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THE IMPACT OF USING DIVERGENT THINKING STRATEGIES ON READING COMPREHENSION

A. Al Masri¹, T. Krishan²

Al Balqa Applied University, Al-Salt, Jordan.

E-mail: ¹amaal.masri@bau.edu.jo; ²krishantamara660@gmail.com

F. Al Talahin

The World Islamic Sciences & Education University, Amman, Jordan.

E-mail: talahinfatema90@gmail.com

S. Almassarweh

Isra University, Amman, Jordan.

E-mail: masars941@gmail.com

Abstract. *Introduction.* Divergent thinking strategies are based on brain activity represented by a series of successive and branching questions related to a particular reading text. These strategies stimulate the minds of sixth graders to think of new stimuli such as finding a solution to a specific problem, or making a specific judgment, or predicting future events, which produces new and innovative solutions and achieves a deeper understanding of the target reading text.

The present research *aims* to investigate the impact of divergent thinking strategies in developing reading comprehension skills among sixth-grade students in the English language.

Methodology and research methods. The authors used the quasi-experimental approach. A pre-post design was used to identify the effect of employing divergent thinking strategies in developing reading comprehension skills. The study sample consisted of 136 students, who were selected purposefully and distributed into two groups: experimental and control groups. Students in experimental group were taught using divergent thinking strategies. Students in control group were taught in the usual way.

Results and scientific novelty. The analysis of covariance (ANCOVA) found statistically significant differences between the two groups in favour of the experimental group in achievement. In addition, significant differences were found in the Motivation for Learning English between the two groups. It was found that divergent thinking strategies stimulate students' thinking through various questions and allow them to look at their familiar knowledge with a new vision, to produce and generate new ideas with creative features.

Practical significance. The current study is useful in determining the appropriate reading comprehension skills for students, and targeting them in developing these skills. This research also draws the attention of teachers to the importance of including strategies compatible with the brain, including divergent thinking strategies, when planning reading lessons. As for the educational supervisors, it puts in their hand's strategies based on the theory of learning in the brain, including the divergent thinking strategies and how to employ them in reading lessons in order to develop reading comprehension. Moreover, these research materials can be employed by mentors in directing teachers to depart from the framework of traditional methods through the use of divergent thinking strategies in their classroom teaching practices.

Keywords: divergent thinking strategies, reading comprehension, skills, sixth-grade students, Wadi El Sir Directorate of Education, Jordan.

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ВЛИЯНИЕ ИСПОЛЬЗОВАНИЯ РАЗЛИЧНЫХ СТРАТЕГИЙ ДИВЕРГЕНТНОГО МЫШЛЕНИЯ НА ПОНИМАНИЕ ПРОЧИТАННОГО

А. Аль Масри¹, Т. Кришан²

*Прикладной университет Аль-Балкаг, Эс-Салт, Иордания.
E-mail: ¹amaal.masri@bau.edu.jo; ²krishantamara660@gmail.com*

Ф. Аль Талахин

*Всемирный исламский университет науки и образования, Амман, Иордания.
E-mail: talahinfatema90@gmail.com*

С. Алмассарщех

*Университет Аль-Исра, Амман, Иордания.
E-mail: masars941@gmail.com*

Аннотация. *Введение.* Стратегии дивергентного мышления основаны на умственной активности, представлены серией последовательных и разветвленных вопросов, связанных с конкретным текстом для чтения. Данные стратегии побуждают шестиклассников думать о новых стимулах, например, о поиске решения конкретных проблем или о вынесении определенного суждения, а также обучают прогнозированию событий, что приводит к новым и инновационным решениям и позволяет добиться более глубокого понимания целевого текста для чтения.

Цель настоящего исследования – изучить влияние стратегий дивергентного мышления на развитие навыков понимания прочитанного шестиклассниками текста на английском языке.

Методология и методы исследования. Авторы применяли квазиэкспериментальный подход. Был произведен предварительный отбор, чтобы определить эффект от использования стратегий дивергентного мышления в развитии навыков понимания прочи-

танного. В исследовании приняли участие 136 учеников, которые были целенаправленно отобраны и разделены на две группы: экспериментальную и контрольную. Участники экспериментальной группы обучались с использованием стратегий дивергентного мышления, участники контрольной группы – обычным способом.

Результаты и научная новизна. Ковариационный анализ (ANCOVA) позволил авторам обнаружить, что участники экспериментальной группы достигли более высоких результатов. Также между двумя группами были выявлены существенные различия в мотивации изучения английского языка. Авторами установлено, что стратегии дивергентного мышления стимулируют познавательную деятельность школьников посредством различных вопросов и позволяют им взглянуть на свои знания по-новому, производить и генерировать творческие идеи.

