. 167).

Concept of Triangle Learning Strategy

The learning triangle strategy is defined as a 'three-stage learning strategy through which students' educational needs are determined in the subject of the lesson being learned where they express by themselves those needs and hence the name of this stage is (express), then the students participate with the teacher in identifying the appropriate activities and then divide them into small groups based on their educational needs called the stage (plans), then measure the level of students and their achievement through various trainings and activities (evaluate) (Tamer Rihan, 2015, p. 17)

The researcher defines it as 'a cooperative learning strategy with three stages that involves the student in determining his educational needs, then planning the study and choosing activities, then self-evaluation, and the teacher is guided, mentored, helpful, facilitator and mentor.

Steps of the learning triangle strategy (express-planning - evaluate):
The strategy of the learning triangle is based on three consecutive stages and is based on the expression of students' educational needs, which confirms its importance.
1- Expressing the needs of learning: a stage through which the student's previous experiences are known in order to plan and design lessons in the light of those needs based on the theory

Meaningful learning (Ozbel theory), also   students' misconceptions are recognized and addressed, and then identify the knowledge they need during the study of the concepts of the subject, as well as exploratory questions are asked through which the teacher learns about the learning methods suitable for the student and his different abilities.

2- Planning (planning for the educational process): this is a stage in which cooperation occurs between the student and the teacher and the planning of the learning process based on the needs of the student already identified in the previous step, which is compatible with his experiences, and takes into account the student's levels and abilities and facilitates the understanding of students.

3- Evaluate (student evaluation): In which the student puts himself to help him measure what he has learned, and the extent to which he achieved the desired goals, by asking questions such as what did the student gain? What new knowledge do you learn? How do I use past information and experiences? How much behavior change has happened to the student? How does a student actually apply what they have learned in the daily situations they face? (El-Shueli, 2016, 345).

The benefits of the 'learning triangle' strategy: The learning triangle strategy gives many benefits to both the student and the teacher, perhaps the most prominent of which is mentioned by Habib 2004 as follows:

• Give students the opportunity to mention their various educational needs.
• Give the teacher the opportunity to design educational experiences and activities in the light of the mentioned educational needs of the students
• Discover and review the previous knowledge and information that the students have and review them to see if they are scientifically correct and the lesson is designed in its light, or if it is incorrect and corrected before acquiring the new knowledge.
• Give the student and teacher many opportunities to build a bridge that links between existing knowledge previously taught and new knowledge, in order to support and strengthen the student's cognitive structure.
• Involve students in setting learning goals and planning activities and experiences through which the student's motivation and interest in learning increases, which motivates him not only to learn but to master what he learns, as well as to make this student responsible for his or her educational process (Habib, 2004, p. 27)

Third: Generative Thinking

generative thinking is one of the higher thinking skills that entail solutions to an emergency problem or a difficult situation, and its definitions are many, including that it is 'a set of mental skills that enable learners to generate and retrieve answers when they are faced with a question they have never faced before or pose an unconventional problem, especially when

these questions and problems differ from what they have learned before and then they can evaluate and judge their validity'. (Chin el al, 2005, p522), it can also be defined as 'a pattern of thinking to practice mental processes such as making assumptions and predictions in the light of data and the use of fluency, flexibility and error identification'. (Leila Hussam and Hayat Ramadan, 2007, p. 130)

Generative thinking is also defined as a structural process in which previous knowledge is linked to new information, resulting in the generation of new ideas (Vanzee, 2000, 117) generative thought is one of the outcomes of the in-depth learning process and reflects the ability of students to generate solutions to an emergency problem that has not been taught before and have no prior solution (Entwistel, 2000, 129), one of the types of thinking that includes the two factors of creativity and exploration (Elsydo Hassan, 2004, 221).

In the light of the previous definition, we find that generative thinking has two dimensions:
1- Exploration dimension: where the learner interprets the knowledge structure that helps him to innovate and makes it the basis for generating and exceeding ideas
2- Generation dimension: in which the cognitive representations of the pre-innovation structure occur and include cognitive characteristics that help the learner to generate ideas (Zayat, 1998, p. 495).

Generative Thinking Skills

In fact, the reader of the generative thinking skills proposed by many researchers finds many and various and perhaps the most prominent refined skills within the literature:
1- Fluency: means using the knowledge stock of the individual when needed (Fisher, 2005, p45)
2- Flexibility: It means being able to generate several different ideas or propose new alternatives to solve a non-traditional problem and change the way of thinking as a kind of response to situation change (Fathi Gruen, 2002, 97)
3- Prediction: The ability to read variables and data and then think beyond its superficial meaning and exceed the limits familiar to the learner (Atum et al., 2013, p. 227) which is a forward-looking of results based on previous information (Salti and Naif, 2005, p. 30)
4- Understanding relationships: the ability to discover and interpret relationships between ideas or things (Fathi Zayat, 2001, p. 351)
5- Expansion: Means the ability to add more details and explanations to information related to previous knowledge in order to enhance understanding
6- Representation: Means the ability of the learner to add a new meaning to knowledge, by changing the shape of the information using symbols, drawings, diagrams or alike (Shahra al-Qahtani, 2018, p. 112)

7- Hypotheses: 'It means the ability of the student to draw conclusions can be experimented and study in order to reach an answer to the interpretation of a problem or situation (Khatib and Ashkar, 2013, p. 8)

8- Detecting fallacies: the skill to identify any gaps in the problem by identifying wrong or illogical relationships or identifying any incorrect actions in the completion of educational tasks (Nadia Al-Afoon and Monha Abdul-Sahib, 2012, p. 217)

The importance of generative thinking skills:

The importance of generative thinking skills is due to several factors, perhaps the most prominent of which is the one outlined by Asfour (2011) in the following:

The student is active and makes his role dynamic in the learning process.

