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The effectiveness of Stimulating Neural Branching Strategies on mental alertness among second-grade intermediate students in science

[1]Helen Sarhan Muhsin, [2]Mustafa Lafta Madhi Al-Ibadi

Abstract

The current research aims to identify the effectiveness of Stimulating Neural Branching Strategies on mental alertness in intermediate second-grade students in the subject of science, and to achieve the goal of the research, the researchers used the experimental method with partial control, through the following null hypothesis: There is no statistically significant difference at the level of significance (0.05) Between the average scores of the experimental group students who will study using strategies that stimulate the nerve bifurcation and the average scores of the control group students who will study in the usual way in mental alertness, the research sample consisted of (54) students, and each group had (27) students, and the two groups were rewarded, and to verify the research hypothesis The two researchers prepared the mental alertness scale (32 items) and their validity and reliability were verified and applied after the end of the experiment, and the results showed statistically significant differences between the mean scores of the mental alertness scale for the experimental group students and the control group students and in favor of the experimental group students. In the light of the results, the two researchers concluded the effectiveness of strategies that stimulate the nerve branching on mental alertness among second-grade intermediate students in the science subject.

Key Words: *Bifurcation Stimulating Strategies, Mindfulness, Science Subject*

I. Introduction

First: the research problem

Today, the world is experiencing accelerated events and developments in all aspects of life, especially developments in the world of computers, Internet and communications services, as well as the creation of new technologies represented by nanotechnology or augmented or virtual reality, and perhaps this delays the school in general, and science education in particular, to counter these Accelerating challenges, science education needs to adopt new approaches and adopt modern teaching methods and methods that keep pace with this development.

[1] *Assistant Lecturer Science teaching methods, The General Directorate of Qadisiyah Education, Iraq*
[2] *Assistant Lecturer Science teaching methods, The General Directorate of Qadisiyah Education, Iraq*

The standards of science in the twenty-first century emphasized in challenging science learning opportunities, and defining capabilities and levels of understanding that students should develop. In the National Standards for Science Education the term "effective process" is both mental and physical activity. Mental activities are not sufficient. Rather, students must acquire mental experiences. Also, teaching should include involving students in the process of scientific inquiry, asking questions to solve problems, planning, making decisions, and group discussions, and they practice types of evaluation to make them learn knowledge and mastery of it, raising their level of achievement, and that understanding and mastering scientific knowledge of the scientific topic is one of the aspects of scientific enlightenment.

Numerous studies and literature have also emphasized the use of teaching methods based on constructivist theory in which the role of the student is more than the role of the teacher, and to building knowledge and acquiring it more than preserving it. The two researchers have noted through their experience in teaching science and their use of the opinions of their fellow specialists and supervisors specializing in teaching Science subject: Most students face difficulty in selecting good stimuli and insight into the situations associated with acquiring or building knowledge, as they can access it and cannot use it as a method of learning, which indicates a clear decline in their mental skills.

Based on the foregoing, the need to search for different teaching strategies that combine sound educational planning, investing in the full potential of the mind and processing information in the best way, and this is what has been confirmed by many studies on the use of modern strategies that keep pace with scientific development, such as the study (Al-Abadi, 2017), (Al-Nabhan, 2017) Therefore, the two researchers decided to teach the science subject using teaching strategies that stimulate the neural bifurcation and know their effectiveness on mental alertness and raise their level of achievement, and thus the researchers define the research problem with the following question: The effectiveness of Stimulating Neural Branching Strategies on mental alertness among middle-grade second-grade students in science subject?

Second: The importance of research: The importance of research lies in the following points:

1. The importance of strategies that stimulate the nerve bifurcation in teaching science subject to the secondary level, which may contribute to increasing the understanding of the scientific material and mental alertness.
2. The current research may help to reconsider the content of high school physics topics and organize their concepts on the basis of these strategies.
3. The model creates a classroom environment that focuses on flexibility and creativity and provides the teacher with the ability to assess and evaluate the learner in all its aspects (skill, emotional and cognitive)

Third: The objective of the research: The current research aims to investigate the effectiveness of strategies that stimulate the nervous branching on mental alertness among second-grade intermediate students in the science subject.

