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The Effectiveness of Neural Branching Thinking Strategies in Improving English Reading Comprehension Skills among Omani 10th Graders

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ABSTRACT

The research aims to identify the effectiveness of using neural branching thinking strategies in developing reading comprehension skills for 10th-grade school students. To achieve this goal, the researchers adopted the quasi-experimental approach. The researchers used the reading comprehension skills test, in which the intervention lasted for 6 weeks. The research was conducted in Oman's first semester of the academic year 2024/2025. A sample of 70 students was divided into two groups: the experimental group, which was taught using the neural branching thinking strategies, numbered 35 students, and the control group, which was taught using the traditional method, numbered 35 students. The results showed the effectiveness of using neural branching thinking strategies in developing reading comprehension skills, and the experimental group revealed their capability to respond to reading comprehension skills questions. The research came out with several conclusions and recommendations.

1. Introduction

Reading plays a significant role in the cognitive and intellectual development of individuals throughout their lives. It fosters personal growth, enhances critical thinking skills, and broadens knowledge by exposing individuals to different perspectives and experiences. Reading contributes to personal development by creating a link between imagination, expanding vocabulary, and acquiring knowledge from one source to another. It also enhances empathy and understanding, allowing individuals to engage with various aspects of learning and becoming skilled readers in the future. The value of reading lies in its ability to stimulate the mind, spark creativity, and foster continuous professional growth in various sectors. By engaging with diverse texts, individuals are prompted to think deeply, analyze, evaluate, and delve into different viewpoints, enriching their cognitive processes and expanding their intellectual horizons. Furthermore, reading for pleasure is essential for mental well-being and personal enrichment. It offers a gateway to escape into different worlds, understand diverse perspectives, and discover new ideas. Not only does reading improve language skills and critical thinking abilities, but it also provides a platform for self-reflection and personal growth. It can be said that fostering a culture of reading, whether for academic purposes or leisure, is

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crucial for intellectual development, emotional well-being, and lifelong learning. It is an invaluable tool for expanding knowledge, enhancing creativity, and nurturing empathy and understanding in individuals (Aladini, 2023, Altun, 2023 and Aladini et al., 2025).

The Research Question

1. What is the effectiveness of Neural Branching Thinking Strategies in improving English reading comprehension skills among Omani 10th Graders?

The Study Hypotheses

1. There are no statistically significant differences at the level of ($\alpha \leq 0.05$) between the mean scores of the experimental group taught using neural branching thinking strategies and the control group taught using conventional methods in the reading comprehension test.

The Study Objectives

The study aims to:

1. Investigate the effectiveness of using neural branching thinking strategies in developing reading comprehension skills among 10th-grade students.
2. Compare the reading comprehension performance of students taught using neural branching thinking strategies with those taught using conventional methods.
3. Assess the extent to which neural branching thinking strategies help students respond to reading comprehension questions.

Concept of reading comprehension skills

The ability to understand text and its meaning is known as reading comprehension. To comprehend text, one should be able to "decode" it, understand what the symbols—words—mean when put together in a certain way. But even beyond that, on an even higher level, comprehension requires constructing meaning from the text and making it gel with what you already know. When learners understand something, they are making a leap beyond the surface and into the realm of the hidden structure, the realm of "What's this really about?" or "Why is this here?" or "How do these ideas connect with the other ideas one already knows?" or "If this is true, what else must be true?" (Ba-Omar et al., 2023; Sharm, et al. 2024 and Aladini, et al., 2023)

Al Udaini (2017) defines reading comprehension as an act of understanding written text. This is the cognitive process of making sense of what is written, from the level of the individual word to the level of the entire text. Comprehension occurs when the reader decodes the text, understands the relationships between words and sentences, and constructs a coherent representation of the text's meaning. And it happens when the reader integrates that understanding with his or her existing knowledge and experience. In this way, reading comprehension is a multifaceted skill that develops over time and is influenced by various factors.