Contribute to promoting lifelong learning.

Make the student's old experiences a bridge to reach new ideas.

It trains students to produce knowledge and ideas instead of just receiving them.

Generative thinking works to develop some important types of thinking such as meditative, critical and creative

The student's self-confidence is enhanced by the importance of his role in producing and generating solutions and ideas depending on himself (Iman Asfour, 2011, 117)

Geographical Drawing

Geography is a scientifically rich material, full quantitatively and qualitatively with everything that relates to land and humanity, including land, water, atmosphere, and others. It is evident that there will be a representation that facilitates the acquisition of this vast amount of geographical information and knowledge that pertains to the entire globe and hence the geographical drawing emerged as a means that reflects information that is indispensable to humans.

Geographical drawing is usually called geographical map, blueprints, or representation and drawing of natural and human phenomena. Geography is considered the most subject that uses the map, which has increased the importance of geography and has become a key to the rest of the sciences as different geographical maps help students to know the environment and its natural or human aspects and enable the student to be aware of the geographical life in which he lives (Al-Salhi, 2009, 6).

The Concept of Geographical Drawing

It can be defined as: the expression of human and natural topographic phenomena on a map panel with the choice of an appropriate scale of drawing with appropriate symbols for the

expression of shapes and dimensions within those phenomena (Hashim al-Masraf, 1982, p. 49).

There have been many and different types of geography maps, perhaps the most prominent of which is mentioned by (Mahmoud et al, 1996) which is the maps (structure and compositions- geology- topography- topography - weather - population- climatic- political etc. Maps are used to draw natural and human phenomena and charts to illustrate and explain many of the phenomena and describe many of them (Mahmoud et al., 1996, 21)

Geographical Chart

Students need to acquire specific contexts and methods in order to be able to draw geographical maps, charts and natural and human phenomena still et al (2010) pointed out that there are three basic methods for an individual to produce continuous text and transmit it to unconnected texts such as maps: first: the ability to draw graphic elements (whether digital or analog), second: knowledge of the basic contents of the art of mapping (e.g. symbols, scales, directions, and generalization), and third: the subjective ability to produce a map linked to the chosen information and map content (Still, Frank, Obermaier, 2010. p98), also when practicing geographical drawing, the main activity should be the selection and encoding of the content, both of which reflect the process of mapping, in other words, a geographical map must provide information regarding a number of characteristics, and a mixed set of elements (e.g. fonts, points and spaces) used during drawing, but they must also indicate the individual's view of the directories of the drawing and information given (Golledge & Stimson, 1997)

The importance of geographical drawing: Based on the above we find the diversity of maps and charts that reflect all human and natural geographical phenomena, therefore, the acquisition of the skill of drawing in the subject of geography is important because:

1- The student's acquisition of the skill of geographical drawing geography cut down the time of completion of the work
2- Encourages students to love learning and helps them acquire multiple knowledge in an easy way.
3- Enable students to describe phenomena, which results in the development of their mental abilities and positive thinking
4. Enhance their overall planning capacity in their lives
5- Students become more able to explain and clarify many phenomena (Tayeb, 2003, p. 37)
Hassan Ayel (1998, p3) states that geographical maps help students acquire a variety of educational experiences such as location regarding longitude, latitudes and natural and human geographic phenomena. This information and geographical data are represented by symbols

qualitatively, quantitatively, in different colors and other means of geographical representation.

Second: Previous Studies

After a long research within the relevant literature, the researcher did not obtain any study that investigates the effectiveness of any of the strategies of the geographical circle and the learning triangle on either generative thinking or geographical drawing, and then the studies will be presented according to the research variables as follows:

First: Studies that have proven the effectiveness of the Geographical Circle (7Es) Learning Cycle Strategy

Farajallah (2018): the study aimed to identify the impact of the (7Es) Learning Cycle Strategy in acquiring geographical concepts and developing systemic thinking among the students of the sixth grade of primary school, and the research tools was based on a list of concepts of geography and a list of the skills of organized thinking and teacher guide and the student's work papers in accordance with the (7Es) Learning Cycle Strategy also the researcher prepared the two tests, one educational in geographical concepts and the other in the skills of systemic thinking, and the study adopted the descriptive methodology in the preparation of the tools and semi-experimental for two experimental groups (40 students) taught in the (7Es) Learning Cycle Strategy, the other is controlled with the same number but taught in the usual way and the results of the study have shown significant statistical differences between the grades of the students in favor of the experimental group in the acquisition of geographical concepts and organized thinking skills which confirmed the effectiveness of the (7Es) Learning Cycle Strategy in learning geography.

Marwa Taha (2018) study aimed to identify the effectiveness of the (7Es) learning cycle (geographic circle) and form samples in teaching units of water security and environmental values in geography for the second year of middle school. The research sample consisted of two experimental groups and a control group, where the research relied on testing concepts Water security and the scale of environmental values. The research sample also included (138 students distributed equally among the three groups). The research used experimental design. The results of the study indicated the effectiveness of the (7Es) learning cycle strategy in developing concepts within the proposed unit.