Fourth: Research hypotheses: To verify the objective of the research and answer the research question, the researchers put the following null hypothesis:

1. There is no statistically significant difference at a level of significance (0.05) between the mean scores of the experimental group students who will study using strategies that stimulate the nerve bifurcation and the average scores of the control group students who will study using the usual method of mental alertness.

Fifth: Research limits: is defined by:

1. Students of the second intermediate grade of secondary and middle schools affiliated to the General Directorate of Education in Al-Qadisiyah / Al-Diwaniyah District.
2. The second academic course for the year 2018-2019
3. The last four semesters of the Science Book / Second Part of the Intermediate Second Grade 2017.
4. Use strategies to stimulate nerve bifurcation.

Sixth: Defining terminology

1. Strategies to stimulate nerve bifurcation:

Define it (Al-Balooshi, 2017, p. 431): as a set of strategies based on finding neural connections in the brain through innovative and structured activities and practices that make the student active and positive in learning, which is summarized in hypothetical thinking, reverse thinking, network analysis and analogy.

2- Mindfulness:

Define it (brown & ryanm2003, P: 822): is the state in which the student is attentive and aware of what is happening in the present and the enhanced interest and awareness of the current experience or reality.

II. Theoretical framework

First: the concept of strategies that stimulate the nerve branching

Today we are facing a knowledge revolution related to how the brain works, as the science of the brain is spreading at an amazing speed, represented by the application of important research on the brain in the processes of learning and education, and then the impact of this revolution on school attendance, discipline systems, methods of evaluation, education strategies, and the use of technology And even the way we look at education. (Joseph, 2011: 55)

Since the middle of the twentieth century, neuroscientists and psychologists began talking to each other to relate what each of them understood about the human mind, and then the triple brain theory appeared, and neuroscience later introduced the idea that there are several overlapping systems to understand the brain and not one system, and educators today encouraged the adoption of The total systems method for understanding the brain. Based on this cooperation between different fields and the acceleration of information in the field of brain research, a new educational system began at the end of the second millennium, based on brain-based learning. (Abu Rias and Abdelhak, 2007: 341)

Many educational literature has referred to a set of facts that neuroscientists have reached related to learning:

- Scientists believe that the direct study of the brain is the only way to understand the causes of behavior. They go beyond the behavioral explanation that holds that behavior is the product of external environmental factors only (stimuli, reinforces), and override cognitive theories based on theoretical assumptions of cognitive processes in the hope of identifying the roots (neurological) For those processes as the mental functions of the brain.
- The nervous system is the physical basis for the human learning process. The brain is not a computer. It is a self-organizing device that studies a functional structure with techniques that were not available before.
- The brain changes throughout the life cycle according to the individual's experiences. The more opportunity for the brain to practice its mental functions, the more we change its structure and develop different patterns of interconnections that are easy to repeat.
- The neuron learns, the brain is able to make neural networks according to the complexity of learning, which affects the brain's ability to adapt to the environment. A child in his first year is capable of forming neural networks that make his brain approach the state it reaches in adulthood. (Muhammad and Isa, 2011: 46)
- Connections between neurons known as shrubs form neural pathways or learning maps. Most of these pathways exist by the end of the third year of life.
- Sensory experiences in the early early years of a child's life have a great influence on brain development and then on behavior and learning. (Al-Rimawi et al., 2008: 187).

In this field, (Cardellicho& Field, 1997) developed teaching strategies that stimulate the neural bifurcation between brain cells seven strategies (hypothetical thinking, reverse thinking, application of different symbolic systems, similarity, point of view analysis, complementation, network analysis) and the two researchers have relied on the following strategies:

1- The strategy of hypothetical thinking: This strategy depends on employing hypothetical thinking during teaching through the teacher directing a set of hypothetical questions to his students, in which he must take into account the sequence so that their answers work to clarify the situation, and to invent new relationships between the phenomena of the problem or the educational situation, and he must also Employing students' answers in helping them discover new relationships or reach conclusions or generalizations based on what they have learned and arrived at. (Ibrahim and others, 2014, p. 125)

2- Reverse thinking strategy: This strategy aims to see scientific attitudes or phenomena in a reverse way by returning from results to causes with a reverse view, as the teacher asks the student to come up with questions instead of answers, and this strategy provides more opportunities for deepening thinking and thus moves from just Thinking about the acquired knowledge to thinking about what the knowledge narrates and thus developing the learner's ability to have a comprehensive view of the situation and a more in-depth view of the learning content. (Al-Mansouri, 2017, p.197)

3. Network analysis strategy: It is intended to link situations, events and phenomena with interlocking and interrelated relationships by training learners to discover, express and simplify these relationships, and to

identify ways of overlapping between them through training that helps to bifurcate the learner's thinking and employ his mental abilities and the teacher when using this strategy in teaching To ask the learner to determine how to relate two or more things, to define the relationship between two or more things, and to clarify the relationships between different topics.