Практическая значимость. Данное исследование помогает определять и развивать необходимые навыки в понимании прочитанного, а также обращает внимание учителей на важность внедрения современных когнитивных стратегий (в том числе стратегий дивергентного мышления) при планировании уроков чтения. Методисты также могут использовать данные стратегии, основанные на теории умственного обучения, в том числе и стратегии дивергентного мышления, а также способы их применения на уроках чтения для развития понимания прочитанного. Более того, руководители в сфере образования могут использовать материалы настоящего исследования, чтобы обучить учителей выходить за рамки традиционных методов и применять вышеупомянутые стратегии в своей практике.

Ключевые слова: стратегии дивергентного мышления, понимание прочитанного, навыки, учащиеся шестого класса, Управление образованием Вади Эль-Сэра, Иордания.

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Introduction

The educational process is closely linked to the theories of learning that guide its course and determine the types of its various activities. This requires the follow-up of updates in this field because of its importance in developing the teaching and learning processes. One of these modern theories is the brain-based learning theory that emerged in the 1990s; its emergence certainly requires experimentation to show the extent of its influence in education. Brain research does not claim that old models, methods, and educational methods were necessarily wrong. Still, they show that these methods are not harmonious with the brain. It is not the best way to know how the brain learns. Although learning is based on the brain in one way or another, this new educational model involves acknowledging the principles of the brain for meaningful learning and organising education according to those principles in the brain. This type of education focuses heavily on the teacher as a chief facilitator of learning, and to become true facilitators, teachers need to know the brain [1].

The theory of learning based on the brain emphasises that each individual can learn, as an active learning environment stimulates learning, which allows him/her to engage in the educational experience without the threat [2]. The theory explains that the learning environment that motivates learning processes is free of threat and tension; it includes motivation, rewards, motor activity, music, and the arts. The theory also highlights the role of emotions in the learning process and provides specific strategies for the emotional attraction [3], as well as brain-based learning, helps create successful learning and enhance students' learning, helps improve memory, learning processes, and exam success, and gains proficiency in the use of technology, as well as in the growth and construction of knowledge, which is necessary for success. It also accelerates learning, providing a means of reaching and maintaining results. The enrichment of the learning environment increases learning processes, and works to increase the neural connections, supports understanding and increases motivation for learning, and helps to develop and acquire knowledge for low achievers and low cognitive skills and this theory also emphasises the importance of memory types, processes of attention and surrounding environmental stimuli, and associated emotions in the change of brain physiology, and the occurrence of the learning process [2]. In this context come mental habits, a primary goal in all stages of education, from primary education to advanced education in institutes and universities. As explained by Sperry [4], the brain that each side of the brain (left and right) has different functions. He pointed out that the left-brain is analytical, specialised in the processing of information by connecting the parts to the whole in a sequential linear manner, and this is most effective in the processing of verbal communication and coding language, and decode them, the right side of the brain is where the parts are assembled to synthesise the faculties. It is a composite that handles information sequentially or synchronously. It looks for patterns and creates them. It identifies the relationships between separate parts, which are most effective in visual and spatial nature, such as drawing and making drawings.

The habits of the mind are distributed on both sides of the brain (right and the left); where the right side includes some habits such as examining the accuracy of the product, flexibility, creativity, and responding with amazement and awe, finding humour, think beyond thinking, question, and other problems. While the left side includes some habits such as perseverance, taking calculated risks, controlling arrogance, listening to others with understanding, empathy and cross-thinking, and constant readiness for continuous learning using all senses [5]. Al-Bakr R. believes that our mental habits affect everything that usually leads to poor learning, regardless of our level of skill or ability [6]. He exclaimed that skilled learners are ineffective if they do not develop solid men-

tal habits. Costa A. L. and Kallick B. also point out that the neglect of habits of mind causes many shortcomings in the educational process results [7]. Mental habits are not the possession of information but also knowing how to work on it and use it; it is a pattern of intelligent behaviors that leads the learner to produce knowledge, not recall or reproduce it earlier.

1.1. Problem of the Study

It is important to understand and comprehend what is read, so the researchers, through the reference to the teachers of the primary stage, especially the teachers of sixth graders, noticed shortcomings in the students' reading comprehension skills. The researchers believe that this weakness is due to the traditional teaching methods used by teachers when conducting reading lessons, and not to seek to use modern strategies, and lack of familiarity with strategies that aim to develop reading comprehension skills, which enables the learner to identify the meanings of vocabulary, and to identify the causes and results and similarities and differences between things. So, the researchers decided to conduct this study to determine the impact of diverting thinking strategies in developing reading comprehension skills and find solutions to problems and other reading comprehension skills.

1.2. Research Questions

The study tried to answer the following questions:

Are there significant differences at the significance level ($\alpha = 0.05$) between sixth-grade students' scores in achievement in the English language attributed to the learning style (divergent thinking strategy learning, the usual methods)?