Skills Involved in Reading Comprehension:

The skills that comprise reading comprehension can be broadly classified into:

1. **Phonological Awareness**: Hearing and manipulating the sounds of language.
   This is the foundation for beginning readers and continues to support comprehension throughout life.
2. **Decoding:** Translating written words into their spoken forms. Accurate and efficient decoding frees up cognitive resources for comprehension.
3. **Fluency**: Reading accurately, quickly, and with expression. Fluent reading allows for smoother processing and better comprehension.
4. **Vocabulary**: Understanding the meaning of words and phrases.
   This is essential for comprehending a text. It includes both recognizing words and understanding their nuances.

2. Comprehension Skills:

Direct rendering:

Grasping the precise content stated in the text. This entails recognizing the main concepts, recalling particulars, and understanding the arrangement of the discourse.

Indirect rendering:

Drawing inferences and making logical suppositions based on the text's information.

This requires reading more deeply and doing some light detective work to get the main idea.

Evaluative rendering:

Judging the text's effectiveness, assessing its credibility, and even pointing out its biases, if any. This requires the reader to be a critic (but in a good way!).

Summarization:

Rendering the text in a way that gets across all the main ideas (but not too many particulars). You need to understand the text pretty darn well to do this and not skip over any surface details in the text you've read.

Analysis:

This is like looking at a painting. You could also think of this as just one level below what happens in a laboratory.

Synthesis:

Like putting together a puzzle, this occurs in the mind of the reader as the reader sees and understands the different components and how they link.

Application:

This is like taking the formula you learned in math class and using it to solve word problems. You really have to understand the material to retain the knowledge well enough to use it in different situations.

3. Metacognitive Skills:

An effective reading strategy requires many elements to work together harmoniously.

Self-Monitoring:

The ability to monitor one's own understanding while reading and to adjust reading strategies as needed.

Planning:

The ability to plan a reading strategy before beginning to read, such as setting a purpose for reading or selecting appropriate strategies for different types of texts.

Self-Regulation:

The ability to control emotional and attentional resources during the act of reading and to stick with the reading task when it is difficult. Not one of these skills alone, or even combined, guarantees the reading outcome expected. Yet they are the primary predictors of the successful degree completion for a student (Mallipa et al., 2024).

Omani English language curriculum

The curriculum framework (2010) confirms that the curriculum for grades 8-10 also provides a framework of core materials, which can be extended in different ways in order to cater for early finishers. The self-study activities at the back of the skills book offer opportunities for further practice and reinforcement of the work done in particular units. Students who finish activities before others can be guided to extend their work in a particular area. Alternatively, students can be encouraged to work on these activities independently in their own time. There is an accompanying self-check answer key that students can use to check their own work. At Grades 8 to 12, the curriculum has more advanced linguistic skills and a broader knowledge of the linguistic systems of English. At this stage, the approach of English as a tool for communication and functional use is balanced with a more analytical mode of learning.

For Omani students to be competent users of English, the curriculum needs to address curriculum identifies appropriate target levels for each skill and aims to help students gain functional abilities in each area. The emphasis throughout the curriculum is on purposeful and meaningful teaching and learning, leading to the acquisition of skills, which can be transferred and used by learners with different backgrounds and interests in a variety of situations. Teachers and students are encouraged to see the goals of learning beyond the specific activities and content encountered in school. At the same time, it is realised that students can develop their language through activities that are enjoyable and pleasurable. In developing objectives for each skill area, an appropriate conceptual framework is employed to identify outcomes in terms of target performance.

Reading comprehension skills in the Omani curriculum framework

The curriculum framework for reading comprehension skills, designed by the Ministry

of Education (2010) are shown in the document as follows:

Specific Objectives of Reading skills for Grades 5 -10

Learners should be able to:

- Understand general meanings.
- Identify main points.
- Extract specific information.

