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Abstract:

The current study was carried out to investigate the effect of a Brain-based Learning Strategy on Developing The Reading Comprehension Skills of Faculty of Specific Education Prospective Teachers . The study adopted the two groups design, in which 60 students participated from the fourth year, Instructional technology department at the Faculty of Specific Education, Zagazig University during the academic year 2023/2024. They were instructed by applying the brain-based learning strategy. To obtain data, one instrument was used: a pre-post reading comprehension skills test.

Findings showed that the brain-based learning strategy improved students' reading comprehension skills. Thus, it is recommended to utilize brain-based learning as a new strategy in developing EFL students' reading comprehension skills.

Key words: Brain-based learning strategy- Reading comprehension skills.

أثر إستراتيجية قائمة على التعلم المستند للدماغ فى تنمية مهارات الفهم القرائى لدى الطلاب المعلمين بكلية التربية النوعية

الملخص:

أجريت الدراسة الحالية لمعرفة أثر استراتيجية التعلم المبني على الدماغ في تنمية مهارات الفهم القرائي لدى المعلمين المحتملين بكلية التربية النوعية، واعتمدت الدراسة على تصميم المجموعتين، حيث شارك فيهما ٦٠ طالباً من الفرقة الرابعة قسم تكنولوجيا التعليم بكلية التربية النوعية جامعة الزقازيق خلال العام الدراسي ٢٠٢٣/٢٠٢٤، تم تعليمهم من خلال تطبيق استراتيجية التعلم المبني على الدماغ، للحصول على البيانات تم استخدام أداة واحدة: اختبار مهارات الفهم القرائي القبلي والبعدي، وأظهرت النتائج أن استراتيجية التعلم المبني على الدماغ

حسنت قراءة الطلاب مهارات الفهم، وبالتالي يوصى باستخدام التعلم المبني على الدماغ كإستراتيجية جديدة في تطوير القراءة لدى طلاب اللغة الإنجليزية كلغة أجنبية مهارات الفهم.

الكلمات المفتاحية: استراتيجية التعلم المستند علي الدماغ – مهارات الفهم القرائي

Introduction

During last decade, new brain imaging techniques have allowed scientists to observe the brain while it is learning. The field of neuroscience has produced a body of empirical data that provides a new understanding of how the brain functions when it is learning, by exploring the neuroanatomical of cognitive functions (Craig, 2007). The brain was referred to in terms of a "triune brain," or a brain in three parts: the lower, middle, and upper sections. The lower brain is responsible for survival learning, while the middle and upper brain are responsible for higher-level thinking. Presently, brain theory focuses more on a holistic view of the brain. The theory emphasizes a more systems based approach wherein the whole is greater than the sum of its parts (Bonomo Ed, 2017).

To understand brain based, a study of brain cells is needed. The brain consists of many cells; one type, which is basic to learning, is the neuron. Learning tasks place when two neurons communicate. When the neuron gathers information, it grows appendages called dendrites Stevens & Goldberg (2001, cited in Clemons 2005) Following are some of the findings from brain research:

- Brains are specialized and are not equally good at everything.
- Brains are designed for fluctuations rather than constant attention.
- Emotions are critical to successful learning.
- Brains are poorly designed for rote learning.
- Multi_sensory input is desired by our brains.
- Learning involves the whole body.
- Each brain is unique.
- Threat, high anxiety, and a sense of helplessness impairs learning.
- Brain process both parts and wholes simultaneously.
- Brains are considered "plastic" and continue to develop throughout our lives.

According to (William, 1999) The principals of brain_based learning are:

1. The brain is a parallel processor. It can perform many functions simultaneously (Omstein& Thompson, 1984).
2. Learning engages the entire physiology. Anything that effects our physiological functioning affects our capacity to learn. Both externally and internally generated stimuli promote brain activity, resulting in increased neuronal connections or synapses.

3. The more extensive the web of these connections, the greater the brain' capacity in the future to take in information and skills, as well as integrate them and apply them appropriately to life's daily challenges (Diamond,1996).
4. The search for meaning is innate. The brain needs and automatically registers the familiar while simultaneously searching for and responding to novel stimuli (O'Keefe &Nadel, 1978).
5. The search for meaning occurs through "patterning". The brain functions as a pattern maker, pattern follower, a d pattern sensor. From early childhood, the brain establishes patterns based on both verbal and nonverbal message that come to us from parents and other authority figures.
6. Emotions are critical to pattering. The learner's feelings and attitudes will be involved in learning and will determine future learning.
7. Every brain simultaneously perceived and creates parts and wholes. In a healthy person, the two hemispheres are inextricably interactive, irrespective of whether a person is dealing with words, mathematics, music or art (Hart, 1984).
8. Learning involves both focused attention and peripheral perception. The brain recognizes stimuli from both its focused and its peripheral fields (Buzan, 1989).
9. Learning always involves conscious and unconscious processes. We remember our experiences, not just what we are told.
10. Each brain is unique. Because learning actually changes the structure of the brain, the more we learn, the more unique we become. The ultimate capacity of the brain for learning cannot be measured and will never be known, as that capacity increases will use (Caine&Caine, 1990).