Second: Studies that have proven the effectiveness of the learning triangle (express- planning - evaluate):

Abu Azraa study (2010) aimed to find out the impact of using the listening triangle strategy in mathematics teaching on the development of creative thinking among students in the seventh grade primary. The research was based on the experimental method, and the sample of the study (140 students) was divided into two experimental groups, the creative thinking test and a guide for the teacher were prepared, and the pre-test and post-test were applied to the two study groups, and then the use of appropriate statistical methods to make comparison. The study found the following conclusions: there were statistically significant differences at the significant level (0.05) between the average score of female students of the experimental group who taught using the learning triangle strategy and the average score of female students of the control group who taught in the traditional way in the creative thinking test for the experimental group. The study recommended that teachers should be encouraged to use the learning triangle strategy (express-planning-evaluate), because it helps students express their needs; participate in the planning of activities and teaching courses in a way that helps teachers give more time to thinking.

The Shoueli Study (2016)

The study aimed to identify 'the impact of the learning triangle strategy on achievement and the transmission and retention of the learning impact in the second grade female students in Arabic grammar, and the research sample was selected intentionally from the second grade female students of two divisions (a, b): the first represent of the experimental group with (33) female students, the second group is the control group with (33) female students. The researcher also prepared a test in the subject of Arabic grammar and applied the test to the students of the two research groups at the end of the research period (10 weeks) and using the T-test for two independent samples, the results indicated the existence of a statistically significant difference between the average achievement of the students of the two research groups at the level of significance (0.05 for the experimental group which taught the subject of Arabic grammar in accordance with the strategy of the learning triangle (express-planning -evaluate) and also recommended the importance of applying that strategy.

Benefits from Previous Studies

• This research benefited from previous studies in choosing experimental design, parity and statistical means.
•Comparing the results of studies with the results of the current research and identifying similarities and differences.
• Benefiting from the procedures of previous studies in preparing and building research tools.
• To benefit from the suggestions and recommendations of previous studies in emphasizing the importance of current research and choice of strategies

Chapter Three: Research Methodology and Procedures
Study Procedures

A semi-experimental approach was used which depended on three groups, one of which was control, two were the first experimental group, and the second experimental group

Study Design

The research took the experimental design according to the following table:

Table 1: The experimental design of research

Group	Pre-application	Experiment	Post-application
First experimental group	Pre- application of generative thinking test, and geographical drawing test	Teaching using Geographical Circle strategy	Post- application of generative thinking test, and geographical drawing test
Second experimental group		Teaching using learning triangle strategy	
control group		Teaching using traditional way	

Research Population: The research population was identified as the fourth grade students in the Department of Geography at the University of Mosul, and they numbered 150 students.
The research sample: The research sample was chosen purposively and was divided into three groups: the control group, which was taught in the traditional way, its number is (18) students, the first experimental group which was taught by applying the geographic circle strategy and their number is (18), and a second experimental group that was taught using the learning triangle strategy and their number Also (18 students).

Third: Procedures for controlling the equivalence of the research sample: The three groups were equating with a number of variables, namely (previous knowledge, time age, generative thinking level, geographical drawing test). These variables were determined by obtaining information about the time age of the student files from the registration division in The College of Education for Humanities, while the level of generative thinking and the skill of geographical drawing, students' grades were obtained after testing them in both the variable and examining their answers and determining the grades of each of them, and when making a comparison between the average scores of the research two experimental and control groups using a (t-test) for two independent samples shows that the value of t calculated amounted to (1.3), ie, less than the tabulated value of (1.96) in the three variables which means that there

is no statistically significant differences among the three groups, which means equality of the three groups with respect to the variables mentioned

The following table shows the statistical data for the equivalence of the three research groups:

Table 1: Data for equivalence of the three research groups

Significance level 0.5	Test value		Standard error of standard mean	Standard deviation	arithmetic mean	Students number	group	variables
	tabulated	calculated						
Not significant	1,960	1,375	1,9510	14,001	78,956 8	18	experimental	Time age
			2,2 274	15.0100	74,8 000	18	control	
Not significant	1,960	0,926	0,34987	2,4021	12.4783	18	experimental	Level of generative thinking
			0,47136	3.1210	11,9500	18	control	
Not significant	1.96	1,44	10,100	3,7200	10,00	18	experimental	Geographical drawing Skills
			9,930	3.125	11,16 1	18	control	

Accordingly, it is clear that there is no difference between the three research groups that may affect the expected results.

Research Implementation Tools

The researcher prepared two tools for the purpose of implementing the research experiment and investigating the impact of independent variables, such as the strategy of the geographical circle and the strategy of the learning triangle on the dependent variables, which are generative thinking and geographical drawing.

Steps to Build Search Tools

In order to prepare the research tools, several steps have been followed, the most important of them can be summarized in the following:

First: Preparing the generative thinking test:

To prepare the generative thinking test, the researcher followed the following steps:

A- Determining the objective of the test: the goal of the test is to measure the skills of generative thinking in the students of the research three groups, first experimental group taught according to the geographical circle strategy, the second experimental group taught according to the learning triangle, and the control group taught in the traditional way.

B- Determining the components of the test: The test measures the four main skills that make up the generative thinking test: fluency, expansion, representation, and predictability in research groups, and these skills have been selected because they are suitable for the geography curriculum.

C- Drafting of test questions: The test questions were drafted after reviewing educational literature and previous studies that used generative thinking test as a tool, where the researcher wrote the test questions in the light of that review, and the number of test questions in its initial form is (21 questions)

D- Formulate test instruction: The research took into account the provision of a set of instructions to help students resolve the test properly, and a separate answer form was designed for the question booklet.