Learners should be able to tackle extended texts with increasing confidence and understanding by:

- sight reading content words.
- getting meaning from texts, using a variety of top-down strategies.
- recognising and understanding punctuation.
- reading sentences (statements, questions, instructions, etc.)
- reading a variety of texts (descriptions, stories, processes, dialogues, etc.)
- reading a variety of non-linear texts (graphs, charts, maps, diagrams.)
- rereading and checking their own writing (spelling, punctuation, word
- selection.)
- fast reading.

Neural branching thinking strategies

Cardellichio and Field (1997) describe seven strategies to encourage neural branching: (1) hypothetical thinking strategy, (2) reversal thinking strategy, (3) application of different symbol systems strategy, (4) analogy strategy, (5) analysis of point of view strategy, (6) completion strategy, and (7) web analysis strategy.

Neural branching thinking strategies comprise seven dynamic strategies, some cognitive and some metacognitive. High flexibility of paths and control, and intentional modification thereof, contribute to cheerful (or positive) mathematics. Neural branching thinking strategies prepare students for life in which path flexibility is essential and in which one must constantly and intentionally modify one's habits of thought if one is to think complementarily; use various tools (symbolic and otherwise); network; or practice hypothetical, reverse, and viewpoint analysis (which are the life-situations analogues of the above-mentioned routines).

Reversal thinking, hypothetical thinking, and neural branching. Hypothetical thinking is the generation of "what if" questions, whereas reversal thinking means to think not only in the forward direction but also in the backward direction (Sternberg et al., 2008). Both types of thinking stimulate the formation of new connections (neural branching) between neurons in the brain. Activities that use the two types of thinking can be considered as two strategies that stimulate neural branching and cognitive development and learning in a more general sense. The following is a brief review of these two strategies and the reasons they are thought to be effective.

I. Hypothetical Thinking Strategy:

Thinking in hypothetical terms means considering possibilities that go beyond the immediate reality. This strategy forces learners to explore "what if" situations, to hypothesize and test their hypotheses. When we engage in counterfactual reasoning, we are attempting to represent alternative scenarios and outcomes, which is akin to modeling the kind of mental representations that speculators use to imagine future market behavior. Some researchers suggest that this might be why scientific thinking and creative thinking are so closely allied. If you want to find out what will happen next, you need first to imagine what might happen, then think through the different possible pathways.

II. Reversal Thinking Strategy:

Involves thinking in reverse. That is, the opposite of a stated idea or perspective is considered (de Bono, 1970). When learners use this strategy, they are probably first told what the predominant assumption is. Then, they are asked to consider the opposite. Obviously, which side is correct is not known at the outset. The effectiveness of reversal thinking must stem from its challenge to our assumptions. Reversal thinking works because it asks us to form new perspectives from old ones (Schoenfeld, 1991). When we ask learners to engage in debate from a side they might not necessarily agree with.

They might not only be integrating new knowledge but also restructuring old knowledge to accommodate the new perspectives.

III. Application of Different Symbol Systems Strategy:

Representing information in different symbol systems is a practical way to ensure that all students can access the content. One of the best things about this strategy is that it is inherently inclusive. If you visualize or diagram a concept, then you've created one form of representation. But what if you also put that same idea into a poem, or a series of equations, or used it as the basis for a short play or drama? Those are all different ways of representing the same set of ideas, the same fundamental concept, and thus, different "access points" to that idea. Combining those different forms of representation into and within your "accessing the content" strategies makes you a better teacher.

IV. Analogy Strategy:

Identifying the semblance between two or more different concepts or situations is what we call making an analogy. In this instance, we are using an analogy to explain the meaning of the word “analogy.” Of course, to use an analogy, you need to grasp the relationships among the different concepts or situations with which you are working, and you also need to understand the relationship among the different concepts or situations you are working within your cooler, thinking brain in order to identify an apparent similarity to enable you to use this framework to understand and learn in a new context. When you do this, you are in effect creating more, and more efficient, neural pathways, or connections, in your brains.

