



Enhancing Some Reading Fluency Skills of Third Year Preparatory Students through a Brain-Based Strategy

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Abstract

This study aimed at the development of brain –based strategy on the reading fluency skills among third year preparatory students. 32 third year preparatory students at EL-Shaheed Abd Allah Mohamed Abd Allah Preparatory School, Zagazig, El Sharkia Governorate, served as a experimental group, and 30 third year preparatory students at Sharweda Preparatory School, Zagazig, El Sharkia Governorate, served as a control group. The experimental group was taught using brain- based strategy. The control group was tough using the traditional method. A reading fluency test that tests reading rate, accuracy and prosody was administered to the students in the two groups as pre-posttests. In addition, a rubric for assessing prosody was used. The proposed program was taught over a period of 3 months (five periods per week). The results of the study showed that the experimental group students outperformed the control group students in reading fluency skills.

Keywords: brain-based strategy, reading fluency

1- Introduction

Reading is an important skill that may impact other academic areas. It allows for academic success as well as real world success. Because of the importance of reading, readers should shift between sources of information, elaborate meaning and strategies and check their interpretation. It is getting meaning from print (Kim, 2004: 34) Moreover, Ediger (2001) in his study asserted that reading is a fundamental and critical skill for students to achieve academic success.

Some researchers such as Fuchs (2007) described the essential reading skills that reading as a skill incorporates: (a) phonemic awareness. (b) phonics. (c) vocabulary development, (d) reading fluency and (e) reading comprehension. Phonemic awareness is the ability to create and identify individual sounds. Students demonstrate phonemic awareness when they recognize the sound each letter makes. Also they are able to complete rhyming sentences and compare different ways to combine sounds to make words. Once vocabulary is developed, the focus moves to reading to read with speed and also accuracy. In order to be a competent reader, each of five reading skills must be mustered to ascertain meaning from text.

Reading fluency is defined as the ability to decode and comprehend the text at the same time. It comprises of three component skills, or fluency indicators : (a) accuracy of word decoding, (b) automaticity of word recognition, (c) prosody of oral text reading. Accuracy of decoding refers to the ability to correctly generate a phonological representation of each word. (Miller &Schwaneflugel, 2006). Automaticity of word recognition refers to the ability to quickly recognize words automatically, with little cognitive effort of attention. Automaticity requires quick and accurate identification of individual words as well as speed and fluidity in reading connected text. While prosody of oral text reading refers to the naturalness of reading, or the ability to read with proper phrasing and expression, imbuing text with suitable volume, stress, pitch and intonation. Prosody is another indicator that reflects reader's ability to actively construct the meaning of the passage while reading (Rasiniski, 2000 and Wilger, 2008).

Reading fluency is important, because it facilitates the comprehension by providing a bridge between word recognition and comprehension. Fluent reading is the ability to read text smoothly and at a rate similar to speech. It occurs when the reader has repertoire of recognizable words and decoding skills that are automatic allowing the reader to focus on meaning. Fluently reading a text does not equate to understanding the text, but it does free up cognitive resources allowing the reader to allocate attention to the purpose of reading that is comprehension, instead of decoding (Scarborough, 2011; Khan, 2011).

In 2007, Ming asserted that the importance of reading fluency is evident in the light of an information processing approach to cognitive ability. Reading text is analogous to taking in information as readers take in or read words and phrases to constitute a fictional story or the account of an individual's life. Many students have fundamental deficits in their "up take process" and this is where problems with fluency are most apparent, as students read so slowly, missing words, disregarding punctuation and ultimately not comprehending the text.

Fluency is found in the Latin word "fluens", which means to flow. Therefore, most description of fluency based in the smooth and effortless flow of the reading process. Fluency is considered one of the principal blocks on which reading skills are built. It is the ability to recognize words rapidly and accurately so that reading appears effortless and automatic. This means that, the fluent reader must identify printed words within milliseconds and comprehend the message conveyed. Thus, reading fluency is a necessary dimension of proficient reading, out of its important distinct components; effortless or automatic reading, appropriate phrasing, and usage of prosodic features of language to appropriately and feeling he or she believes the author intended (Farah, 2006).

Reading fluency is the ability of the reader to have the following skills phonics and blending skills, word reading efficiency, word reading autonomy, text reading fluency, reading with comprehension, and reading with expression. Beginning with the skill of phonics and blending for any fluent reader he or she must be able to quickly identify letters and large units such as syllables, prefixes and suffixes and translate them into speech. Through practice some highly frequent

words, suffixes, and multilateral phonics patterns eventually undergo a process called utilization, in which the letter patterns come to be processed holistically rather than as slow sequential phonics patterns (Rasiniski, Blachowicz and Lems, 2006).

Reading fluency is important, as the fluent reader is multi-tasking during the reading process by processing the visual symbols, automatically attaching sounds at the lexical or sub-lexical level, activating the word meaning, processing syntactic understanding and combining these components for passage comprehension (Harris, 2010).

Moreover, Jeon (2012), considered fluency as a marker of automatized and well-coordinated sub-processes such as phonological decoding, word recognition and systematic parsing of reading, so it was a prerequisite for comprehension. This relationship between reading fluency and comprehension could be found in the automaticity theory and the verbal efficiency theory. Both theories assumed that attention and working memory, the two mental resources necessary for reading, are limited in capacity. As all automatized mental processes compete for these mental resources, an unskilled reader who is struggling with decoding, word recognition and syntactic parsing, would have fewer resources for higher level comprehension processes such as inference and comprehension monitoring. So reading fluency needed to be an integral part of any reading instruction.