E- Test correction methods: The researcher has established rules for the purpose of correcting the test these are illustrated in the following: regarding skills: fluency, flexibility and representation: the degree obtained by the student for each question was calculated by giving him one mark for each acceptable answer written by the student or a valid alternative of his choice.

Regarding the skills of forecasting: the degree obtained by the student for each question was calculated by giving him one mark for the correct answer he writes or chooses.

Validity and Reliability of the Test

To ensure the validity and reliability of the test, several steps have been taken that can be summarized as follows:

1- Presenting the initial form of the test to a group of specialists in psychology and the methods and approaches of teaching social studies (geography in particular) in order to know their views on the suitability of the test items to its goals, age group and specialization that measures generative thinking in its scope, and the researcher made the necessary adjustments based on the opinions of the arbitrators, and then the test appeared in its final form, including (17) questions distributed among the four main skills that make up the generative thinking test mentioned above.

2- Taking the test by a pilot sample:

Where the test was applied to a sample identical in number to the original research sample represented by (18 students) out the research sample on 10/17/2019, then the test was

corrected and students' degrees monitored where the goal of applying the pilot study was the following:

A- Calculating the logical validity of the test: where the arbitrators agreed on the suitability of all questions for the purpose that was set for measuring it and this consensus indicates the logical validity of the test.

B- Knowing the average time needed to finish the test: The test time was calculated through the average time equation, where the average time needed to finish the test was (50 min)

C- The strength of the test's item discrimination index: As the item discrimination index calculation indicate indicated for each test items ranged between the two values (0.38-0.79), meaning that the discrimination index for all the items exceed (25%) (Muhammad Abu Sassel, 2002, p. 142) then all the test items are acceptable.

D- Test Consistency

In order to ensure the consistency of the test, the overall consistency coefficient of the test was calculated, in addition to calculating the test coefficient for each of the thinking skills mentioned above, and the spearman equation for the mid-segment fraction was used to ensure the consistency of each component (skill) the correlation coefficient for fluency flexibility, representation, and prediction respectively are (0.76, 0.77, 0.72, 0.69) The total test (0.86) and the consistency coefficients for each were respectively (0.86, 0.81, 0.87) and the total test (0.90) and the consistency for each of them respectively (0.91, 0.92) , 0.93, 0.90) and the overall test was (0.95)

Consistency coefficients for the skills of the generative thinking test using the Spearman Brown equation for the midterm fractionation, the Alpha Cronbach coefficient for each, respectively, was 0.74, 0.81, 0.79, 0.77) and the total test was (0.84). From reviewing the previous information, it is clear that the suitability of the coefficients of consistency for the selected skills (test items), which means its consistency and suitability for application. The test in its final form: The final form of the test included (17) questions distributed on generative thinking skills, according to the following table:

Generative thinking test questions and their percentages were distributed for each of the skills question number (3, 4, and 5.5) and their percentages were respectively (29.41%, 29.41%, 23.52%, and 17.64%) and the total number of questions was 17 and the total percentage (100%).

Second: Preparing the Geographical Drawing Test

The overall objective of the test: to measure the geographical drawing of fourth graders in the Department of Geography

The research approved the measurement of the performance aspect of the geographical drawing among students, and the preparation of the test proceeded according to the following steps:

1- Knowing the performance aspect of the geographical drawing, the following was chosen:
1. Draw a map frame, shapes, diagrams, and some natural and human phenomena represented by drawing, distribute data, place symbols, enlarge or reduce the map, the ability to convert data into charts.
2- Vocabulary Formulation: The vocabulary of the test was formulated, whereby students were asked to transfer some data to an appropriate scheme and to convert the information and represent it into maps, shapes, and charts. The test in its initial form included (13 items)
3- Validity of the test: It was confirmed by presenting the test to a group of arbitrators specialized in the field of social studies, especially geography, except 3 items were deleted according to of arbitrators' opinions
4- Correction of the test: Each item converted into correct geographical drawing has been awarded two marks, for a total score of 20 for the test.
5- The pilot study of the test: The geographical drawing test was applied to a sample of (18) non-experiment groups on 10/17/2019 with the aim of determining the test time through the average time (the time required to finish the test reached 60 minutes), as well as to identify the degree of consistency of the test and statistical reliability, the same methods previously used in the generative thinking test has been followed which are: the Alpha Cronbach coefficient (for statistical validity) and the mid-segmentation method (the degree of persistence), and the coefficient of stability reached (0.87), while the validity of the test reached (0.96) which are two high scores indicating the reliability and validity of the test, The item discrimination index test was calculated using the previous method in generative thinking and it became clear that the strength of item discrimination index acceptable ranging from (0.40- 0.080)

Carrying out the Research Experiment

The research went according to the following steps to implement the research experiment, namely:
1- Choosing the basic research group represented by 54 students from the fourth grade students in the Department of Geography in the College of Education for Humanities / University of Mosul, as they were divided into three equal groups (18 students per group) two experimental and one control
2- The pre-tests were applied to the research groups on 10/17/2019 and monitoring the results
3- The teacher's booklet was prepared for teaching according to the department of geography strategy and another for teaching according to the strategy of the learning triangle. The

booklet included teaching plans according to the two proposed strategies and another according to traditional methods, where one of the teaching plans for each strategy was presented to a group of arbitrators specializing in social curricula and teaching method, some notes were adjusted according to their opinions and then the rest of the teaching plans were designed in the light of those observations.