Are there significant differences at the significance level ($\alpha = 0.05$) in students' marks on the motivation to learn English scale attributable to the learning style (divergent thinking strategy, usual methods)?

1.3. Definition of Terms

1.3.1. Divergent Thinking

A pattern of thinking consists of invisible processes in neurons of the brain, inferred through the basic sixth-grade students' flexibility of thinking, creative and non-stereotypical responses to situations, creative solutions to problems in reading texts, and prediction of future events.

1.3.2. Divergent Thinking Strategies

Brain-based strategies are a series of consecutive and sequential questions about a particular reading text, which evokes the thinking of sixth-grade pupils to think about new stimuli such as solving a particular problem, making a judgment, or predicting future events, resulting in new and innovative solutions. It achieves a deeper understanding of the targeted reading text, consisting of seven strategies, five of which have been used in the present study: the strategy

of virtual thinking, the strategy of reverse thinking, the strategy of symbolic systems, the strategy of symmetry, and the strategy of perspective analysis.

1.3.3. Reading Comprehension

Reading comprehension means extracting meaning from the written material and analysing its symbols and reading involves attention, cognition, remembering, understanding, tasting, and emotion.

1.3.4. Skill

Skill: It is the performance of a task or activity convincing and appropriate methods and procedures and correct manner. The skill is to accomplish a specific task in a specific way and with extreme accuracy and speed in implementation.

1.3.5. Sixth-grade students

Students whose age is about 12 years old enrolling in the governmental schools in Amman.

1.3.6. Wadi El Sir Directorate of Education

It is among five directorates of education in Amman Governorate, Jordan.

Literature Review

2.1. Theoretical Framework

1. Diverting thinking strategies:

Teaching strategies must be prepared to consider the natural direction of the brain, which determines, in turn, how much information flows, and which works to expand the neural network by increasing connections or neurotransmissions between brain cells, resulting in creative ideas, which help students solve their problems, to live better by dealing with the environment and innovation more positively. Also, creativity and intelligence are developed in different areas in varying degrees, depending on the tendencies and abilities of each student [8].

Hence the importance of diverting thinking strategies appeared because of their special influence in expanding the student's network of thinking and deepen it, where it opens connections between nerve cells of the brain, which expands and extends the neural network, which results in the expansion of the thought of students to produce new ideas and the opening of different mental paths.

Divergent thinking and its strategies are based on several philosophical theories, which are summarised in:

- Jean Piaget's theory of cognitive development.
- Guilford's theory of creativity factor analysis.

– Contemporary theories of intelligence, including Garner’s theory of multiple intelligences.

– Brain theories, the most important of which are the theory of hemispheres of the brain, Hermann’s model of the whole brain, the theory of brain-based learning, which is the main basis from which divergent thinking was launched, due to the dependence of divergent thinking on the relationship between neurons within the human brain.

Costa A. L. and Kallick B. assured the need to pay attention to the development of the mind’s abilities because neglecting it affects the educational process of the individual because its development leads to intelligent behaviors that help the learner to produce knowledge on his/her own, which helps to remember [7].

Brain-based teaching relies on several foundations, the most important of which are:

1. The learner’s brain is characterised by characteristics consistent with its nature. For example, the learner’s brain cannot find certain relationships or links between previous experiences and subsequent experiences if the previous experiences do not have real foundations in the cognitive structure. Thus, in this case, the learner cannot use his/her brain to search for the intended meaning in a sound manner and on clear grounds.

2. The performance of the brain on its right and left sides improves whenever the learner is exposed to educational experiences and situations related to the classroom environment or the environment surrounding the learner, as the human brain changes its cells from time to time in light of the circumstances, situations and experiences it is exposed to.

3. The learner’s brain system is characterised by movement and activity, as the brain grows as the learner moves from one class to another, as the brain capacity can impose certain patterns of interaction that enable the learner to deal with several situations simultaneously.

4. The human brain can categorise experiences under names to understand and understand the meaning, as many learners encode experiences or give a specific symbol such as laws or dates to control the stimuli associated with those experiences.

5. Brain characteristics differ from one learner to another, such as the thumbprint, where each individual differs in its nature and characteristics, even if the learner is of the same age or grade, which calls for diversifying the experiences provided to them [9].

It is necessary to use teaching strategies that consider the work of the brain, which helps to expand the neural network, which results in a sequence of creative ideas that help students find solutions to their daily problems, in

addition to the development of intelligence among students in all fields and in varying proportions [8].

Teaching strategies based on brain-based learning must develop the mind's capabilities, leading to the formation of pathways that make learning meaningful, helping them link current knowledge with prior knowledge. This helps form neural pathways that are strengthened with new information added to the individual's knowledge, which helps to convert it into a long-term memory, which helps the learner add new information efficiently and effectively [10].