V. Analysis of Point of View Strategy:

This approach motivates students to assess a problem from many angles. When they consider multiple solutions, they are more likely to understand the problem and think critically about it. This kind of work not only develops empathy (understanding someone else's viewpoint) but also makes the learner reconfigure the problem in their head and come up with a new answer (neural understanding from research on social cognitive development). These switches in your head likely make more connections between neurons, which is good for learning.

(Perspective-taking is a good thing to understand, especially for social cognition and conflict resolution; it is linked to cognitive flexibility. Cognitive flexibility is good for all kinds of learning and for problem-solving in general.

VI. Completion Strategy:

The strategy of completion has learners working with incomplete information or tasks. This makes them work harder and more creatively, but not in a futile way, to discover solutions that they must fill themselves. In some cases, learners may have to fill in their own missing content. In others, they might be more engaged if they collectively tease out the important but not-yet-obvious content and ideas. For example, in a class discussion, I might ask, "What is the emergent (or important) idea that we're nearing?"

VII. Web Analysis Strategy:

This strategy involves portraying information as a network of interconnected concepts and relationships. Making concept maps or mind maps allows learners to visualize the structure of the information and key relationships between different ideas. The act of constructing and navigating these web-like structures lights up the brain and gets neurons firing, which is good for learning. And research backs up both the act of mapping and the web itself as beneficial for understanding. Studies have shown that if you can visualize something, you have a much better chance of remembering it. The harder you work to construct a visualization in your own mind, the better your chance of it being a lasting memory.

The seven strategies discussed previously are not direct measures of neural branching but are nevertheless strong pieces of evidence for the effectiveness of their stimulation of cognitive processes necessary for the formation of new neural connections in the brain. Several studies indicated that the neural branching strategies

operate via the same mechanisms of brain function that ensure learning and the establishment of new connections among the neurons in our brain, namely, neural plasticity.

Empirical studies

To the researcher's knowledge, no studies were conducted in Oman for the same purpose of the current studies. Yet, there are some relevant studies in the EFL context in Arab and Non-Arab countries as: Al Masri et al. (2021) who investigated the impact of divergent thinking strategies in developing reading comprehension skills among sixth-grade students in the English language. The results of this study indicated that divergent thinking strategies stimulate students' thinking through various questions and allow them to look at their familiar knowledge with a new vision, to produce and generate new ideas with creative features. Similarly, Indriyana and Kuswandono (2019) aimed at describing the teachers' strategies in developing HOTS in teaching reading skills. The researcher used a mixed method, as it is relevant to the methodology needed in this study. The participants were 22 English teachers at Junior High Schools in Yogyakarta. The data were collected through questionnaires, observations, and interviews. The findings indicated that the strategies by the teachers to develop HOTS were as follows: (1) asking divergent questions to the students, (2) using group discussions, (3) informing learning objectives to the students, (3) giving feedback to invite the students to review, refine, and improve understanding about learning materials, and (5) giving motivation to the students to think critically. The recommendation for further study is also discussed. In the same concern, Alshammari (2021) explored the effectiveness of teaching using cross thinking strategies in developing the competencies of reading comprehension for the fifth grade primary students, To achieve the goal of the research, he used the experimental approach - with a quasi-experimental design - based on the two groups (experimental and control), and for this the researcher built a list of reading comprehension competencies needed for fifth grade students, a guide for the teacher to implement strategies, and a test to measure reading comprehension competencies, and after verifying their validity And its stability, it was applied to a sample of (42) pupils from the fifth grade of primary school in Hail, by (22) pupils representing the experimental group, and (20) pupils representing the control group. The results indicated that cross-thinking strategies improve reading comprehension. Ibrahim and Mahmoud (2014) investigated divergent thinking strategies on improving reading comprehension skills for 10th graders. The results showed that the strategies apparently improved the reading comprehensions skills.