Fluency is an essential and life-long skill that all students must master in order to be successful not only in academics, but also in everyday life (Lo, Cooke & Starling, 2011). Reading fluency is an essential component of reading, the on-going of its importance centers around the relation to the various stages of reading development, and how, and what aspects of reading fluency should be. It is the product of the initial development of accuracy and the subsequent development of automaticity in underlying sub-lexical processes, lexical processes, and their integration in single word reading and connected text. These include perceptual, phonological, orthographic and morphological processes at the letter, letter pattern and word levels, as well as semantic and syntactic processes at the word level and connected – text level (Kim, 2004).

Reading fluency is a key component in effective instruction because without good reading fluency students will not have comprehension. Poor readers spend time while reading to figure out the production of unknown words. For fluent readers do not expend mental energy on figuring out the production of unknown words. For fluent readers very little effort is used to decode words. Therefore the mental energy that the reader uses is for making sense of the text. (Zukowsk, 2009: 30).

Reading includes accuracy, and prosodic features. Each of these components work in conjunction with the others. Without one, reader does not display fluency. Because fluency is not meant to be the end goal in reading, it must be recognized as the bridge between decoding and comprehension. Thus, in order to create meaningful fluency instruction with automatic processing, it must include accuracy and prosody as well (Rasiniski, Blachowicz, and Lems, 2006).

The prosody or the text phrasing is essential to an understanding of oral reading fluency. The text phrasing referred to as chunking or the ability to phrase the text into syntactically appropriate and meaningful units of multiple words. This means that, the proficient reader must go beyond calling words and learn to group words together in meaningful sequences (Wilger, 2008).

Researchers, such as Richard, (2000), & Brenznitz. (2006), who support defining fluency in terms of prosodic features often list the following items as characteristics of fluent reading (1) lack of inappropriate hesitation, (2) appropriate phrase duration, (3) appropriate phrasing, (4) lengthening the final phrase vowel, and (5) use of pitch change at appropriate place. While the non-fluent reader often lacks a desire to read orally, reads slowly, engages in words-by-word reading, lacks appropriate phrasing and expression, doesn't observe punctuation cues, and fails to comprehend due to a slow pace of reading in addition to pausing at inappropriate spots.

Students' reading prosody can be measured only through observation of an oral reading of a connected text. During the reading of the text teacher can listen to the students' inflection, expression and phrase boundaries such as placing vocal emphasis on appropriate words, voice tone rose and fell at appropriate points in the text and the

use of punctuation to pause appropriately at phrase boundaries. Prosody in oral reading sound signal reading comprehension of the reader and enhance listening comprehension of the listener.

Table 1: NAEF oral Reading Fluency Scale, adapted from Rasiniki, Blachowcz&Lems (2006.P. 97)

Level 4	Readers primarily in larger, meaningful phrase groups. Although some regressions, repetitions, and deviations from the text may be present, these do not appear to detract from the overall structure of the story. Preservation of the author's syntax is consistent. Some or most of the story is read with expressive interpretation. Reads at an appropriate rate.
Level 3	Readers primarily in three – and four-word phrase group. Some smaller groupings may be present. However, the majority of phrasing seems appropriate and preserves the syntax of the author. Little or no expressive interpretation is present. Reader attempts to read expressively and some of the story is read with expression. Generally reads at an appropriate rate.
Level 2	Readers primarily in two –word phrase group some three and four-word groupings. Some word-by-word reading may be present. Word groupings may seem awkward and unrelated to the larger context of the sentence of passage. A small portion of the text is read with expressive interpretation. Reads significant section of the text excessively slowly or fast.
Level 1	Readers primarily word-by-word. Occasional two-or three word phrase may occur- but these are infrequent and / or they do not preserve meaningful syntax, Lacks expressive interpretation. Reads text excessively slowly.

Using this rating scale, a teacher can decide whether students need to learn better expression of more appropriate phrasing. The emphasis on expression through intonation, inflection, and pitch helps the students become more fluent. Teachers should select an appropriate texts by thinking about the reading level of their students, so that each can demonstrate his or her strength with oral reading. In other words, struggling readers might initially need texts that are shorter, with fewer challenging words. In this way, they can participate in the reading, demonstrating their oral reading along with the more

proficient peers and the text should be practiced several times to encourage more expression. (Rasinski, Blachowicz & Lems, 2006).

Table 2: Multidimensional Fluency Scale for Reading Prosody, adopted from Zutell and Rasinski (1991, P. 215).