4- A student activity booklet has been prepared in the light of the two strategies

5- The implementation process started on October 20, 2019 through teaching using the geographic circle strategy on the first experimental group

6- On the same day, teaching began to be applied using the learning triangle strategy on the second experimental group.

The experiment continued from 10/20/2019 - 12/22/2019

7- At the same time, the control groups were followed and teach according to the traditional teaching method of geography.

8- After completing the specified application period which is two months, the post-tests were applied to the first and second experimental groups and the control group, and then the grades were monitored according to the response forms prepared for the two tests.

9- Calculated mean averages and standard deviations for students' grades in the first and second experimental groups and the control group to determine the statistically significant differences and then to identify the effectiveness of the proposed strategies.

- Statistical methods: Statistical methods appropriate to the nature of the research and its variables were used, most notably the Pearson correlation coefficient, the Cronbach alpha equation, the T-test for two unequal independent samples, The T-test for two equal independent samples, the discrimination equation, and the Cooper equation.

Research Findings
First: Presentation of the Results

1- Results related to the first hypothesis which states: There is no statistically significant difference at the level of significance (0.05) between the mean scores of the first experimental group that was teach according to the strategy of the geographical circle and the control group that was taught according to the traditional method in the test of generative thinking.' To verify the hypothesis, the researcher did the following:

Calculating arithmetic averages, standard deviations, T-test values, and then obtaining statistically significant differences between the scores of the first experimental group and the control group in the generative thinking test scores. The results are presented in the following table: Table (): Arithmetic averages, standard deviations, T values, and the level of statistical significance for differences between the first experimental and control groups in the generative thinking test

Group	Arithmetic averages	standard deviations	Calculate T value	Tabulated T value	Significance
Control	65.98	12.11	2.3	1.99	Statistically significant
First experimental	73.15	10.012			

By reading the above table, it is clear that the calculated T-value estimation is (2.3), which is greater than the tabulated T- value and its value was (1.99), which indicates the existence of a statistical difference between the first experimental group scores that were taught according to the geographical circle strategy and the control group that was taught by the traditional way in the generative thinking test, which confirms the rejection of the first hypothesis and proves the positive effect of the geographical circle strategy.

Results Related to the Second Hypothesis Which States

'There is no statistically significant difference at the level of significance (0.05) between the mean scores of the first experimental group that was teach according to the strategy of the geographical circle and the control group that was taught according to the traditional method in the test of geographical drawing among university students.' To verify the hypothesis, the researcher did the following:

Calculating arithmetic averages, standard deviations, T-test values, and then obtaining statistically significant differences between the scores of the first experimental group and the control group scores in geographical drawing test. The results are presented in the following table: Table (): Arithmetic averages, standard deviations, T values, and the level of statistical significance for differences between the first experimental and control groups in the geographical drawing test

Group	Arithmetic averages	standard deviations	Calculate T value	Tabulated T value	Significance
Control	3.23	1.36	4.6	2.1	Statistically significant
First experimental	16.88	1.167			

From reading the previous table, it is clear that the calculated T- value is estimated at (4.6) which is greater than the tabulated T -value and was valued (2.1), which indicates a statistical difference between the grades of the first experimental group taught in accordance with the geographical circle strategy and the control group taught in the traditional way in the geographical drawing test, which confirms the rejection of the second hypothesis and proves the positive impact of the geostationary strategy.

The results related to the third hypothesis and it states: There are no statistically significant differences between the averages of the grades of the second experimental group taught by applying the learning triangle strategy and the control group that taught in the traditional way at the level of significance (0.05) in the generative thinking test among university students.

To verify the validity of the hypothesis, the statistical means were used, namely calculating the arithmetic averages, standard deviations and t-test values, and then obtaining statistically functioning differences between the grades of the first experimental group taught in accordance with the learning triangle strategy and the grades of the control group that were taught in the traditional method in the generative thinking drawing test, and the statistical data were included in the following table:

The values of (T) and the level of statistical significance for the degrees of the first experimental group that was taught according to the learning triangle strategy and the degrees of the control group that were taught in the traditional way in the generative thinking drawing test

Group	Arithmetic averages	standard deviations	Calculate T value	Tabulated T value	Significance
Control	66.1	11.95	2.9	1.99	Statistically significant
Second experimental	73	10.16			

By reading the above table, it is clear that the calculated T-value estimation is (2.9), which is greater than the tabulated T- value and its value was (1.99), which indicates the existence of a statistical difference between the first experimental group scores that were taught according to the learning triangle strategy and the control group that was taught by the traditional way in the generative thinking drawing test, which confirms the rejection of the third hypothesis.

The results related to the fourth hypothesis and it states: There are no statistically significant differences between the averages of the grades of the second experimental group taught by applying the learning triangle strategy and the control group that taught in the traditional way at the level of significance (0.05) in the geographical drawing test among university students.

To verify the validity of the hypothesis, the statistical means were used, namely calculating the arithmetic averages, standard deviations and t-test values, and then obtaining statistically differences between the grades of the first experimental group taught in accordance with the learning triangle strategy and the arithmetic averages, standard deviations and test (T) values were calculated to determine whether there was a statistically significant difference between the two groups' scores on the test, and the following table shows those data:

Table () the value of (T) and the level of statistical significance of the differences between the second experimental group and the control group in the geographical drawing test

Group	Arithmetic averages	standard deviations	Calculate T value	Tabulated T value	Significance
Control	20.43	3.023	4.4	2.2	Statistically significant
Second experimental	25.01	2.30			

Looking at the previous table, we note that the calculated T value (4.4) exceeds the scheduled T value (2.2), which indicates the presence of a statistically significant difference between the degrees of the second experimental group that was taught according to the learning triangle and the control group that was taught in the usual way in the test of geographical drawing, which indicates the rejection of the fourth hypothesis.