The teacher should recognise the individual mental abilities of his/her students, as each person has his/her brain that distinguishes him/her from others, and the difference comes from the acquired experiences and genetic factors. Each brain arranges, organises, and puts relationships and links between the information it learns, which helps in the process of rapid recall; he/she must also know how to organise the acquired experiences through his/her/her observation of his/her students [11].

The development of awareness of thinking abilities and learners' ability to plan, follow-up progress, and efforts to evaluate performance and the ability to make decisions, all of above must be included in the objectives of secondary school teaching [12].

Expanding our neural networks has important implications for education, as quality education requires that students have the opportunity to choose and absorb enough data to force them to challenge misconceptions and to create strong and accurate concepts. They cannot do this if the curriculum, methodology, or school structure is so rigid that students only learn to view the data without having a chance to understand it. This kind of education only speeds up neural adaptation, but we need to get students to think in a branching way [13].

Divergent thinking strategies are based on developing several skills in the learner based on the brain's work. Divergent thinking skills are defined as a set of practices and abilities that link ideas, concepts, and information that begin with an internal dialogue in the student's brain and appear in his/her ability to address problems and situations through the ability to produce the largest number of ideas, images, and appropriate expressions, and the ability to generate diverse, unexpected ideas [14].

Divergent thinking is based on a set of basic principles, which are:

- Not to rush to make judgments. This principle recommends postponing judgment and evaluation until many ideas have been generated since making hasty judgments hinders the process of thinking about something deeper.

- Search for many ideas. This principle requires finding the largest number of ideas and alternatives without concern for quality because distinct ideas are produced from among many ideas.

– Accept all ideas. This principle emphasises not being afraid to present any idea that comes to mind because ideas that may seem strange or ridiculous in the eyes of a group may be a basis on which others build original ideas.

– Taking your thinking to a greater extent. This principle sees the need to abandon the tendency of idle thinking and to maintain vitality and seriousness in the search for ideas.

– Taking a little break until the ideas brew. This principle emphasises the necessity of practicing an activity or a hobby that is not related to the problem for some time, as original ideas that had not previously occurred to him/her might jump to mind.

– Attempting to integrate ideas. This principle requires that the individual be alert to what others are offering, and he/she may be able to reach an original idea by linking various ideas from here and there [15].

– Beaty R. E., Silvia P. J. emphasised the effect of using divergent thinking in helping students generate new ideas, which helped create and increase their IQs [16].

The Washington Educational Center has indicated four basic methods that must be followed to develop divergent thinking:

1. Brainstorming

It is a method that helps the learner to generate a list of innovative ideas quickly, recording all ideas, whether acceptable or unacceptable and after completion, they are sorted and discussed to reach the list of correct ideas.

2. Keeping Journals

Through it, the learner is helped to preserve all the publications he/she sees, whether magazines, books, and literature, and index them according to the topics they contain to be a source of information when needed.

3. Freewriting

This is done by accustoming the learner to writing on one subject with specific elements, writing about it in a specific period, and emphasising to write everything that comes to mind about the topic, which helps to produce ideas without stopping, and then after completion, the writings are reviewed with the teacher.

4. Mind or Subject Mapping

It is intended to transform the ideas that the learner has reached through brainstorming into shapes and diagrams that show the relationships between those ideas, starting with the main general ideas, then the sub-ideas, and the map can include many levels.

The divergent thinking strategies are summarised in seven strategies, which are the following:

1. *Hypothetical thinking strategy*

It is intended to generate new information by stimulating neurons by visualising different issues and their consequences unusually or unexpectedly.

When the teacher uses this strategy in teaching, the teacher must direct a set of hypothetical questions to the learners, which encourage him/her to think about the consequences, and he/she must also use the students' answers to help them discover new relationships or reach conclusions or generalisations based on what they have learned and reached.

2. Reversal thinking strategy

It is intended to reverse the known and expected things and to provide the student with an opportunity by providing an educational situation that asks him/her to state the consequences of reversing things. And when the teacher uses this strategy in teaching, he/she must ask the learner to state what he/she expects to happen if he/she sees something that is the opposite of reality, or what he/she expects if he/she takes one step from one activity step to another or starts with the end of something and makes it the first, or vice versa.

3. Application of Different Symbol System Strategy

It means using different symbolic systems in learning situations to better understand the educational situation's elements better, link its parts, and express it in its way through planning, equations, or graphics that show the links and relationships between the components of the situation. When the teacher uses this strategy in teaching, he/she must ask the learner to draw a map or lines that express a sequence of situations or events, convert textual information into diagrams and equations, or summarise specific content in a tiered chart content is displayed.