Dimension	1	2	3	4
Expression	Reads with little expression or enthusiasm in voice. Reads words as if simply to get them out. Little sense of trying to make text sound like natural language. Tends to read in a quiet voice	Some expression. Begins to use voice to make text sound like natural language in some areas of the text, but not others. Focus remains largely on saying the words. Still reads in a quiet voice	Sounds like natural language throughout the better part of the passage. Occasionally slips into expressionless reading. Voice volume is generally appropriate throughout the text.	Reads with good expression and enthusiasm throughout the text. Sound like natural language. The reader is able to vary expression and volume to match his/her interpretation of the passage.
Phrasing	Monotonic with little sense of phrase boundaries, frequent words by word reading	Frequent two-and three-word phrases giving the impression of choppy reading, improper stress and intonation that fail to mark ends of sentences and clauses	Mixture of run-ons, mid-sentences pauses for breath, and possibly some choppiness, reasonable stress/intonation	Generally well phrased, mostly in clause and sentence unit, with adequate attention to expression
Smoothness	Frequent extended pauses, hesitations, false starts, sound-outs, repetitions, and/or multiple attempts	Several "rough spots" in text where extended pauses, hesitations, etc, are more frequent and disruptive	Occasional breaks in smoothness caused by difficulties with specific words and / or structure.	Generally smooth reading with some breaks, but word and structure difficulties are resolved quickly usually through self-correction
Face	Ready Slowly and laboriously	Reads moderately slowly	Reads with an uneven mixture of fast and slow pace	Consistently reads at a conversational pace, appropriate pace throughout reading

Each of the four dimensions of the Multidimensional. Fluency Scale consists of a 4-point rating system. Scores range from 4 to 16. Generally, scores below 8 indicate that fluency may be a concern. Scores of 8 or above indicate that the student is making good progress in fluency.

Automaticity refers to the processing of information or the application of a skill with a little conscious attention of effort. When any skill has reached automaticity, four basic elements are demonstrated: speed, accuracy, economy of effort, and flexibility. In contrast, the processing of information or execution of a task that has not become automatic requires significantly more conscious thought and thought in addition to considerably more of an individual's attention and working memory capacity. (Rasiniski, 2004).

Automatically is considered as bottom-up model that the reader uses perceptual information in the text to guide the word identification process. It holds the bottom-up perspective of reading as the reader learns to read as he or she progresses from reading parts of language such as letters to the whole meaning. Automatically also considered as a top-down perspective of reading as it is assumed that the information and experience that the reader brings with him/her as driving the meaning process rather than the print on the page. Because the reader uses his/he semantic memory in conjunction with the automatic word processing, both the bottom-up and the top-down perspectives are involved (Sargent, 2003).

Reading rate appeared to reflect students' ongoing development of automatically in their decoding which can be developed through practice and assisted readings. If teachers provide the kind of instruction in fluency that works, then fluency, comprehension, and rate will improve. Their goal may be to get from one point in the text to another as fast as possible, without understanding the nuances of meaning in the text. Similarly, teachers need to be cautious in using reading rate to assess English Language Learners (ELLS). Many ELLS can be deceptively fast and accurate in their reading, yet demonstrate little understanding of the text. Teachers cannot assume that such students are progressing well in reading based solely on their reading rate. Other issues such as vocabulary and language

proficiency may impede the students' growth in reading and require instructional intervention (Rasiniski, 2004).

Accuracy has traditionally been associated with reading fluency. As to become a fluent reader, one must be able to vacuum the words from the page almost automatically and within milliseconds. This means that reading word-by-word is the opposite of reading with fluency. As when readers stops to decode unknown words, thoughts dealing with that portion of the text are likely disrupted. Also when reading slows in such a way, the reader has difficulty making connections between ideas within a text (Sargent, 2003).

According to Rasiniski (2004), the importance of accuracy in reading had a rich history. Informal reading inventories, in use for decades, had used decoding word accuracy as one of their key benchmarks for marking reading achievement. Accuracy is determined by the percentage of words a reader can read correctly, it has been shown to be a valid measure of reading proficiency. The levels of accuracy in reading, reflect various levels of word decoding accuracy.

Independent Level	97- 100%
Instruction level	90 – 96%
Frustration level	< 90 %

Figure 1. Levels of performance for word decoding Accuracy, adopted from Rasiniski (2004, P. 4).

Brain-Based Learning (BBL) is an education which brings the learning system of brain forward. BBL is an instruction which takes into consideration how brain takes, processes, interprets information; makes connection, stores (like making connection, coding, constructing matrix), and remembers the messages (Greenleaf, 2003, 14). Brain-Based Learning is student centered learning that utilizes the whole brain and recognizes that not all students learn in the same way. It is also an active process where students are actively engaged in constructing their own knowledge in a variety of learning situations and contexts (Caine & Caine, 1994, 1997; Caine and Crowell, 1999).

According to Connell (2009), if any grand theory of learning is to emerge, it will do so from a combination of neuroscience, psychology, and education. This leads many researchers and scholars to try to define brain-based learning in the light of these factors. Since the 1990s, educators and psychologists such as Caine & Caine (1994), Goleman (1995) and Jensen (1995, 2000), have been forerunners in the brain-based learning movement.

Caine & Caine (1994, p3) argue that brain-based learning involves acknowledging the brain's rules for meaningful learning and organizing teaching with these rules in mind. Therefore, they define brain-based learning as "a student-centered learning that utilizes the whole brain and recognizes that not all students learn in the same way." This definition regards learning as an active process where students are actively engaged in constructing their own knowledge in a variety of learning situations and contexts.

As for Lankard (1996), brain-based learning can be regarded as a process that aims at helping students enhance their self –knowledge. In other words, it is a process that moves the learner from memorizing information to meaningful learning. This can be done through instruction that incorporates the principles of brain-based learning. Thus, students are led to comprehend and draw upon the vastness, complexity, and potential of the human brain.