Results related to the fifth hypothesis and it states: 'There is no statistically significant difference at the level of significance (0.05) between the mean scores of the first experimental group that was taught according to the geographic circle strategy and the second experimental group that was taught according to the strategy of the learning triangle in the generative thinking test.

And to validate the hypothesis, the researcher calculated mathematical averages, standard deviations and T values, and then obtained statistically significant differences between the scores of the first experimental group and the second experimental group scores in the generative thinking test, and this was illustrated by the following table:

The value of (t) and the statistical significance level of the differences between the first experimental group and the second experimental group in the generative thinking test

Group	Arithmetic averages	standard deviations	Calculate T value	Tabulated T value	Significance
first experimental	41.340	7.40 57	4.476	1,986	Statistically significant
Second experimental	35.211	6. 927			

It is clear from the above table that the calculated T value (4.476), is greater than the T-Tabular amount of (1.986), at the level of significance (0.05), which indicates that there are statistical differences between the mean scores of the first experimental group that was taught according to the geographic circle strategy and the second experimental group scores which was taught according to the strategy of the learning triangle, and accordingly rejects the fifth hypothesis, and this indicates that there are differences in favor of the experimental group that was taught according to the strategy of the geographical circle.

Results related to the sixth hypothesis and it states: 'There is no statistically significant difference at the level of significance (0.05) between the average scores of the first experimental group that was taught according to the geographic circle strategy and the second experimental group that was taught according to the strategy of the learning triangle in the geographic drawing test.'

For the purpose of validating the hypothesis, arithmetic averages, standard deviations and T values were calculated, and then the statistically significant differences were obtained between the scores of the first experimental group and the scores of the second experimental group in a geographical drawing test and the following table illustrates this:

Table () T-Test and the statistical significance of the statistical differences between the first and second experimental groups in the geographical drawing test

Group	Arithmetic averages	standard deviations	Calculate T value	Tabulated T value	Significance
first experimental	27.97	0.89	1.99	4.494	Not Statistically significant
Second experimental	26.14	0.86			

It is clear after reviewing the previous table that is the calculated T-value (1.99) is smaller than its tabular value (4.49) at the level of significance (o.05), which indicates that there is no statistical significance between the degrees of the first experimental group that was taught according to the geographical circle strategy and the second experimental group taught according to the learning triangle, which indicates the acceptance of the sixth hypothesis.

Interpretation of the Results

First: Results related to the first independent variable (geographical circle): The results related to the geographical circle showed that there are statistically significant differences in favor of the first experimental group that was taught according to this strategy versus the control group that was taught according to the traditional method in both generative thinking and geographical drawing, which confirms the effectiveness of this strategy and the researcher attributes those results to:

1- Educational studies and research confirm the importance of the Constructivism theory on which the geographic circle strategy is based in the educational process, where its seven stages help students to explore, conclude, and link previous ideas with the current
2- The geographic circle stages helped the students to develop their generative thinking, especially the stages of exploration and information exchange, as well as the extension

stage, which helps them to link the taught topic to other topics, which are all activities that help them to generate solutions, alternatives and new ideas by drawing on previous experiences, which are the same skills of generative thinking

3- The seven circle stages, especially the expansion phase, which help the student to interpret and explain the phenomena further, helped to develop the skills of geographical drawing, especially laying the basis for the map, plans, or drawing phenomena

4- The evaluation phase, which is intertwined with the seven stages, helped to enhance the drawing power of students, so that their output from the maps could be better output after the end of the cycle. The recurrence of the evaluation enhances the generation of valid ideas, which also contributes to enhancing generative thinking.

5- The geographic circle's superiority over the learning triangle with regard to developing generative thinking among students may be due to its seven steps and the introduction of continuous evaluation at each stage with the use of conclusion, expansion, extension and exchange of ideas.

Second: Results related to the second independent variable (learning triangle):

The results related to the learning triangle showed that there were statistically significant differences in favor of the second experimental group that was taught according to this strategy versus the control group that was taught according to the traditional method in both generative thinking and geographical drawing, which confirms the effectiveness of that strategy and the researcher attributes those results to:

1- The learning triangle strategy makes students at the center of the educational process, they are expressing their need, are planning their lesson and activities, and are involved in evaluating themselves, which is positive for generative thinking, as this thinking is based on the individual's position to solve urgent problems and choose alternatives to solve them based on his previous ideas.

2- The three steps of the strategy help students express their educational needs, which helps a lot in designing geographical drawing, as well as their involvement in planning and evaluation in developing their drawing skill.

Conclusions

In the light of the research results, we can reach the following conclusions:

1- The geographic circle strategy has a positive impact on developing generative thinking in geography, which contributes to solving modern geography issues

2- The geographic circle strategy has a positive effect on the geographical drawing of the university's students who study geography, and it is evaluate their performance level continuously.

3- The learning triangle strategy (express - planning - evaluate) has a positive impact on developing generative thinking among students, it is a strategy designed in light of the real educational needs that students need

4- The strategy of the learning triangle (express - planning - evaluate) has a positive impact on the skill of geographical drawing among students, as students are already participating in planning and evaluation, which enhances their geographical drawing.