4. Analogy Strategy

It is intended to activate the mental abilities of learners by looking at a set of different responses and searching for similar things between them. This strategy requires high creativity and innovation abilities, and when the teacher uses this strategy in teaching, he/she must ask the learner to mention the similarities or differences between two or more things or to reach things that are similar or different from a particular thing.

5. Analysis of Point of View Strategy

It is intended to guide the learner to think about his/her opinions and principles in different situations, which accordingly affect his/her vision and judgment on matters and his/her interaction with events, which helps in deepening his/her thought in them and reflecting on their validity and suitability to solve the problem or address the situation. And when the teacher uses this strategy in teaching, he/she must ask the learner to state his/her point of view on a particular matter, or the justifications that made him/her agree or reject a particular matter, or support a specific topic.

6. Completion Strategy

It is intended to guide learners towards the completion of incomplete and missing things, and this is according to the Gestalt theory in the permanent

desire of the individual to complete the missing things, according to the law of closure, which urges the learner to diversify his/her thinking to find relationships between the existing elements to complete the incomplete that does not exist. And when the teacher uses this strategy in teaching, he/she must ask the learner to complete something missing, or to expect an appropriate end to a sequence of specific events, or to complete certain spaces in a paragraph, or to choose between groups of things to determine the most appropriate to fill the void.

7. Web Analysis

It is intended to link situations, events, and phenomena with intertwined and overlapping relationships by training learners to discover, express, and simplify these relationships and identify ways of overlapping them through training that helps to branch the learner's thinking and employ his/her mental abilities. And when the teacher uses this strategy in teaching, he/she should ask the learner to specify how he/she relates two or more things, determine the relationship between two or more things, and clarify the relationships between different topics [17–18].

The roles of the teacher when using divergent thinking strategies are outlined in the following points:

- Create the appropriate atmosphere for cooperative learning to provide social interaction in the classroom.
- Provide a degree of flexibility during learning and allowing students to express their opinions, and that is by providing a safe environment for students to help launch creative ideas.
- Attempt to reveal the learning styles, methods, and brain abilities of learners.
- Give students an opportunity for expanded, multi-track thinking.
- Enable learners to deal with scientific and social problems [19].

Clemons S. assures that one of the most critical roles of the teacher is to organise education around a set of real problems and use multiple teaching models, focusing on the learner's tendencies and interests [20].

One of the studies that dealt with divergent thinking strategies is the study by Jensen E., who confirmed that high school students who employ divergent thinking strategies while learning mathematics could contribute diverse and innovative ideas while addressing situations involving open-ended mathematical problems [3]. The study of Omran T. found the effectiveness of using divergent thinking strategies in developing creative thinking, acting in life situations, and the trend towards family education for middle school students [21]. The study by Gilhooly K. J., Fioratou E., Anthony S. H., Wynn V. emphasised the effectiveness of using divergent thinking strategies in generating new ideas from familiar things in acquiring English language skills [22]. Roger E. and Paul J. empha-

sised the effect of using divergent thinking in helping students generate new ideas, which helped in creativity and increase their IQ [18]. Imai T. confirmed that students, who employ divergent thinking strategies while learning mathematics, can contribute diverse and innovative ideas while addressing situations that include open-ended mathematical problems [23]. Abul-Naga N., Mohamed M. confirmed the effectiveness of using divergent thinking strategies in developing visual intelligence and achievement in geometry for first-year preparatory students [24]. Ibrahim A., Mahmoud A., Saeed F. achieved the effectiveness of a programme based on divergent thinking strategies for developing creative reading comprehension skills and some habits of the productive mind among first-year secondary students [25].

The research of Suleiman T. verified the effectiveness of a training programme based on hyper-thinking strategies for developing thinking among science teachers and generative thinking among their students [26]. The study of Abu Zaid A. confirmed the effectiveness of using divergent thinking strategies in developing achievement and some habits of mind and attitude among industrial secondary school students [27]. Abdel Majid A. verified the impact of the use of divergent thinking strategies in teaching “calculus” on self-organised learning skills and the appreciation of sports values among students and teachers in the College of Education [28]. Ramadan H. confirmed the effectiveness of using divergent thinking strategies in developing achievement and scientific sense and transferring the impact of learning in science for primary school students [17]. Al-Amoudi H. verified the effectiveness of a proposed strategy based on electronic educational blogs in teaching chemistry on developing divergent thinking skills, social skills, and the trend towards studying chemistry [29]. Jad Al-Haq N. verified the validity of the experimental dialectical approach to the development of divergent thinking and practical skills in science among middle school students [30]. Issa W. confirmed the impact of the use of divergent thinking on the development of reading comprehension skills for the fourth-grade female students [31].