Jensen (2005, p.76) defines brain-based learning as "the informed process of using a group of practical strategies that are driven by sound principles derived from brain research." Lopez & Alipoon (2000, p.29) agree with this definition by affirming that brain –based learning can be viewed as "an educational pedagogy that incorporates neuroscience concepts in its curricula and practices".

A different group of researchers demonstrate that brain-based learning is concerned with using available knowledge about where and how the brain functions during learning and then applying this knowledge to daily practices in the classroom (Connell ,2009). In other words, how this knowledge can be used to the advantage of pupils. This can be achieved by creating a learning experience that is

engaging and motivating, which then builds the networks of neurons allowing learning to take place.

The essential point of brain-based learning is meaningful learning. Mapping is required to maintain meaningful learning. Mapping means that new knowledge is linked to previous knowledge and the new knowledge is put into the current system (Keles & Çepni, 2006).

The phrases of brain-based learning are the ones that make learning meaningful and permanent. These phrases are relaxed alertness, orchestrated immersion, and active processing. Caine and Caine (1990) explain these:

Relaxed Alertness: It means to create the optimal emotional and social climate for learning. A challenging learning environment with minimal threats should be provided (Gulpinar, 2005). When a person is interested in something, s/he is open to learn, or vice versa. A relaxed and open brain can learn more easily. Findings show that some learning is influenced positively in a relaxed environment, but it is suppressed when threat and tiredness are felt (Caine, Caine, & Crowel, 1999).

2- Context of the Problem

In spite of the importance of the EFL reading fluency there is a lack in the EFL reading fluency skills among third year preparatory students.

Out of the researcher's experience as an EFL demonstrator, it has been noticed that third year preparatory students encounter difficulties in reading fluency. Most students are not fluent when they read aloud. Their reading is characterized by slow and laborious movement through the text and inappropriate application of prosodic features such as rhythm, intonation and expression. This inefficiency in EFL reading fluency of third year preparatory students may be due to back of oral reading practice to sum up, third year preparatory students lack EFL reading fluency skills, so the researcher proposes the brain based strategy for developing their reading fluency skills.

3- Statement of problem:

In spite of the importance of EFL reading fluency, third year preparatory students lack these skills, thus, there is a need for an effective strategy for developing some EFL reading fluency skills among third year preparatory students. So, the flowing study aimed at the development of a brain based strategy in developing some EFL reading fluency skills.

4- Questions of Study:

To face this problem, the present study answered the following questions:

- 1- What reading fluency skills required for EFL third year preparatory students?
- 2- What is the current level EFL third year preparatory students in reading fluency?
- 3- What are the features of a brain – based strategy?
- 4- What is the effectiveness of using a brain based strategy in developing reading fluency skill among EFL third year preparatory students?

5- Purpose of the study:

This study aimed at investigating the development of using brain – based strategy on the reading fluency of third year preparatory students.

6- Sample of the study:

The Participants were 32 third year preparatory students at EL-Shaheed Abd Allah Mohamed Abd Allah Preparatory School, Zagazig, El Sharkia Governorate, served as a experimental group, and 30 third year preparatory students at Sharweda Preparatory School, Zagazig, El Sharkia Governorate, served as a control group. The experimental group was taught using brain- based strategy. The control group was tough using the traditional method.

7- Tools of the study:

- 1- An EFL reading fluency skills checklist.
- 2- An EFL reading fluency test.

8- Hypotheses of the study:

Based on the theoretical background, the review of the previous studies and the general discussion, the study hypotheses could be formulated in as following:

- 1- There would be a statistically significant difference between the mean scores of the treatment group and those of the non-treatment group in the post administration of the reading fluency test in favor of the treatment group.
- 2- There would be a statistically significant difference between the mean scores of the treatment group in the pre and the post administrations of the reading fluency test in favor of the post administration.
- 3- Brain- based strategy would be effective in improving the treatment group students' reading fluency skills.

9- Procedures of the study:

In order to achieve the aims of the study, the following procedures will be adopted:

1. Reviewing relevant literature and previous studies related to reading fluency skills to determine the skills needed for this stage.
2. Reviewing the relevant literature and previous studies related to brain-based strategy to design the experiment.
3. Designing the instruments:
 - a- Preparing the reading fluency skills questionnaire.
 - b- Preparing reading fluency test.
 - c- Preparing a reading fluency scoring rubric.
4. Analyzing the content of the EFL course of the third grade at the preparatory stage to choose the reading topics.
5. Submitting the reading fluency test to a jury of EFL specialists to verify its contents and modify it to reach its final forms.
6. Selecting sample of third year preparatory school EFL students and dividing them into two group (the treatment group and non-treatment group).
7. Pre administering the reading fluency test to both groups.
8. Teaching the experimental treatment material to the treatment group.

9. Post administering the reading fluency test to both groups.
10. Comparing the results of both .
11. Collecting and analyzing data.
12. Providing the study conclusions, recommendations and suggestions for further research.

10- Findings of the Study:

This study aimed at examining the development of brain-based strategy on the reading fluency: rate, accuracy and prosody of third year preparatory stage students SPSS was used for analyzing the data of the post administration of the tool. One way ANOVA was used for comparing the means of the experimental group the control group in rate, accuracy and prosody.