Method:

The study aims at exploring the effectiveness of neural branching thinking strategies in improving English reading comprehension skills among Omani 10th graders.

The intervention lasted for 6 weeks..

Research Design

This study employs a quasi-experimental design involving two groups; experimental and control.

Sampling:

The study was implemented in Sultan Taimor School in Salalah. The participants were 70 students from grade 10. Two classes were assigned randomly. Each class had 35 students. The control group was taught via the conventional method, and the experimental group was taught via the proposed method (neural branching thinking strategies). The sample was chosen purposefully and the classes were assigned randomly.

Instrumentation:

The tool of the study was a reading comprehension skills test.

Validity:

The test was shown to experts in the field of ELT, and it was modified based on their comments.

Pilot study:

A pilot study was conducted on a sample of 15 students from the same school, who were excluded from the main experiment.

Ease and Difficulty Coefficients: The ease and difficulty coefficients for the test were extracted, as illustrated in the following table (1):

Table 1: Coefficients of test.

Skill/item	Ease and difficult coefficient	Item evaluation/ease and difficult
Understand general meanings.	0.72	Easy
	0.54	Medium
	0.62	Easy
	0.45	Medium
- Identify main points.	0.65	Easy
	0.62	Easy
	0.60	Easy
	0.41	Medium
	0.45	Medium
- Extract specific information	0.70	Easy
	0.62	Easy
	0.61	Easy
	0.71	Easy
	0.47	Medium
	0.54	Medium

Table (2) shows that the items are acceptable in terms of ease and difficulty, with coefficients ranging between easy and moderately difficult items, making the test items suitable for application to the research group.

The test was administered to measure the reliability and validity of the tool and to determine the ease and difficulty coefficients:

- **Test Reliability:** To ensure the reliability of the test, the tool was applied to the pilot sample, and the results were analyzed using Cronbach's alpha formula. The reliability coefficient was determined as shown in the following table (2):

Table 2: The reliability coefficient.

Sample	Questions/skills	Items per skill	Total of the test questions based on the skills	Alpha Cronbach result
15	3	5	15	0.822

Table (1) shows the overall reliability coefficient of the test, which was 0.822, indicating a high level of reliability and stability of the test results.

- **Appropriate Test Duration:** For the appropriate duration for the test, calculations based on the time taken by the first three students and the last three students indicated that the average test duration was 50 minutes, with an additional five minutes for instructions, resulting in a total appropriate time of 55 minutes.

Preparation of the Program Based on neural branching thinking strategies:

The following procedures were undertaken:

1. **Determining the bases for Preparing the Program:**

Several bases were identified that were relied upon in the preparation of the current program. These bases are:

- **Reading Comprehension Skills**: These were determined by the Ministry of Education in Oman.
- **Eighth Grade Students:** They should be capable of comprehending to the reading skills and other English language skills.
- **Neural branching thinking strategies**: This is a modern approach that stimulates students' thinking and encourages them to consider multiple perspectives. It provides them with ample opportunities to practice and develop their critical and creative thinking skills, showcasing their various abilities and helping them achieve self-fulfillment.

2. **Revising the Program Components:**
The program components were prepared based on the previously identified foundations, including the following:

Program Objectives:
- **General Objective**s: The current program, based on neural branching thinking strategies, aims to develop reading comprehension skills among 10th-grade students in Oman.
- **Specific Objectives:** These are the skills upon which the test was developed, as determined by the Ministry within the theoretical framework as follows:
- Understand general meanings.
- Identify main points.
- Extract specific information.
- **Program Content**: The program includes 12 lessons over six weeks, including two lessons designated for pre- and post-testing. Each lesson lasts 45 minutes and covers reading passages from the eighth-grade curriculum, from Unit Two to Unit Seven. Each session includes the study title, objectives, content, and the neural branching thinking strategies used in the lesson, followed by an evaluative activity.
- **Teaching Strategies for the Program**: Since the program is based on neural branching thinking strategies, it incorporates various strategies such as:
  - Hypothetical Thinking Strategy
  - Reversal Thinking Strategy
  - Points of view Analysis Strategy
  - Analogy Strategy
- **Teaching Aids and Materials**: Supporting materials were used, including computers, projectors, relevant images and videos, a whiteboard, colored markers, and accompanying worksheets for each lesson.
- **Accompanying Activities**: Worksheets were utilized for different reading topics, along with exercises and presentations of various images to train students in expressing their ideas and engaging them in idea generation and discussion.
- **Assessment Methods**: The following assessment methods were implemented: pre- and formative assessments, self-assessment, peer assessment, and a portfolio including homework and a written test.

Presentation of the Program to Reviewers:
The program was presented to specialized reviewers to gather their opinions and feedback regarding its basis in neural branching thinking strategies and its suitability for tenth graders.. Some observations were noted and addressed, resulting in the final version of the program. Also, the program was implemented with a sample of 15 students to ensure its suitability to 10th graders.

Program implementation:
After confirming the validity of the test and the program's suitability for implementation, the program was applied to the experimental group, using the control group for research purposes. The program was implemented in the first semester of the 2024-2025 academic year, starting from October 1, 2024, to November 16, 2024, for a duration of six weeks.
- **Post-Testing:** The reading comprehension skills test was administered post-program, and the scores were recorded, analyzed, and compared between the control and experimental groups.

Data analysis and findings:
The study aims at exploring the effectiveness of neural branching thinking strategies-based learning in improving English reading comprehension skills among Omani 10th graders.The intervention lasted for 6 weeks. The results were as follows:
Findings of Question 1: ***Are there statistically significant differences at (α ≤ 0.05) in the total average score of the post application of the reading comprehension skills test between the experimental group and the control group?*** To answer this question, the researchers tested its' hypothesis; There are no statistically significant differences at ($\alpha \leq 0.05$) in the total average score of the post application of the reading comprehension test between the experimental group and the control group by using Mann-Whitney Test. Results are shown in table (3).

Table (3): Mann-Whitney Test results of the experimental and control group in the post application of the reading comprehension test.

Level	Group	N	Mean Rank	Sum of Ranks	Z	Sig. value	Sig. level	r_{prp}
Total	Experimental	35	49.49	1729.00	-5.797	0.000	sig. at0.01	0.803
	Control	35	21.41	752.00				

* The critical value Z at ($\alpha \leq 0.05$) equal (1.95)
** The critical value Z at ($\alpha \leq 0.01$) equal (2.56)

Table (3) revealed that significant value was less than (0.01), and (z) the calculated was more than (z) the tabulated. This indicates that there were statistically significant differences at ($\alpha = 0.01$) between the experimental group and Control group in relation to the English reading comprehension skills. These differences were in favor of the experimental group. The average score of the reading post-test in the experimental group was (49.49), and the control group got a mean of (21.41). This indicates that the experimental group performed better than the control group in the post application of the reading test.

Effect size: To show the extent of a program based using neural branching thinking strategies effect on the experimental group achievement in the English reading comprehension skills, the study applied the "Effect Size" technique (Safi, 2017, p. 300). The researchers computed " r_{prp}" using the following formula:

$$r_{prp} = \frac{2(MR_1 - MR_2)}{n_1 + n_2}$$

To determine the size of the effect, the researchers compared the value with the rely on reference the following table

Table (4): Level of size effect by (r_{prp})

	Small	Medium	Large
r_{prp}	0.4 and less	$0.4 \leq r_{prp} < 0.7$	0.7 and more

Table (5): The value ($\boldsymbol{r\ prp}$)

	r_{prp}	Effect level
Total	0.802	Large

The values in table (3) indicate that there is a large effect size of employing neural branching thinking strategies on the development of the experimental group's English reading comprehension skills. Table 3 reveals statistically significant differences ($\alpha \leq 0.05$) in the scores between the experimental and control groups following the intervention. This supports the study's hypothesis, indicating that the neural branching thinking strategies significantly improved students' reading comprehension skills. The Effect size was large.