5- The geographic circle strategy outperforms the learning triangle in developing generative thinking.

Recommendations: In light of the previous results, the survey recommends

1- The necessity of conducting more studies in the methods of teaching geography, which emphasize the use of the proposed strategies, especially the learning triangle, as the researcher did not find one study that employs the strategy in research related to geography teaching methods.

2- The necessity of encouraging educators and specialists in constructive learning strategies because of their effectiveness and importance and placing teachers at the secondary stage in courses held by the Preparation and Training Unit

3- Holding seminars and training courses in the continuous education centers and educational colleges to raise awareness and train the university's teachers on modern strategies and draw attention to the necessity of avoiding traditional teaching and indoctrination.

4- The necessity of directing need and request from the specialized unit to set the curricula of educational colleges, especially geography majors, and these curricula should be based on the basis of enrichment activities and information that can be taught by modern strategies such as the geographic circle strategy and the learning triangle and others that facilitate to the student and the teacher the understanding of materials smoothly.

5- The necessity of including modern teaching strategies, including the strategy of the geographical circle, the learning triangle, and others in the vocabulary of the curriculum subject and teaching methods taught in educational colleges in order to prepare efficient future teachers.

Suggestions: To complement the current research, the researcher suggests conducting the following research:

1. The effect of the geographic circle and learning triangle strategy on collecting geographical information and developing meta-cognitive thinking for students of the College of Education for Humanities

2. The effectiveness of the geographic circle and learning triangle strategy in acquiring geographical concepts, developing inventive thinking, and the interests of students of the College of Education for Humanities.

3. The effect of using the geographical circle strategy and the learning triangle in achievement, developing geographic skills, subtle or systemic or divergent thinking, or emotional intelligence among students of the College of Education for Humanities

REFERENCES

Abu A. K. M. A. (2010). To know the impact of the employment of a strategy (express-planning- evaluate) in the teaching of mathematics on the development of creative thinking among the students of the seventh grade in Gaza, (unpublished master's thesis), Faculty of Education, Islamic University - Gaza.

Agaa, H. (2002) The effectiveness of employing VEs construction strategy in the development of life skills in the Palestinian Public Sciences Research for fifth graders, unpublished master's thesis, Faculty of Education, Al-Azhar University, Gaza

Bargoth, M. (2008). Following the use of the problem-focused learning strategy to develop some technology skills for sixth graders in Gaza, an unpublished master's letter, Faculty of Education, Islamic University, Gaza.

Gamal, A. R. A. S. (2002). Ways to teach social subjects, dar, curriculum for publishing and distribution, Amman, Jordan.

Habib, A. (2004) The impact of the use of a strategy (express-planning- evaluate) on the development of scientific research skills in the first grade of secondary school through physics, the eighth scientific conference, the absent dimensions in the science syllabus in the Arab world (July 25-28) MJ (1), Assala, Egypt.

Hussam, a-D. L. and Ramadan, H. (2007). The effectiveness of written tasks accompanied by a collective evaluation in the development of generative thinking and the drive of achievement and physics achievement in the first grade of secondary school. Journal of Scientific Education, Egypt.M.M. (10), P.2, p. 120-170

Al-Khatib, M. Faisal, a.-A. S. (2013). Using the model of building common knowledge in science teaching to develop generative thinking and scientific concepts in fourth grade students. Journal of Studies in Curriculum and Teaching Methods. Egypt (192), p. 61-109.

Khaireddine, M. Khaireddine, K. (2018). The effectiveness of a proposed program in the development of mapping skills and visual thinking among first-grade secondary students, Arab studies in education and psychology, Association of Arab Educators. Mg (1), P (39), p. 89-118

Rehan, T. M. G. (2015). Chose to employ a strategy (think-paired-participate) compared to the strategy (express- planning-evaluate) in developing the skills of mathematical thinking in the basic seventh grade students in Gaza, a master's thesis in curriculum and teaching methods, faculty of education. Al-Azhar University, Gaza, Palestine.

Zaytoun, A. (2007). Structural theory and the repertoire of science teaching. First edition. Amman: Al Shorouk Publishing and Distribution House.

Zayat, F. M. (2001). Introduction, models and theories of cognitive psychology, Part II, Cairo, Publishing House for Egyptian Universities

Zayat, F. M. (1998). Cognitive psychology, i1. University Publishing House, Part II, Cairo, Egypt

Sami, S. A. and Nayef, A. Su. (2005). Science and mathematics teaching methods. Dar Safaa.Oman.

Al-Shuwaili, H. M. S. (2016). The impact of the strategy express - planning - evaluate in the achievement and transmission of the impact of learning and retention in the middle second grade students in Arabic grammar. Basra Research Journal for humanities, Basra University of Basra, Faculty of Education of the Humanities.

Al Sarayrah, R. Shaher, T. (2017). The effectiveness of the strategy of the seven-year learning course in developing the level of achievement and the trend towards biology among the tenth grade students in Jordan. Journal of Education, Al-Azhar University, College of Education, Volume (1), No. 174, pp. 516-541

Al-Saqr, M. H. (2018). The relationship between the educational stage and the skill of drawing the map of Libya: (University of Tripoli, College of Education, Qasr bin Ghashir (as a model, Journal of Humanities, Scientific and Social Sciences, Al-Marqab University - College of Arts and Sciences, Qasr Al-Akhyar, p. 5, pp. 45-53

Taha, M. H. I. (2018). Effectiveness of a proposed unit in geography using the seven-cycle learning and formatting modules in developing concepts of water security and some environmental values for second-year middle school students. Journal of the Educational Association for Social Studies, p. 98, pp. 125-176.