Before presenting results of the study and analyzing them according to the hypotheses of the study, a comparison between the control and experiential groups on the pre-test was conducted using t-test for independent samples to examine if there were any statically significant differences between the two group before implementing the strategy.

The following table shows that there was no statistically significant difference between the control and experiential groups on the pre-test in overall reading fluency.

Table (3): T-test comparison of the control and the experimental group students' scores on overall reading fluency Pre-test.

Variable	Group	N	M	S.D.	D.F	T value	Sig.
Overall reading fluency	Experimental group	32	29.28	7.08	60	0.120	0.05
	Control group	30	29.47	4.72			

As shown in table (3), the T-value of overall reading fluency is (0.120) which is not statistically significant at 0.05 level hence, it may be safe to say that the differences between the two groups on the pre-test were not statistically significant. Thus, it can be concluded that the two groups were almost at the same level of reading fluency

performance and therefore, any variance between the two groups that may occur after implementing the strategy will be attributed to it.

Hypothesis one:

There is statistically significant difference between the mean scores of the experimental group exposed to the brain – based strategy and the control group receiving regular instruction on the post-test in overall reading fluency in favor of the experimental group.

In order to verify the validity of this hypothesis, a t-test for independent samples was used to compare the mean scores of the two groups on the post-test. The results of the t-test proved to be statistically consistent with the hypothesis. See table (4).

Table (4): T-test comparison of the control and the experimental group students' scores on overall reading fluency Post-test.

Group	N	M	S.D.	D.F	T value	Sig.	Effect size
Experimental	32	58.88	7.09	60	17.883	0.01	4.6
Control group	30	30.87	4.98				Large

The previous table shows that the estimated T value (17.883) was statistically significant at 0.01 level. Thus, it can be safety said that there was statistically significant difference between the experimental and control groups on the post-test in overall reading fluency in favor of the experimental group. Moreover, in order to make sure that the results obtained from the t-test were reliable and to measure the effectiveness of the brain bases strategy on students' reading fluency skills. Effect size was calculated according to the following formula suggested by Rosenthal and Rosnow (1991):

$$D = \frac{2T}{\sqrt{D.F.}}$$

Where D = the calculated effect size, T = the estimated, t= value and $\sqrt{D.F.}$ = The square root of degrees of freedom.

The referential framework for identifying the effect size of t-values is presented by Cohn (1988) as follows :

Effect size (d value)	Interpretation
From 0.2 till less than 0.5	Small
From 0.5 till less than 0.8	Medium
0.8 or more	Large

In Becker, 2002: 2)

As shown in table (4), the calculated effect size value of the brain- based strategy on the experimental group students' overall reading fluency was (4.6). Therefore, it can be said that the brain-based strategy had a very large effect on the experimental group students' overall oral reading fluency on the post-test as compared to that of the control group students receiving regular instruction.

T-test for independent samples were also conducted in order to compare the post-test mean scores of the experimental and control groups in overall reading accuracy, rate and prosody. The results of the t-test proved to be statistically consistent with the above stated hypothesis. Therefore, the first hypothesis was accepted. The following tables show this statistical significance.

Table (5): T-test comparison of the control and the experimental group students' scores on overall reading rate and accuracy Post-test.

Skills	Group	N	M	S.D.	D.F	T value	Sig.	Effect size
Total reading & accuracy	Experiential	32	21.53	2.51	60	11.789	0.01	3.04
	Control group	30	11.93	3.81				Large
Reading rate	Experiential	32	9.53	2.51	60	7.412	0.01	1.9
	Control group	30	4.90	2.40				Large
Reading accuracy	Experiential	32	12.00	0.00	60	10.004	0.01	2.6
	Control group	30	7.03	2.81				Large

Table (5) shows that there was a statistically significant 0.01 level between the mean scores overall reading rate and accuracy (t-value = 11.789), reading rate only (t value = 7.412) and the reading accuracy

only (t value = 10.004) in favour of the experimental group. In addition, the effect size value of overall rate and accuracy (3.04), reading rate only (1.9) and reading accuracy only (2.6) shown in the previous table reveal that the brain – based strategy had a large effect on the experimental group students' overall reading rate and accuracy on the post-test as compared to that of the control group receiving regular instruction.

Moreover, a t-test for independent samples was used to compare the mean scores of both the experimental and control groups on the post-test in overall reading prosody and it revealed a statistically significant difference at 0.01 level. See table (6).

Table (6): T-test comparison of the control and the experimental group students' scores on overall reading prosody Post-test.

Skills	Group	N	M	S.D	D. F	T value	Sig.	Effect size
Total reading & accuracy	Experientia 1	32	37.34	5.80	60	15.903	0.01	4.1
	Control group	30	18.93	2.65				Large

Table (6) shows that there was a statically significant difference at 0.01 level between the mean scores of the control and experimental groups on the post-test in overall reading prosody (t value = 15.903) in favor of the experimental group. In addition, the effect size value (4.1) shown in the above table reveals that the brain- based strategy had a very large effect on the experimental group students' overall reading prosody on the post – test as compared to that of the control group.

T-test results obtained through the previous tables indicated that there were statically significant difference between the post-test scores of both the experimental and control groups in overall reading fluency and its sub skills in favour of the experimental group. So, the first hypothesis was confirmed.