Brain-based or brain compatible instruction requires instructors to understand how the brain works and thus, design instruction with that information in mind (Stevens & Goldberg, 2001). Teachers have been encouraged to combine knowledge about their profession with findings from brain research to create learner centered environments whether online or in physical classrooms. Applying brain research to instructional design can result in the practice of brain_ compatible instruction instead of brain antagonistic instruction (Stevens & Goldberg, 2001).

Reading comprehension is a complex process that requires the coordination of bottom-up word level skills and top-down meaning processing skills. Much research over the past several decades has focused on the decoding component of this equation, demonstrating strong correlations between low-level decoding skills and reading comprehension (e.g., Shankweiler, 1989). More recent research has

examined the unique contribution of higher-level skills to reading comprehension (e.g., Landi & Perfetti, 2007; Nation & Snowling, 1998; Yuill & Oakhill, 1991). The bulk of the research exploring both lower-level and higher-level contributions has been done with school age children, leaving the population of adults relatively ignored.

Literal comprehension, or reading on the lines, engages a student in the process of extracting information explicitly stated in a passage (Carnine et al.2010). This level of understanding depends upon learners' word level processing capacity, or their ability to exactly identify individual words and apprehend the meaning created by the combination of words into longer strings including propositions and sentences (Perfetti et at.2010). In line with this, Goff (2010) proposed that the components of literal comprehension include context, facts and sequence.

Inference making, the ability to infer information that is not explicitly stated in the text, is a crucial component of reading comprehension as reflected in several models of reading such as the Direct and Inferential Mediation (DIME) model (Cromley & Azevedo, 2007; Cromley et al., 2010), Structure Building Framework (Gernsbacher, 1991), Reading Systems framework (Perfetti & Stafura, 2014), and the Landscape Model (van den Broek et al., 1999).

Statement of the problem

The study problem could be stated as thus: The prospective teachers at the technological education department at faculty of Specific Education show poor mastery of the Reading Comprehension skills. Therefore, the current study attempted to develop those using a strategy based on Brain-Based Learning. This problem could be translated into the following general question:

What is the effect of a brain_ based strategy on developing literal and Inferential reading comprehension skills of the prospective teachers at Faculty of Specific Education, Zagazig University?

This main question could be divided into the following sub questions:

1. What are the reading comprehension skills literal and inferential reading comprehension skills needed for prospective teachers at the faculty of Specific Education Zagazig University?
2. What is the effect of utilizing a brain-based strategy on developing literal reading comprehension skills for prospective teachers?
3. What is the effect of utilizing a brain-based strategy on developing inferential reading comprehension skills for prospective teachers?
4. What are the features of a brain-based learning strategy to develop reading comprehension skills for the prospective teachers?

Significance of the Study

This study was supposed to be beneficial for both:

1. EFL learners: as it could help them to improve their reading comprehension skills.
2. EFL teachers: as it provides them with a brain-based strategy to develop their reading comprehension skills.
3. Researcher: This study may clear the way for other researchers to conduct further studies on developing other English Skills (Listening, Writing, and Speaking) through using a brain-based learning strategy.

5. Delimitations of the Study

This study was delimited to:

1. A group of EFL prospective teachers (instructional technology) at the faculty of Specific Education, Zagazig University.
2. Reading comprehension skills (literal and inferential levels).
3. The brain-based learning strategy to develop EFL reading comprehension skills for prospective teachers.

Table 1. The List of EFL Reading Comprehension Skills Judged valid by the Jury.

NO	Sub Skills	Degree of Importance		
	The prospective teachers at the Instructional Technology Department are supposed to:	**Very Importance**	**Importance**	**Less Importance**
1	identify the main idea in a text.			
2	recognize the sequence of events.			
3	determine major reading details.			
4	guess the meaning of unfamiliar words.			
5	recognize referents of words and pronouns.			
6	identify cause and effect relationships.			
7	make comparisons between different ideas.			
8	distinguish between the main idea and the supporting ideas.			
9	identify the author's purpose.			
10	underline main points.			

11	identify-author's tone.			

Hypotheses of the Study

The study hypotheses was as follow:

The current hypotheses of the study principally aim to explore the effect of comparing the mean scores of the students of the experimental group from the department of the instructional technology.