4. Similarity strategy "symmetry": In this strategy, the mental abilities of the learners are activated, by looking at the various responses and searching for similar or similar things between them. This strategy requires high capacities of creativity and innovation and the teacher when using this strategy in Teaching is to ask the learner to mention the similarities or differences between two or more things, or to arrive at things that are similar to or different from a certain thing. (Muhammad, 2018, p.136)

Second: mental alertness

Mindfulness refers to carefully examining expectations and continuous thinking by relying on the individual's experiences, valuing important things in the context, identifying new aspects of the context that would lead to insight and functional performance of the individual during his social interactions, as well as accepting new ideas. Mindful students also notice similarities in objects and ideas that differ greatly outwardly. Mindfulness theory also assumes that all capabilities are limited as a result of an unconscious acceptance of premature cognitive creations. Langer believes that mindfulness means the ability to create new classes and receive new information. Being open to different perspectives, controlling the context, and emphasizing the outcome process, in other words, mindfulness is the ability to look at things in new and thoughtful ways with feelings. It is a product of our tendency to view our world in an indisputable way, which leads to automatic responses that may act on He made us able to make the decision. (langer, 1989: 72-65)

As for the effect of mindfulness on the educational process, it has a direct effect with many skills and responses and works to increase awareness and solve problems facing students, and that mindfulness varies from one student to another and can be developed through training and practice, and students are characterized by mental alertness during the learning process. They show attention while performing tasks and have creative thinking during the learning process, unlike students who have poor mental alertness, and they perform their tasks without focus and awareness and are unable to transfer what they have learned to their working life or when they interact with the problems they face. (Al-Shalawi, 2018, p.6)

(Langer2000) has identified the following dimensions of mindfulness:

1- Attentive distinction: it means introducing new ideas and developing them by students who are distinguished by mindfulness, in contrast to students who are not distinguished by alertness, as they depend on old ideas.

1. Openness to new: In this dimension, mentally alert students tend to love discovery and experimentation with new solutions to unfamiliar stimuli, while preferring actions that challenge them.

2. Orientation to the present: Mindfulness students tend to have a specific position, and prefer selective choices when performing work.

3. Awareness of different points of view: as they possess the ability to view the situation with different visions without stopping at an opinion, which enables him to be fully aware of the situation and take the appropriate decision. Quoted from (Al-Shalawi, 2018, p.6)

Previous studies: There is no experimental study for the secondary stage of the mindfulness variable according to the researchers' knowledge, while there was one study for the independent variable, which is:

Study (Al-Balooshi, 2017): The study aimed to investigate the effectiveness of teaching using strategies that stimulate the neural branching on the development of innovative and critical thinking among students of the eighth grade of basic education in the Sultanate of Oman, as the study used the quasi-experimental approach - the Torrance test was used for innovative thinking and testing of thinking A critic of Watson and Gelser, while the results revealed the emergence of statistically significant differences between the study groups in favor of the experimental group in the innovative thinking test, while there were no statistically significant differences for the critical thinking test.

III. Research procedures and requirements

To verify the procedures of the research hypothesis, the following procedures were followed:

First: Research methodology

To achieve the goal of the research, the two researchers used the experimental design with two equivalent groups (experimental and control), and the experimental group is the group whose students are exposed to the independent variable (strategies that stimulate nerve bifurcation), and the control group is the group whose students study in the usual way, and the mental alertness of the science subject is the dependent variable that is measured By means of a scale prepared by the two researchers for the purposes of the current research to identify the effectiveness of the independent variable in it.