Hypothesis Two:

There are statistically significant differences between the mean scores of the experimental group on the pre-test and the post-test in overall reading fluency and its sub-skills (rate, accuracy and prosody) in favour of the post-test.

To determine the relative extent of change fostered by the implantation of the brain-based strategy from the pre-test to the post-test for the experimental group, a paired samples t-test was used. This t-test aimed at comparing the mean scores of the experimental group on the pre-test and the post-test in overall reading fluency see table (7).

Table (7): T-test comparison of the control and the experimental group students' scores on the pre-post overall reading fluency test.

Test	N	M	S.D.	D.F	T value	Sig.	Effect size
Pre-test	32	29.28	7.08	31	20.312	0.01	7.3
Post-test	32	58.88	7.09				Large

Table (7) indicates that there was a statistically significant at 0.01 level in overall reading fluency between mean scores of the experimental group the pre/post-test in favour of the post-test since the estimated t-value was (20.312).

Thus, it can be safely said that the t-test results proved to be statistically consistent with the hypothesis. In addition, the estimated effect size value (7.3) indicated that the brain-based strategy had a very large effect on the experimental group students' overall reading fluency skills on the post-test as compared to their overall reading on the pre-test.

Paired samples t-test results were also used prove that there were statistically significant differences between the mean scores of the experimental group on the pre-test and the post-test in overall reading rate, accuracy and prosody skills.

In other words, the results of the t-test proved to be statistically consistent with the above stated by hypothesis. The following table shows this statistical significance.

Table (8): T-test comparison of the control and the experimental group students' scores means on the Pre-post reading rate and accuracy test.

Skills	Test	N	M	S.D.	D.F	T value	Sig.	Effect size
Total reading & accuracy	Pre-test	32	12.78	3.63	31	14.175	0.01	5.1
	Post-test	32	21.53	2.51				Large
Reading rate	Pre- test	32	5.25	2.51	31	11.543	0.01	4.1
	Post-test	32	9.53	2.51				Large
Reading accuracy	Pre-test	32	7.53	2.59	31	9.760	0.01	3.5
	Post-test	32	12.00	0.00				Large

Table (8) shows that there are statistically significant differences at 0.01 level between the mean scores of the experimental group on the pre-test and the post-test in overall reading rate and accuracy together (t value = 14.175), the overall reading rate only (t value = 11.543) and the overall reading accuracy only (t value = 9.760) in favour of the post-test.

In addition, the effect size value of the overall reading rate and accuracy together (5.1), the overall reading rate only (4.1) and that of the overall reading accuracy (3.5) shown in the above table reveal that the brain-based strategy had a very large effect on the experimental group student's overall reading accuracy and rate together, overall reading rate only and also the overall oral reading accuracy only as shown in their performance on the post-test as compared to their overall reading rate and accuracy together, overall reading rate only and also their overall reading accuracy only on the pre-test.

Moreover, descriptive statistics were used to determine the mean reading rates of the experimental group students on both the pre-test and the post test so as to identify the baseline of the students' reading rates before the brain-based strategy and the reading rates they achieved after the brain-based strategy.

These results help in investigating the progress the experimental group students achieved in terms of reading rates of test three passages as well as recognize the mean total score of correct words the sample students read per minute. The following table shows these results.

Table (9): The pre/post reading of the experimental group students'

Passage	Rate	N	Range	Mini	Max.	Mean	Std. Deviation
Passage 1	Pre-rate	32	27	47	124	86.28=86 words	2269
	Post-rate	32	63	73	136	113.34=113 words	20.72
Passage 2	Pre-rate	32	55	24	79	49.81=50 words	15.33
	Post-rate	32	63	50	113	81.69=82 words	17.28
Passage 3	Pre-rate	32	105	13	118	67.38=67 words	26.29
	Post-rate	32	87	61	148	107.78=108 words	25.10

Table (9) shows that the mean number of the correct words the experimental group students and per minute in the first passage was about 86 CWRPM before the using of brain-based strategy while it was about 113 CWRPM after the using of bring-based strategy. The mean number of read per minute on the second passage was About 50 CWRPM before using brain-based strategy while, it was about 82 CWRPM after using a brain-based strategy. Besides the mean number of correct words the students read per minute in the third passage was about 67 CWRPM before using the brain-based strategy while, it was about 108 CWRPM after the using of brain-based strategy. The difference between the pre and post reading rates of the students shown in the above table reveals that the brain-based strategy had an effect on the experimental group students' reading rate. This also helps emphasize the validity of the previous hypothesis.

According to the above results, the mean number of correct words the students read per minute and within the limits of the study sample is about $113 + 108 = 303 \div 2 = 151.5 = 152$ CWRPM.

The descriptive statistics were also used to determine the mean number of the reading errors the experimental group students made while reading the three passages of both the pre and post –test so as to identify the baseline of the students reading errors before the brain-based strategy and the reading errors they made after the brain-based strategy. These results help investigate the progress the experimental group students achieved in terms of reading accuracy represented by decreasing the reading errors they made while reading the three passages as well as recognize the mean number of errors they made per minute while reading. The following table shows there results:

Table (10): The pre-post reading errors made by the experimental group students.