Al-Tayyeb, M. (2003). The effectiveness of a proposed educational bag in the subject of geography on developing academic achievement and the skills of using the map for third-graders from middle school. College of Education Journal, National Research Center, Egypt

Obaid, W. (2011). Teaching and learning strategies in the context of quality culture. 4th Floor, Al Masirah Publishing House, Amman.

Al-Atoum, A. et al. (2013). Development of thinking skills, 5th edition, Dar Al Masirah for Publishing and Distribution, Amman, Jordan

Asfour, I. H. (2011). A program based on lateral thinking strategies to develop generative thinking skills and self-efficacy for female teachers, Department of Philosophy and Sociology. Journal of Studies in Curricula and Teaching Methods, No. 17.

Afaneh, A. and Jaish, Y. (2008). Teaching and learning with the two-sided brain, 1st floor, Islamic University, Miqdad Press, Gaza

Al-Afoun, N. H. and Abdel-Sahib, (2012). Thinking, its patterns, theories, and methods of teaching and learning it. I 1. Amman. Dar Safaa for Publishing and Distribution

Faris, M. E. (2009). Effective effectiveness of a suggested program to treat common mapping mistakes for primary studies teachers in the primary stage and its impact on providing some of their drawing skills. Educational Journal, Egypt, p (52), pp. 71-124

Fathi, J. (2002). Thinking education concepts and applications. Amman, Dar Al-Fikr Publishers and Distributors.

Al-Fatlawi, F.l Abdul, A. (2016). The effectiveness of using the modified 7es learning course method on achievement among middle school students in mathematics. Journal of the Islamic University College, Iraq (2), p (40), pp. 258-333

Faraj, A. Walid, M. K. (2018). The effect of using the strategy of the seven-year learning cycle on the acquisition of geographical concepts and some systemic thinking skills among sixth-grade primary students, Journal of the Educational Association for Social Studies, Educational Association for Social Studies, p (98), pp. 53-84

Al-Qahtani, S. S. (2018) Strategic Effectiveness (PQ4R) in teaching social and national studies on cognitive achievement and development of generative thinking for third grade intermediate female students in Riyadh. Journal of Educational and Psychological Sciences Issue Fourteenth - Volume Two.

Mahmoud, S. and others. (1996). 'Methods of teaching geography', first edition, Dar Al-Amal for Publishing and Distribution, Jordan

Mahmoud, S. E.-D. A. (2003). A proposed program based on cooperative learning to train middle school students in drawing a map and measuring its effect, educational and social studies, volume (9), p (2) pp. 11-42

Mahmoud, S E.-D. A. (2005). "Teaching and learning geography in the information age, its goals - its content - its methods - its evaluation, the world of books, Cairo.

Al-Masoudi, M. H. M. (2013). The evaluation of the fourth literary students in geographical mapping skill, Journal of Humanities, Babylon University - College of Education for Humanities, p. 15, 235-242

Elmasref, H. M. Y. (1982). Principles of cartography, Al-Adeeb Press, Baghdad, Iraq

Swer, H. A. R. (2013). Effectiveness of a modified PODEA strategy based on active learning in developing generative thinking for first-year secondary students. Scientific Research Journal of Education, Ain Shams University - Girls College of Arts, Sciences and Education No. 13, Volume 2, pp. 755--771

Najdi, A. and others. (2007). Teaching science in the contemporary world, recent trends in science education in light of international standards and the development of thinking and structural theory, 2nd floor, Cairo, Dar Al-Fikr Al-Arabi

Yahya, H. A. (1998). Criteria to be met in the atlas used in the educational process in the general education stages, Faculty of Education, Ain Shams University, No. (22), Part 1, Cairo.

Foreign References

Amy, F. B. And AnitA, C. All (2010). Constructivism theory analysis and application to curricula. Nur s ing Educ a t ion Pe r spe c t i v e s , VOL (31) ,NO 2 158-169.

Balta, N. & Sarac, H.(2016). The effect of 7E learning cycle on learning in science Teaching : A meta-analysis study . European Journal of Educational Research 5 (2) 61-72

Chin, C & Brown, D. E. (2000). Learning in science: A comparison of deep and surface approaches. *Journal of Research of Science Education*. *24* (5). 109-138.

Fisher.R (2005): Techind children to think. London. On nelson thorns ltd. https://books.google.iq/books/about/Teaching_Children_to_Think.html?id=0az0JYM_p HMC&redir_esc=y

Golledge, R.G. & Stimson, R.J. (1997). *Spatial behavior: A geographic perspective*. New York: The Guilford Press.

Honebein, P.C. (1996). Seven goals for the design of constructivist learning environments.in *Constructivist Learning Environments: Case Studies in Instructional Design*. Brent G. Wilson (Ed.). Englewood Cliffs: Educational Technology Publications: 11-24.

Kursat Yenilmez $ Mehmet Erosy .(2008) Opinions of mathematics teacher candidates towards applying 7E instructional model on computer aided instruction environment , international Journal of Instruction , January . VOL 1 , NO 1

Obermaier, G., Frank, F. & Raschke, N. (2010). Kompetenz des Kartenzeichnens – Theoretische Grundlagen und

Vanzee E (2000): "Analysis of Student Generated Gmqioru Discussion" International Journal of Science Education 22(2), pp.115-142.