The study could be presented as follow:

1. There would be a statistically significant difference between the mean scores of the experimental group and the control group on the post-test of overall reading comprehension skills, favoring the experimental group.
2. There would be a statistically significant difference between the mean scores of the experimental group on the pre_post test of reading comprehension skills, favoring the post-test.
3. The brain-based learning strategy is effective in developing some reading comprehension skills (literal and inferential levels).

Method

Design of the Study

The study adopted the quasi-experimental design using two groups. The groups were divided into an experimental group and a control group. The experimental group prospective teachers were taught using brain-based learning strategy, while the control group prospective teachers received no other treatment except for the regular way of learning. Both groups were exposed to the pre- post reading test.

Participants and Settings of the Study

The participants of this study were intact classes selected from level four students, Faculty of Specific Education, Zagazig University. This was in the first term of the 2023-2024 academic year. The participants were divided into two groups: an experimental group and a control group, 30 students (prospective teacher) each.

Instruments of the study: The study employed the following instrument

1. A pre/post reading comprehension test (Appendix C) **Description of the Instruments**

- ***Test purpose***

The test was designed to evaluate the prospective teachers at Faculty of Specific Education reading comprehension skills.

- ***Sections of the Test***

The test consisted mainly of four sections, all of them measure prospective teachers' reading comprehension skills. The test is divided into eleven subskills; identifying the main idea in a text, recognizing the sequence of events, determining major reading details, guessing the meaning of unfamiliar words, recognizing referents of words and

pronouns, identifying cause and effect relationships, making comparisons between different ideas, distinguishing between the main idea and the supporting ideas, identifying the author's purpose, underlining main points, and identifying author's tone.

Procedures

The experimental participants of the study as mentioned earlier were 30 students from the Faculty of Specific Education, Zagazig University. The reason for choosing Level four students was that those students need an adequate level of reading comprehension. Thus, it was believed that developing their reading comprehension thinking skills would benefit them in studying their core courses as well as in their future career.

Results of the Study

It was hypothesized that: "There would be a statistically significant difference between the mean scores of the experimental group and that of the control group with the two-levels of Reading Comprehension Skills for both groups in their performance on the Reading Comprehension post test as a whole and its dimensions in favor of the experimental group". A t-test for independent samples was used as shown in Table 2. Table 2. Differences between experimental and control groups in the reading comprehension skills post-test

skills	Group	N	Mean	Std. Deviation	t	df	Sig.
Identify the main idea in a text	Experimental	30	1.933	1.461	0.88	58	0.930 not sig.
	Control	30	1.967	1.473			
Recognize the sequence of events	Experimental	30	1.633	1.425	0.182	58	0.857 not sig.
	Control	30	1.700	4.419			
Determine major reading details	Experimental	30	1.600	1.354	0.387	58	0.700 not sig.
	Control	30	1.733	1.311			
Guess the meaning of unfamiliar words	Experimental	30	1.967	1.425	0.186	58	0.853 not sig.
	Control	30	2.033	1.351			
Recognize referents of words and pronouns	Experimental	30	1.867	1.358	0.195	58	0.846 not sig.
	Control	30	1.933	1.284			
Identify cause and effect relationships	Experimental	30	1.533	1.358	0.291	58	0.772 not sig.
	Control	30	1.633	1.299			
Make comparisons	Experimental	30	1.867	1.431	0.091	58	0.928 not sig.
	Control	30	1.900	1.398			

between different ideas							
Distinguish between the main idea and the supporting ideas	Experimental	30	1.500	1.456	0.89	58	0.929 not sig.
	Control	30	1.533	1.431			
Identify the author's purpose	Experimental	30	1.433	1.381	0.094	58	0.925 not sig.
	Control	30	1.467	1.357			
Underline main points	Experimental	30	1.633	1.586	0.249	58	0.805 not sig.
	Control	30	1.733	1.529			
Identify-author's tone	Experimental	30	1.667	1.347	0.196	58	0.845 not sig.
	Control	30	1.733	1.285			
Total	Experimental	30	18.633	5.041	0.598	58	0.552 not sig.
	Control	30	19.367	4.437			

Table (2) indicates that *t*-values are not statistically significant at the 0.01 level. This means that there are not statistically differences between the mean scores of both experimental and control groups in the pre- reading comprehension test and its sub skills before conducting the experiment. Therefore, any differences on post administration of the reading test will be attributed to the experimental treatment.