Passage	Rate	N	Range	Min i	Max.	Mean	Std. Deviation
Passage 1	Pre- rate	32	48	5	53	16.19=16 errors	9.230
	Post- rate	32	6	0	6	1.50=2 errors	1.626
Passage 2	Pre- rate	32	35	7	42	21.53=22 errors	8.316
	Post- rate	32	9	0	9	2.66 = 3 errors	1.771
Passage 3	Pre- rate	32	42	3	45	20.13=20errors	91.71
	Post- rate	32	4	0	4	0.94 = 1 errors	1.216

Table (10) shows that the mean number of reading errors the experimental group students made per minute in the first passage was about 16 errors before the brain-based strategy while, it was about 2 errors after the brain-based strategy. The mean number of reading errors they made per minute in the second passage was about 22 errors before the brain-based strategy.

Besides, the mean number of errors the students made per minute in third passage was about 20 errors before the brain-based strategy while, it was about 1 error after the brain-based strategy. The difference between the pre and past reading errors made by the experimental group students

shown in the above table reveals that the brain-based strategy had an effect on the experimental group students' reading accuracy in which the number of reading errors per minute decreased. This also helps emphasize the validity of the pervious hypothesis.

Moreover, paired samples t-test were also used to prove that there were statistically significant differences between the mean scores of the experimental group on the pre-test and the post-test in overall reading prosody skills.

In other words, the results of the t-test proved to be statistically consistent with the previous hypothesis. The following table shows this statistical significance.

Table (11): T-test comparison of the experimental group students' scores mean on pre/post reading prosody test.

Skills	Test	N	M	S.D	D.F	T value	Sig.	Effect size
Total reading prosody	Pre-test	32	16.50	4.61	31	17.533	0.001	6.3
	Post-test	32	37.34	5.80				

Table (11) shows that there are statistically significant differences at 0.01 level between the mean scores of the experimental group on the pre-test and the post-test in overall reading prosody (T value = 17.532) in favour of the post-test. In addition, the effect size value of the overall reading prosody (63) shown in the above table reveals that the brain-based strategy had a very large effect on the experimental group students' overall reading prosody as shown in their performance on the post-test as compared to their overall reading prosody on the pre-test.

Paired samples t-test results obtained through the pervious table indicated that there were statistically significant differences between mean scores of the experimental group on the pre-test and the post-test in overall oral reading fluency and its sub-skills (rate, accuracy and prosody) in favour of the post-test. So, the third hypothesis was confirmed.

11-Discussion of the results:

First of all as shown previously, the pre-test statistical analyses results indicated there were no significant differences between the experimental and control groups in overall reading fluency skills or in any of its sub-skills.

More importantly, the post-test results revealed that the brain-based strategy proved to be effective in developing the experimental group students' reading fluency skills. Taking into consideration that both the experimental and control group were almost at the same level in reading fluency on the pre-test, therefore, any variance that occurred between the two groups after the application of the brain-based strategy was attributed to it.

Thus, in the light of the post-test results of the present study, the research could safely state that the brain-based strategy was effective and accounted for

- (a) The significant differences between the experimental group in overall reading fluency and in each reading fluency sub-skills.
- (b) The significant differences between the mean scores attained by the experimental group before and after the treatment in favour of the post-test in overall reading fluency and in each one of its sub-skills.

The experimental group students showed an increase from 86 to 113 correct words read per minute (CWRPM) in the first passage, from 50 to 82 CWRPM in the second passage and from 67 to 108 CWRPM in the third passage. Besides, reading errors decreased from 16 to 2 errors per minute in the first passage. Consequently, it can be said that after the implementation of the brain-based strategy, the experimental group students demonstrated tangible progress in overall reading fluency and in reading rate, accuracy and prosody levels.

Factors that might have helped the experimental group students' progress in overall reading fluency performance and in each one of its sub-skills:

- (1) The explicit explanation, description and definition of reading fluency, its relevant elements and terms as well as its importance

the student received at the beginning of the program as a whole and as a preparation stage at the beginning of each lesson, played a very important role in making students understand clearly what they were going to do or in other words improved the students' meta fluency.

- (2) Presenting word walls of the most high frequency words at the very beginning of the program. High-frequency words are those words that appear over and over again in English language. These lists of words helped the students identify instantly these words as first step towards becoming fluent readers because of the wide spread presence of these words. The students' practice of these words in the first lesson made the process of recognizing the same words in the next lessons quickly and accurately in which they did not find any problems in pronouncing and understanding the meanings of these words. Consequently, this enabled them increase their or reading rates and also make few errors while reading.

Through modeling strategy, the researcher helped the students notice the way of reading each type of phrase in a way that improved their prosody skills.

- (3) Involving the students into (Reading – While – Listening) activity or tape assisted reading helped them compare carefully and successfully their way of reading with that of the fluent model on tape. The students enjoyed listening to a recorded version of the text. First they followed a long in their own copy of the text pointing to each word and the readers said it while they were listening to the recorder text. Students repeated this activity many times when they found some difficult or new words. The researcher also repeated it when she wanted to pay the students' attention towards the vocal tone of the speaker, how punctuation singles were read and how the speaker chunked the sentences into phases while reading. This activity was so useful in terms of avoiding making mistakes while reading especially pronunciation of words.