2.2. Previous Studies

Al-Hudaibi A. conducted a study to identify the effectiveness of the divergent thinking strategies in developing adult concepts and the trend toward adult language learners in other languages [32]. The study used a semi-experimental method. The sample consisted of 57 students from the fourth level in the Arabic Language Education Institute for non-native speakers at the Islamic University in Madinah Monawwarah. The study tool was designed to identify the basic concepts of Arabic language learners speaking other languages, the testing of adult concepts, and the scale of the trend of Arabic speakers in different

languages towards adults. The study results showed statistically significant differences between average students' degrees in the applications, pre/post-application. However, this confirms that using divergent thinking strategies has led to statistically significant differences in the development of adult learners of Arabic speakers in other languages.

Ibrahim A., Mahmoud A., Saeed F. conducted a study to identify the effectiveness of a programme based on the divergent thinking strategies in developing creative reading comprehension skills and some of the habits of the mind produced by the first-grade secondary student [25]. The study used the descriptive approach and the semi-experimental method. The study sample consisted of two sections at Ibrahim Mahfouz School in Assiut Governorate in Cairo. The first section represents the experimental group (30) and the second section describes the control group (30 students); the study tool was a list of creative reading comprehension skills, a list for the appropriate mental habits of the first-grade secondary student, the scale of the practices of the fertile mind, in addition to a brain-based learning programme to develop creative reading comprehension skills and habits. The study results showed clear superiority of the mind produced by the first-grade secondary student in the post-performance in testing creative reading comprehension skills for the experimental group; this indicates the significant impact of the divergent thinking strategies in these skills.

Shehata M. conducted a study to measure the effectiveness of a proposed programme based on some of the thinking strategies in developing mathematical communication skills among primary school students [33]. The semi-experimental syllabus consisted of 70 students of the fifth class was in one of the schools in the governorate of Al-Beheira in Saudi Arabia, distributed to 33 students as a pilot group and 37 students as a control group. The tool was included in the list of immigrants' sports communication and sports communication testing. The results indicated the superiority of the experimental group which examined the proposed programme, which includes the student's book, where the two modules included transfers engineering and statistics, after reformulating them in the light of the philosophy of cross-thinking and communication mathematics and using some of the multiple thinking strategies in teaching them to the control group which studied the units as stated in the school curriculum. Thus, this emphasises the programme effectiveness in developing sports communication and teaching among students in the experimental group.

Lee Y. conducted the study to identify the effect of using divergent thinking strategies in developing creative thinking and performance. The study used the quasi-experimental approach, and the study sample consisted of 15 students in

the experimental group, and 15 students in the control group, all of them ranged in age from 5-11 years, and they were Korean students residing in America. The study tool was the Torrance test of creative thinking, and tasks to solve real problems in the form of a story, and the results indicated that the experimental group achieved gains in the degrees of originality and fluency in Torrance test of creative thinking, in addition to the superiority in problem-solving tasks represented in real stories over the control group [34].

Design and Methodology

3.1. Study Approach

In this study, the researchers used the quasi-experimental approach, which is defined as “a method that studies a current phenomenon with changes in one or more factors and monitors the results of this change” [35]. It also followed a pre-post design for two groups, one of them was experimental, which was taught using divergent thinking strategies, and the other was control, which was taught in the usual way; to identify the effect of employing divergent thinking strategies in developing reading comprehension skills.

3.2. Population of the Study

The population comprised of all 6-grade students at schools at Wadi El Sir Directorate of Education; their number reached 1830 for 2019/2020 academic year.

3.3. Sample of the Study

The study sample comprised 136 students of the sixth grade at Wadi El-Sir Directorate of Education in Amman. The school was chosen intentionally. The researchers divided the sample into experimental 72 and control 64 students.

3.4. Study Tool

In this study, the researchers used the achievement test of reading comprehension.

3.4.1. Test Validity

3.4.1.1. The arbitrator's validity

The test was presented to a group of academic arbitrators and educators specialising in the field of curricula and teaching methods, and some English language supervisors and teachers, and their opinions were taken, as some paragraphs were linguistically modified, some camouflaged, and one item was deleted, and another item was added.

3.4.1.2. Internal consistency validity

It means the strength of the correlation between the score of each test item separately and the overall test score, as well as between the score of each

test item with the domain to which it belongs using the Pearson correlation coefficient, where the researchers calculated the correlation coefficients between the score of each test item with its total score using the Pearson correlation coefficient. The results showed that all the test items were statistically significant at the significance level (0.01) except for two items (20,5) significant at the significance level (0.05), and this indicates that the test has a high degree of internal consistency.

3.4.2. Reliability of the test

The reliability of the test means: the same individual obtains the same score or a close degree to it in the same test or groups of equal or similar questions when it is applied again [37]. To verify the reliability of the test, the researchers used the following methods:

3.4.2.1. Split-half reliability

The researchers calculated the reliability of the test using the split-half method. Firstly, the researchers divided the test into two parts: items with odd numbers, and items with even numbers, then the Pearson correlation coefficient was calculated using the statistical program (SPSS) between the first half of the test, which is represented by odd items and the second half, which is represented by even items, and the results showed that the value of the reliability coefficient is equal to 85.0.