These findings align with existing literature emphasizing the importance of developing reading comprehension skills. Several studies highlight the positive feedback loop where students, recognizing their ability to connect and integrate reading comprehension texts concepts with prior knowledge, experience increased confidence and a stronger inclination towards studying English language. The observed superiority of the experimental group in responding to the reading comprehension questions provides empirical evidence supporting this theoretical framework, demonstrating that fostering neural branching through targeted strategies can significantly enhance students' reading comprehension skills. The large effect size suggests a practically significant impact, indicating the potential for widespread application of these strategies in teaching EFL learners.

Discussion

This empirical study investigated the effectiveness of neural branching thinking strategies in enhancing English reading

comprehension among 10th-grade students in Oman. The findings demonstrated compelling evidence of the positive impact of these strategies on learners' reading performance. Specifically, the experimental group, which received instruction using neural branching strategies, outperformed the control group, which was taught using conventional methods. This suggests that neural branching thinking facilitates more profound cognitive engagement with reading tasks.

The strategies rooted in neural branching are not merely supplementary techniques; they represent essential tools for fostering creativity, critical thinking, and adaptive learning—skills highly valued in English as a Foreign Language (EFL) education. By promoting the development of flexible thought patterns, neural branching supports students in making meaningful connections between new texts and their existing knowledge, thus deepening comprehension.

However, despite the promising results, several persistent challenges should be acknowledged. One significant issue lies in the limited capacity of current educational systems to assess neural branching thinking strategies reliably and validly. The cognitive processes behind branching—how learners generate and connect ideas—remain relatively underexplored in both cognitive neuroscience and educational assessment. As a result, the integration of these strategies into mainstream instruction is often hindered by a lack of robust assessment tools and a mismatch with standardized testing frameworks that dominate many educational contexts.

Nevertheless, the observed improvements in reading comprehension can be partially attributed to the cognitive stimulation these strategies provide. Neural branching encourages multiple pathways of understanding, allowing students to approach texts from diverse perspectives (Sternberg, 2019). It effectively bridges prior knowledge with new content, enabling a richer learning experience. Teachers also reported that students became more metacognitively aware of their learning processes, which aligns with findings from Aladini et al. (2025), Indriyana and Kuswandono (2019), and Al Masri et al. (2021), who emphasized the role of such strategies in promoting active, self-regulated learning.

Moreover, when students were encouraged to "branch" during reading—revisiting texts to map out ideas—they not only demonstrated better comprehension but also showed enhanced problem-solving capabilities. This reinforces the idea that reading is not a linear process but a dynamic, interconnected cognitive activity that can be optimized through thoughtful instructional strategies.

Conclusion

The results of this study clearly indicate that neural branching thinking strategies have a statistically significant and pedagogically meaningful impact on the reading comprehension skills of 10th-grade EFL students in Oman. The students who received instruction incorporating neural branching strategies outperformed their peers in the control group, demonstrating that such approaches effectively enhance comprehension through cognitive engagement, connection-building, and metacognitive reflection.

Neural branching thinking promotes not only better text understanding but also cultivates essential cognitive abilities such as creativity, idea generation, problem-solving, and adaptive thinking. These abilities are indispensable in 21st-century classrooms, particularly in EFL contexts, where learners should often make sense of unfamiliar language, structures, and content. By encouraging students to mentally "branch" ideas from one text to multiple meanings or contexts, this strategy stimulates multiple neural pathways, improving memory retention and comprehension depth.