12-Conclusions:

Based on the results of this study, the following conclusions can be made:

- 1- There is evidence that using High Frequency words has an important role in developing the students' reading accuracy and automaticity as highlighted earlier by scholars like Ehri (1995), Torgesen and Hudson (2006), Wilger (2008), Mitchell (2009), Han and Chen (2010). Progress in reading beyond the beginning stages is depended on the oral language development in which reading word fluently is dependent of the brain-based strategy creates such familiarity. It makes the aspects of decoding or word recognition, meaning and pronunciation more fast and effortless through exposing students to read and practice these most high frequency words in text repeatedly.
- 2- There is as indication that introducing the program and also each lesson of the program with explicit instruction and definition of the relevant terms and elements of reading fluency is effective in helping students formulate a good background of what they are going to do and its benefits in addition to improving their reading accuracy as highlighted earlier by studies like NICHD (2000), Keehn (2003), Reutzel (2006), Simmons and Kamènu (2006), Mitchell (2009), Han and Chen (2010). In other words, explicit instruction is fundamental in improving the students' meta fluency as well as the way of monitoring both of their own fluency progress and their peers' progress.
- 3- Results of the present study highlighted the effect of using the strategy of brain-based strategy in fostering the reading fluency skills. Brain-based strategy, in the present study, made widespread gains in students' motivation, confidence and social relationships. This is consistent with the results of topping (1989), Semonick (2001), Hudson et al., (2005), Hopstak and Tracy (2006), Topping (a,b 2006), Winn et al., (2006), Neumann et al., (2008), Foust (2010).
- 4- Results of the present study proved the efficacy of "Reading-While- Listing" in enhancing the students' reading fluency through the repeated exposure to vocabulary assisted by tape. These results are in consistent with Chonisky (1978), Dowhower (1987),

Rasiniski (1990), Biemiller and Shany (1995), Marsoylia (1997), Tanguchi (1997), Langford (2000), Adams (2002), Osborn et al., (2003), Rasiniski (2003), Hudson (2005). Tagauchi et al., (2006). Winn et al., (2006) and Neumann et al., (2008).

13-Recommendations:

In the light of the present study significant results, the following recommendations are presented:

- 1- Attention should be focused on the necessity of developing oral reading fluency in all its areas – accuracy, rate and prosody – for truly effective reading instruction for all students. Explicit reading fluency based instruction should be incorporated into the language education programs in general and reading remedial programs in specific because of its significance in the development of reading proficiency.
- 2- EFL teachers are recommended to make use of and brain-based strategy into the context of the regular education curriculum to foster EFL learners' reading fluency skills. They should:
 - a- Apply the brain-based strategy which provide the students' with assistance while reading and with good models for reading rate, accuracy and expression.
 - b- Encourage prosody development through cueing phase boundaries and reading more literacy texts.
- 3- EFL teachers should increase time allotted for reading a loud in order to model the reading fluency and expose students' to more sophisticated text than they could read independently.
- 4- EFL teachers should check and monitor the level of students' reading fluency individually from time to time in order to diagnose points of weakness and thus identify the methods of suitable remedy so that readers can make sense of what they read.
- 5- EFL teachers should be aware of the tools and rating scales necessary for measuring and monitoring the students' reading fluency progress in all its components: rate, accuracy and prosody so as to be able to make progress reading file each student.

- 6- The present program can be adopted for teaching reading fluency skills to students' at the primary stage and other stages taking into considerations students' age, needs, interests and linguistic proficiency levels.

Suggestions for further researchers:

- 1- Further, research is needed to explore the effectiveness of other programs based on brain-based learning in developing students listening, writing and speaking skills.
- 2- While the present study provided support to the effectiveness of brain-based strategy in developing third year preparatory school students' reading fluency skills. Further research is needed to investigate the effectiveness of similar programs in developing students' vocabulary and grammar skills within the reading context.
- 3- Further research is needed to explore the effectiveness of other strategies in developing the students' reading fluency.
- 4- More studies are needed with different student populations in other areas with purpose of investigating the effectiveness of similar programs based on brain-based learning in developing the struggling readers' reading fluency skills.
- 5- More research is needed to propose and design more scales and rubrics for measuring the students' reading fluency with all its components in a way that is more relevant to be applied in EFL.

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ملخص الدراسة

تنمية مهارات طلاقة القراءة لدى طلاب الصف الثالث الاعدادى من خلال
استراتيجية قائمة على التعلم المستند إلى الدماغ

استهدفت الدراسة الحالية البحث فى تنمية مهارات طلاقة القراءة باستخدام استراتيجية قائمة على التعلم المستند إلى الدماغ لدى تلاميذ الصف الثالث الاعدادى . شارك طلاب الصف الثالث الاعدادى حيث شارك ٣٢ طالب وطالبة كمجموعة تجريبية من مدرسة الشهيد عبدالله محمد عبدالله الاعدادية ، الزقازيق ، محافظة الشرقية و ٣٠ طالب وطالبة كمجموعة ضابطة من مرسنة شرويدة الاعدادية ، الزقازيق ، محافظة الشرقية . طبق اختبار طلاقة القراءة على الطلاب قبليا وبعديا . أشارت نتائج الدراسة إلى تفوق طلاب المجموعة التجريبية على اقرانهم بالمجموعة الضابطة فى طلاقة القراءة من كل ابعادها (معدل القراءة ودقتها والقدرة على التعبير).