3.4.2.2. Kuder- Richardson 20

The researchers used other methods of calculating the reliability coefficient, which is the Kuder-Richardson equation 20, where the reliability coefficient of the test as a whole was according to the Kuder-Richardson equation, and the value of the Kuder-Richardson coefficient of 20 for the total score of the test as a whole was 89.0, which is a high value. This indicates that the test has a high degree of stability, confirming the validity of using the test in the current study with confidence.

Results of the Study and its Discussion

Results relating to the first question: “Are there significant differences at the level of significance ($0.05 = \alpha$) between the means of sixth-grade students’ scores in achievement in the English language attributed to the learning style (divergent thinking strategy, the usual methods)?”. The arithmetic averages for each pre-test and post-test were calculated, and arithmetic means of the post-test and standard deviations of both tests, depending on the difference in two study groups (experimental and control), see Table 1.

Table 1

Arithmetic observed and modified means to pre- and post-English language test

Teaching strategy	N.	Pre-test achievement		Post-test achievement		Modified mean	ERROR
		Observed mean	Standard deviation	Observed mean	Standard deviation		
Traditional	72	24.60	7.903	29.35	5.994	29.455	0.814
Divergent thinking strategy	64	24.91	8.082	32.36	6.608	32.268	0.776

Table 1 shows a virtual difference between the modified English language achievement post-test averages and the significance of these apparent differences depending on the different teaching strategies among the two study groups' members (control and experimental). One-way analysis of covariance (ANCOVA) for the English language achievement post-test was used and reduced the effect of the pre-test according to the study variable (teaching method), refer to Table 2.

Table 2

One-way analysis of variance to examine the differences between the averages of the experimental group and the control group on the post-test

Source of variance	sum of squares	Degree of freedom	Mean of squares	Value of calculated F	Value of error	Practical significance
Pretest achievement (ANCOVA)	1,082.870	1	1,082.870	81.723	0.000	67.7%
Teaching style	82.839	1	82.839	6.252	0.016	13.8%
Error	516.771	39	13.251			
Overall	1,694.786	41				

It is evident from Table 2 that the existence of the statistically significant effect at the significance level ($\alpha = 0.05$) on the English language achievement posttest attributed to the teaching style, in favour of the experimental group members, who were taught using blended learning. Their modified arithmetic mean was 32.268 compared to members of the control group, who were taught by the usual way, where their modified arithmetic mean was 29.455.

These results related to the high level of performance of the sixth-grade students at Wadi El-sir in the English language, who were taught using divergent thinking strategy, can be attributed to the advantages in using new strategies to enhance thinking.

This can also be attributed to the novelty in the style of introducing English language lessons in this way – using divergent thinking strategy. It is recognised, any new methods are interesting and cause to reduce the degree of dispersion of the mind and focus attention, and students even more exciting and focused on the new thing. And therefore, such methods make students enjoy it more than the usual way.

To answer the second question in the study, which states: “Are there significant differences at the level of significance ($\alpha = 0.05$) in the means of students’ marks on the motivation to learn English scale attributable to the learning style (using divergent teaching strategy, usual methods)?”, the means for each of the pre- and post-scale were calculated, the modified arithmetic means of the post scale and standard deviations of the two groups were also calculated depending on the difference in the two study groups (control, experimental), see Table 3.

Table 3

Arithmetic observed and modified means to pre- and post-motivation scale to learn the English language

Teaching strategy	N.	Pre-motivation scale		Post-motivation scale		Modified mean	ERROR
		Observed mean	Standard deviation	Observed mean	Standard deviation		
Traditional	72	1.87	0.094	1.84	0.134	1.834	0.023
Divergent thinking strategy	64	1.83	0.100	1.93	0.060	1.937	0.022

Table 3 demonstrates the existence of a virtual difference between the modified means of the post scale of motivation to learn the English language. To check the indication of these apparent differences depending on the different teaching strategies among the members of the two study groups (control and experimental), a one-way covariance analysis of variance (ANCOVA) was conducted for the post scale of motivation to learn English after neutralising the impact of pre-scale according to the study variable (teaching method), refer to Table 4.