Second: the research community and sample

The current research community is determined by the second-grade middle school students in the governmental day and middle schools in the Qadisiyah Governorate Center for the academic year (2019-2020), which number (27) schools according to the statistics of the Planning Directorate of the General Directorate of Qadisiyah Education, as the two researchers chose randomly (by lot) from Among the intermediate science schools for boys that contain three sections for the second intermediate grade, and two classes were chosen randomly (by lot) to represent Division (A) the experimental group and Division (B) the control group. In the results of the research, the number of students who failed the experiment was 4 students, 3 students in Division A and one student in Division B, thus the total number of students subject to the experiment became (64) students in the two groups, (32) students representing the experimental group and (32) students representing the control group.

Third: the equivalence of the two research groups

The two groups were equivalent in variables (age in months, intelligence, first-course grades for physics, and the scale of constructive perception toward physics, and previous information in physics) and the t-test was calculated where the results were not statistically significant, as in Table (1).

Table (1) t-test results for parity of the two study groups

Statistical significance at (0.05) level	T		Degree of freedom	standard deviation	Average Arithmetic	The number of students of the sample	group	Parity
	Tabular	Calculated						
Not statistically significant	2.01	0.530	62	3.82	168.75	32	Experimental	Age (in months)
				4.19	169.28	32	Control	
Not statistically significant	2.01	0.635	62	7.43	34.81	32	Experimental	Intelligence
				7.52	33.62	32	Control	
Not statistically significant	2.01	0.209	62	6.00	70.96	32	Experimental	Mindfulness
				4.71	71.25	32	Control	
Not statistically significant	2.01	1.034	62	1.76	11.18	32	Experimental	Previous information Parity
				2.08	10.68	32	Control	

Fourth: the search tool

The researchers prepared the mental alertness scale towards general subject matter (32 items) in its final form and verified their validity, stability, and application after the end of the experiment. The SPSS statistical program and Excel were used to calculate the t-test for two independent samples, chi-square, Pearson correlation coefficient, paragraph difficulty factor, coefficient Discrimination, efficacy of false substitutes and Cronbach's alpha coefficient.

Fifth: Preparing daily teaching plans

(40) teaching plans were prepared for each group (experimental and control) in light of the content of the four chapters of the physics book to be taught to students of the second intermediate grade for the academic year (2019-2020) and the behavioral purposes, as the experimental group plan included presenting the material and conducting experiments using strategies that stimulate branching As for Al-Asabi, the teaching plans for the control group, which were studied according to the regular method, contained the vocabulary of the daily

teaching plan, and to ensure the validity of the teaching plans, a sample of each of them was presented to a group of referees and specialists in physics and teaching methods, and it was modified in light of their opinions to take their form Final.

Fifth: The application of the experiment: The students of the experimental groups studied the science book for the second intermediate grade for eight weeks at two lessons per week using the strategies of neural bifurcation. The students of the control group studied the same subject with the same teacher, place and time, but in the usual way.

IV. Displaying and interpreting research results

First: Verify the null hypothesis, which states:

1. There is no statistically significant difference at a level of significance (0.05) between the mean scores of the experimental group students who will study using strategies that stimulate the nerve bifurcation and the average scores of the control group students who will study using the usual method of mental alertness.

2. In order to verify the validity of the hypothesis, the two researchers calculated the arithmetic mean and the standard deviation of the grades of the two groups (experimental and control) in the Dimensional Mindfulness Scale as in Table (2)

3. The results showed that there are statistically significant differences between the mean scores of the mindfulness scale between students of the experimental group and the students of the control group in favor of the students of the experimental group. The control group (71.14) with a standard deviation of (5.64), and by using the t-test for two independent samples, it became clear that the difference between them was statistically significant at a level of significance (0.05), since the calculated t value was (2.21) which is greater than the tabular value of t (2.01) with a degree of freedom (54) And as shown in Table (2)

Table (2) t-test results to find out the significance of the difference between the mean scores of the experimental and control groups in the mindfulness scale

The tabular t value	The computed t value	Degree of freedom	standard deviation	Average Arithmetic	numbers	the group
2.01	2.21	52	5.64	71.14	32	Control
			6.04	74.42	32	Experimental

In this way, the first null hypothesis is rejected and the alternative is accepted. This means that the students of the experimental group who studied using the strategies of neural bifurcation were superior to the control group students who studied in the traditional way in the mindfulness scale of science.