Table (3): T-test results of the experimental and control groups on the post reading test

Skills		N	Mean	Std. Deviation	T	df	Sig.
identify the main idea in a text	control	30	2.033	0.889	-11.481	58	0.01
	experimental	30	4.367	0.669			
recognize the sequence of events	control	30	2.043	1.033	- 9.740	58	0.01
	experimental	30	4.367	0.808			
determine major reading details	control	30	1.633	0.718	-11.271	58	0.01
	experimental	30	4.100	0.959			
guess the meaning of unfamiliar words	control	30	1.433	0.897	-12.940	58	0.01
	experimental	30	4.233	0.774			
recognize referents of words and pronouns	control	30	1.500	0.820	-9.798	58	0.01
	experimental	30	3.900	1.061			
identify cause and effect	control	30	1.467	0.819	- 8.999	58	0.01
	experimenta	30	3.767	1.135			

relationships	l						
make comparisons between different ideas	control	30	1.533	0.776	-13.437	58	0.01
	experimental	30	4.200	0.761			
distinguish between the main idea and the supporting ideas	control	30	1.532	0.819	-14.403	58	0.01
	experimental	30	4.267	0.639			
identify the author's purpose	control	30	1.667	0.711	-14.432	58	0.01
	experimental	30	4.300	0.702			
underline main points	control	30	1.933	1.142	-9.128	58	0.01
	experimental	30	4.233	0.774			
identify-author's tone	control	30	1.533	0.776	-12.661	58	0.01
	experimental	30	4.167	0.834			
Total	control	30	18.233	3.136	-37.117	58	0.01
	experimental	30	45.767	2.582			

It's clear from table (3) that there is statistically significant difference between the mean scores of the experimental and control group at (0.01) level in favor of experimental group. This means that brain-based strategy was effective in enhancing students' reading skills. Thus, the first hypothesis can be confirmed. The researcher attributes these differences to the proposed strategy.

Table (4) t-test results of the experimental group in reading skills on the pre/post reading test

Skills	Group	N	Mean	Std. Deviation	T	df	Sig.
identify the main idea in a text	pre	30	1.933	1.461	- 9.016	29	0.01
	post	30	4.367	0.669			
recognize the sequence of events	pre	30	1.633	1.425	- 9.645	29	0.01
	post	30	4.367	0.808			
determine major reading details	pre	30	1.600	1.354	- 9.724	29	0.01
	post	30	4.100	0.959			
guess the meaning of unfamiliar words	pre	30	1.967	1.425	- 8.641	29	0.01
	post	30	4.233	0.774			
recognize referents of words and pronouns	pre	30	1.867	1.358	- 7.441	29	0.01
	post	30	3.900	1.061			
identify cause and	pre	30	1.533	1.358	- 6.817	29	0.01

effect relationships	post	30	3.767	1.135			
make comparisons between different ideas	pre	30	1.867	1.431	- 8.836	29	0.01
	post	30	4.200	0.761			
distinguish between the main idea and the supporting ideas	pre	30	1.500	1.456	- 9.942	29	0.01
	post	30	4.267	0.639			
identify the author's purpose	pre	30	1.433	1.381	-11.564	29	0.01
	post	30	4.300	0.702			
underline main points	pre	30	1.633	1.586	- 9.089	29	0.01
	post	30	4.233	0.774			
identify-author's tone	pre	30	1.667	1.347	- 9.724	29	0.01
	post	30	4.167	0.834			
Total	pre	30	18.633	5.041	- 26.279	29	0.01
	post	30	45.767	2.582			

Table (4) indicates that there is a statistically significant difference at the 0.01 level between the mean scores of the experimental group the pre and the post administration of the reading test regarding each sub-skill of reading comprehension skills. Therefore, the second hypothesis can be confirmed. The following figure shows the difference between the experimental group pre-post-performance in the reading test .

Table (5) Effect size of the brain based strategy in developing reading skills

Skills	η2	Effect size
identify the main idea in a text	**0.737**	**High**
recognize the sequence of events	**0.762**	**High**
determine major reading details	**0.765**	**High**
guess the meaning of unfamiliar words	0.720	**High**
recognize referents of words and pronouns	0.656	**High**
identify cause and effect relationships	0.615	**Middle**
make comparisons between different ideas	0.729	**High**
distinguish between the main idea and the supporting ideas	0.773	**High**
identify the author's purpose	0.822	**High**
underline main points	0.740	**High**
identify-author's tone	0.765	**High**
Total	0.959	**High**

Table (5) shows the effect size of the proposed strategy on the overall score for testing reading comprehension skills, where the values of (η 2) in each skill and the total score of the test ranged between (0.615, and 0.822).

Discussion

the proposed program has had appositive effect on developing reading comprehension skills of the experimental participants. This was an indication to the effect of the proposed strategy on developing the experimental participants' targeted skills. In addition, the experimental participants' overall development was satisfactory as no one failed. For this reason, the study joins and adds to the other studies that have investigated similar approaches for developing various aspects of reading comprehension skills. The obtained results of this study revealed that they are in line with those of many related studies and supported by a certain theoretical background that places more emphasis on the necessity of acquiring reading skills in a motivating environment.

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