Table 4

One-way analysis of variance to examine the differences between the averages of the experimental group and the control group on the motivation scale to learn the English language

Source of variance	Sum of squares	Degree of freedom	Mean of squares	Value of calculated F	Value of error	Practical significance
Pre-motivation (ANCOVA)	0.016	1	0.016	1.569	0.218	4%
Teaching style	0.107	1	0.107	10.382	0.003	21.0%
Error	0.400	38	0.010			
Overall	0.511	40				

Table 4 shows the presence of statistically significant impact at the significance level ($0.05 = \alpha$) on a scale of motivation to learn English due to the teaching style variable, in favour of the experimental group. Thus, for example, those, who were taught using divergent thinking skills, had a modified mean of 1.937 compared to the members of the control group, who were taught using the usual methods, where their arithmetic mean was 1.834.

4.1. Discussion

The results relating the increase of students' motivation to learn English can be attributed to the style in which it was displayed, where it worked to raise attention and reduce students' chances of preoccupation in distant subjects from the lesson. This is in addition to the reinforcement provided brain activities, which has had the good and the beautiful effect on the student's personality, which differed from the reinforcement provided by the teacher, which was offered through only pronouncing known and familiar words to the student. As well as providing direct feedback after the dissolution of the exercise, all of this has increased the students' motivation to learn through divergent thinking strategy.

It can also be attributed to the unfamiliar novelty in providing English language lessons through brain activities, where the new is always interesting and thrilling, which increases motivation.

This can also be interpreted in computer programs that increase the students' internal motivation due to factors in the task they perform since this kind of teaching method gives happiness to the students. Internal motivation is stronger and more lasting than external motivation; internally enhanced students perform their duties and are keen to learn classroom material [36].

Conclusions

The nature of the divergent thinking strategies and the freedom of answer associated with it, the issuance of many responses, and the constant excitement of the student provided the students with the opportunity to develop reading comprehension skills.

It was noted that the students' passion for these strategies and their willingness to interact with them, especially the strategies that direct them to hypothetical thinking and departing from the realistic framework and thinking in the opposite of the usual or the existing, this in turn gave the students free thinking and distance from restrictions and deaf memorisation of knowledge, as well as strategies related to expressing views and analysing their ideas and identification of the relationships between the elements of the subject, which allowed them to know the secrets of the text or the topic, and invent new relationships and identify points of similarity and difference between the elements of the topic. The nature of the questions related to the divergent thinking strategies distinguished by their gradation and branching from each other so that each piece of information complements the information that follows it. Comprehending the different aspects of the text stimulated the students' minds and expanded their perceptions and ideas to contemplate and fully understand the read text, which positively affected their level of achievement.

Recommendations

Through the results of the study, the following recommendations can be provided:

1. Use divergent thinking and the usual teaching methods due to the positive results shown by the current study in achievement.
2. Conduct similar studies that measure the effect of divergent thinking strategy on other variables specialised in the English language such as font, spelling, pronunciation, or any other variables.
3. Conduct similar studies on other subjects and classes.
4. Conduct a study so that the student learning will be self-learning through the computer without relying on the teacher.

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Information about the authors:

Amaal Al Masri – Assistant Professor, Department of English Language and Literature, Princess Alia University College, Al Balqa Applied University; ORCID 0000-0002-8874-755X; As-Salt, Jordan. E-mail: amaal.masri@bau.edu.jo

Tamara Moh'd Krishan – Assistant Professor, Department of Basic and Applied Sciences, Translation Studies, Zarqa University College, Al Balqa Applied University; ORCID 0000-0003-1710-7704; As-Salt, Jordan. E-mail: krishantamara660@gmail.com

Fatima Mohammad Rashed Al Talahin – Associate Professor, Department of Counseling and Mental Health, The World Islamic Sciences & Education University; ORCID 0000-0002-5046-4554; Amman, Jordan. E-mail: talahinfatema90@gmail.com

Sami Salameh Almassarweh – Assistant Professor, Department of Psychology, Isra University; ORCID 0000-0002-5010-6079; Amman, Jordan. E-mail: masars941@gmail.com

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Информация об авторах:

Аль Масри Амаал – старший преподаватель кафедры английского языка и литературы университетского колледжа принцессы Алии Прикладного университета Аль-Балкаг; ORCID 0000-0002-8874-755X; Эс-Салт, Иордания. E-mail: amaal.masri@bau.edu.jo

Кришан Тамара Мох'д – старший преподаватель кафедры фундаментальных и прикладных наук университетского колледжа Зарка Прикладного университета Аль-Балкаг; ORCID 0000-0003-1710-7704; Эс-Салт, Иордания. E-mail: krishantamara660@gmail.com

Аль Талахин Фатима Мохаммад Рашед – доцент кафедры консультирования и психического здоровья Всемирного исламского университета науки и образования; ORCID 0000-0002-5046-4554; Амман, Иордания. E-mail: talahinfatema90@gmail.com

Алмассаршех Сами Саламех – старший преподаватель кафедры психологии Университета Аль-Исра; ORCID 0000-0002-5010-6079; Амман, Иордания. E-mail: masars941@gmail.com

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