Interpretation of results

The results of the research indicate through Table No. (4) that the students of the experimental group who studied using the strategies of neural bifurcation outperformed the students of the control group who studied in the traditional way in the measure of mindfulness in the subject of science, because the strategies of neural bifurcation have the specificity of combining theoretical information with pictures. Which encourages students to develop their abilities to plan and organize knowledge and consciously follow it up for in-depth thinking processes during teaching, which was reflected in linking previous knowledge with new situations and decision-making and putting forward creative ideas to solve problems. Participation helped improve their performance of various activities through experimenting with new and unfamiliar solutions, which helped to give results that are indicative of the mindfulness scale when applied at the end of the experiment, as this study agreed with a study (Al-Balushi, 2017)

V. Conclusion

In the light of the results, the two researchers concluded the effectiveness of strategies that stimulate the nerve branching on mental alertness among second-grade intermediate students in the science subject.

Recommendations

And based on the results of the research and its conclusions, the researchers recommend: -

1. Adoption of neurostimulating strategies in teaching
2. Training teachers to use them through courses in which they participate in teaching science and physics subjects at the intermediate and secondary levels.

The proposals

To complete this research, the researchers suggest:

1. Conducting studies similar to the strategies of stimulating the nerve bifurcation in the teaching of other subjects and other study stages.
2. Conducting another study to find out the effectiveness of Stimulating Neural Branching Strategies in other variables, such as (visual thinking, strategic thinking, and mental abilities).

References

1. Ibrahim, Ahmed Sayed Mohamed and others (2014), The Effectiveness of a Program Based on Divergent Thinking Strategies for the Development of Creative Reading Comprehension Skills and Some Habits of Productive Mind among First-Grade Secondary Students, Journal of the College of Education, Volume 30, Issue 4, Pages (116-165)
2. Aburaiash, Hussain and ZahriehAbdelhak. (2007). Educational Psychology. Amman: House of the March for Publishing, Distribution and Printing

3. Al-Balushi, Khadija Bint Ahmed Salih and Sulaiman bin Muhammad (2017), The Effectiveness of Strategies to Stimulate Neural Bifurcation on the Development of Innovative and Critical Thinking among Eighth Grade Students of Basic Education in the Sultanate of Oman, for an urging published in the Journal of Educational and Psychological Studies - Sultan Qaboos University, Majd (11) Issue (2) pages (425-443)
4. Al-Rimawi, Mohamed Odeh and others. (2008). General Psychology i 3. Amman: House of the March for Publishing, Distribution and Printing.
5. Al-Shalawi, Ali Muhammad (2018), mental alertness and its relationship to self-efficacy among a sample of students of the College of Education in Al-Dawadmi, a research published in the Journal of Scientific Research in Education, Issue 19 of 2018, Al-Saffat (1-24).
6. Al-Abadi, Ali Lafta (2017) The Effectiveness of Teaching with a Brain-Based Learning Strategy in the Achievement of Physics and Lateral Thinking for Fifth-Grade Applied Preparatory Students, Unpublished Master Thesis, Al-Qadisiyah University
7. Muhammad, Hanan Mahmoud (2018), The effectiveness of using divergent thinking strategies in teaching biology to develop reflective thinking skills and self-regulation of learning among high school students, a research published in the Journal of Scientific Research in Education, Issue Nineteenth of the year 201, pages (123-158)
8. Muhammad, Shatha Abdul-Baqi, and Mustafa Muhammad Issa. (2011). Recent Trends in Cognitive Psychology. Amman: House of the March for Publishing, Distribution and Printing.
9. Mansouri, MishaalBadr Ahmad (2017), The Effectiveness of Divergent Thinking Strategies in the Development of Mathematics Achievement for Ninth Grade in the State of Kuwait, research published in the Journal of Educational Sciences, Issue Three, Pages (284-311)
10. Al-Nabhan, Muslim Muhammad Jasim (2017) The Effectiveness of Teaching Using the Strategies of Educational Pillars and Differentiated Education in the Achievement of Intermediate Second Grade Students in Physics and their Attitudes Toward it, Unpublished PhD thesis, Basra University
11. Yousef, Suleiman Abdel-Wahid (2011). Individual differences in cognitive mental processes, Amman, Dar Al-Masirah for Publishing and Distribution.