Furthermore, the study's findings emphasize the growing need for teaching strategies that align with students' cognitive processes. The evidence supports the inclusion of neural branching within inclusive and student-centered learning environments, which aim to respect and accommodate learners' diverse thinking styles, learning needs, and language backgrounds.

Despite the effectiveness observed, challenges remain—particularly the limited understanding and assessment of neural branching in formal

educational contexts. Reliable assessment tools and well-articulated pedagogical frameworks for implementing these strategies are still under development. Additionally, teachers may require further training and resources to apply these methods effectively and consistently in diverse classrooms.

This study contributes to a growing body of literature supporting cognitive-based instructional strategies and their transformative potential in enhancing language education. It demonstrates that integrating thinking strategies grounded in cognitive science not only improves academic performance but also encourages students to become reflective and independent learners. Long-term implementation and further exploration could yield even more significant benefits across a broader range of learning contexts.

Recommendations

In light of the findings of this study, several key recommendations are proposed to support the integration and effective application of neural branching thinking strategies in EFL education. First, it is essential to incorporate these strategies into the EFL reading curriculum at both intermediate and secondary levels. Doing so will not only improve students' comprehension skills but also foster cognitive flexibility and deeper engagement with texts. Second, professional development opportunities should be provided to EFL teachers through targeted workshops and training programs that focus on the practical implementation of neural branching strategies. Empowering educators with the right tools and pedagogical understanding is critical for sustained and meaningful classroom application.

Third, there is a pressing need to develop and validate robust assessment tools that can accurately evaluate students' use of neural branching thinking in real classroom contexts. Without reliable measures, it becomes difficult to assess the true impact and refine the strategy further. Fourth, further research is recommended to explore the long-term effects of these strategies, particularly their influence on other language skills such as writing, speaking, and vocabulary acquisition. These investigations can also examine how the strategies function across different age groups and linguistic backgrounds.

Additionally, neural branching thinking should be positioned as a part of a broader approach to differentiated and inclusive instruction. Given its flexibility and learner-centered nature, it can be highly effective in supporting students with diverse learning needs, including those with learning difficulties or different cognitive styles. Finally, educators and curriculum designers are encouraged to explore the cross-disciplinary potential of neural branching strategies. While this study focused on EFL, the underlying cognitive benefits suggest valuable applications in subjects like science, mathematics, and social studies—areas where critical thinking, pattern recognition, and comprehension are equally essential. Together, these recommendations can help establish neural branching thinking as a powerful and sustainable element in modern teaching and learning.

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فاعلية استراتيجيات التفكير المتشعب في تطوير مهارات الفهم القرائي في اللغة الانجليزية لطلاب الصف العاشر في سلطنة عمان

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الملخص

هدفت الدراسة إلى معرفة فعالية استخدام استراتيجيات التفكير المتشعب في تطوير مهارات الفهم القرائي لدى طلاب الصف العاشر. ولتحقيق هذا الهدف، اتبع الباحث المنهج شبه التجريبي. استخدم الباحث أداة اختبار مهارات الفهم القرائي. استمر التدخّل لمدة 6 أسابيع. تم تطبيق الدراسة في الفصل الدراسي الأول من العام الأكاديمي 2025/2024 في سلطنة عمان. تكونت عينة الدراسة من (70) طالبًا تم تقسيمهم إلى مجموعتين: المجموعة التجريبية، التي تم تدريسها باستخدام استراتيجيات التفكير المتشعب، وعددها (35) طالبًا، والمجموعة الضابطة، التي تم تدريسها باستخدام الطريقة التقليدية، وعددها (35) طالبًا. أظهرت نتائج الدراسة فعالية استخدام استراتيجيات التفكير المتشعب في تطوير مهارات الفهم القرائي، وأن طلاب المجموعة التجريبية الذين درسوا باستخدام استراتيجيات التفكير المتشعب تمكنوا من الإجابة عن أسئلة مهارات الفهم القرائي.

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