

EFFECTIVENESS OF USING MIND MAPPING TECHNIQUES TO IMPROVE TWELFTH-GRADERS' READING COMPREHENSION SKILLS

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ARTICLE INFO	ABSTRACT
Received: 26/5/2022	Educators have currently tried to renovate teaching methodology to meet the demand of the current situations in English language teaching and learning. This study investigated the improvement of implementing mind mapping techniques to improve reading comprehension skills. The study was conducted through a quasi-experimental approach with two classes at Pham Ngu Lao high school (12A1 functioned as the control group and 12A2 as the experimental group), in which the participants were given before-and-after reading comprehension tests to measure the practicality of using mind mapping techniques in improving reading comprehension skills. The results indicated that while there was a progress in reading comprehension skills of the students in the experimental group, hardly did the improvement occur among the twelfth-graders in the control group. The outcomes benefit the educational administrators to renovate the policies concerning the application of mind mapping techniques. Teachers can recognize the advantageous practicality of using mind mapping techniques to improve their efficiency in teaching. High school learners can consult the findings to adjust their learning styles. Additionally, future researchers can confer these results as the references to enrich their own studies.
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TÍNH HIỆU QUẢ CỦA VIỆC SỬ DỤNG THỦ THUẬT SƠ ĐỒ TƯ DUY TRONG VIỆC PHÁT TRIỂN KỸ NĂNG ĐỌC HIỂU CỦA HỌC SINH LỚP 12

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THÔNG TIN BÀI BÁO	TÓM TẮT
Ngày nhận bài: 26/5/2022	Các nhà giáo dục hiện đang cố gắng đổi mới phương pháp dạy học để đáp ứng nhu cầu của tình hình hiện nay trong dạy học tiếng Anh. Nghiên cứu này đã khảo sát việc thực hiện các kỹ thuật lập bản đồ tư duy để cải thiện kỹ năng đọc hiểu. Nghiên cứu được thực hiện thông qua phương pháp bán thực nghiệm với hai lớp tại trường Trung học phổ thông Phạm Ngũ Lão (lớp 12A1 là nhóm đối chứng và 12A2 là nhóm thực nghiệm), trong đó, các học sinh được làm bài kiểm tra đọc hiểu trước và sau để đo lường tính thực tiễn của việc sử dụng kỹ thuật sơ đồ tư duy trong việc nâng cao kỹ năng đọc hiểu. Kết quả chỉ ra rằng mặc dù có sự tiến bộ về kỹ năng đọc hiểu của học sinh trong nhóm thực nghiệm, nhưng hầu như không có sự cải thiện ở nhóm đối chứng. Kết quả mang lại lợi ích cho các nhà quản lý giáo dục trong việc đổi mới các chính sách liên quan đến việc áp dụng các kỹ thuật lập bản đồ tư duy. Giáo viên nhận thấy lợi ích thực tế của việc sử dụng kỹ thuật sơ đồ tư duy để nâng cao hiệu quả trong giảng dạy. Học sinh trung học tham khảo những phát hiện của nghiên cứu để điều chỉnh cách học của mình. Ngoài ra, các nhà nghiên cứu trong tương lai có thể dùng những kết quả này là tài liệu tham khảo để làm phong phú thêm các nghiên cứu của riêng họ.
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1. Introduction

Reading is fundamental in providing human beings with unlimited accumulated knowledge and wisdom transferred among and from one generation to another. It is one of the primary gateways to educate people with hands-on experience and practical knowledge. The ultimate purpose of reading is to construct meaning from written pieces [1], [2]. Understanding the nature of reading comprehension is to appreciate its complexity [3, p. 23]. The crucial thought organization of reading tends to hinder readers from how complex comprehension it is which can pose many obstacles for novice readers, particularly high school pupils. It is worth considering cognitive strategy which refers to how a reader seeks to understand what to read, how to make the reading meaningful, and what to do if he/she encounters difficulties or problems [4]. Besides, cognitive strategy addresses how to learn, how to remember, and how to convey ideas reflexively and analytically [2]. As cognitive strategies are considered as internal processes, they can be utilized for various activities requiring cognitive involvement, including (a) cognitive strategies in reading comprehension, (b) cognitive strategies in learning, (c) cognitive strategies in recall, and (d) cognitive strategies in thinking or solving problems [2]. Among the four micro-skills in learning English as a Foreign Language (EFL), namely, listening, reading, writing, and speaking, reading is considered one of the most important skills for learners [2], [5], [6] because it helps learners develop other related skills like grammar, vocabulary, and writing. The difficulties and obstacles about the challenges of teaching and learning reading skills have been mentioned in many studies [5], [7], [8]. Reading is a lifelong skill to be used both at school and throughout life. According to [8], reading is a basic life skill. It is a cornerstone for a child's success in a school and, indeed, throughout life. Without the ability to read well, opportunities for personal fulfillment and job success will inevitably be lost.

In teaching reading comprehension, teachers need to direct student activities to get to know and use the correct reading strategy. They can be models in reading comprehension strategies by instructing their learners in terms of predicting, activating prior knowledge, making connections, setting purpose for reading, and making inferences. By doing so, internal comprehension processes are made explicit, and learners activate metacognitive knowledge of how and how to implement particular strategies for the sake of comprehending a text and fulfilling tasks assigned. Previous studies (e.g., [7] - [10]) have shown that mind mapping techniques have a far-reaching consequence on learners' cognition in terms of language learning in general, reading comprehension in particular. Although the effectiveness of applying mind map techniques in improving reading comprehension skills has been conducted and acknowledged in educational aspect, perspectives and findings of the previous studies [11] - [13] tend to base on experience of researchers' observation or description, which might not reflect the liability in evaluating the cutting-edge value and nature of using mind map technique to develop learners' reading comprehension skills. In Vietnam, common testing and assessment formats are greatly based on the multiple-choice questions, which basically centralizes to develop reading comprehension skills. There is a real demand of using effective pedagogical methodology to help learners better at reading comprehension skills. As a result, the purpose of this study was to evaluate the effectiveness of using mind map technique to improve high school learners' reading comprehension skills by an action research. Actually, mind mapping techniques are usually examined by descriptive survey questionnaires, and usually at the tertiary levels [14] - [16], this study was conducted at Pham Ngu Lao high school with grade 12 to highlight the practicality of the mind mapping techniques. Specifically, the study attempted to answer the following questions:

1. What is the effectiveness of using mind mapping technique to improve the twelfth-graders' reading comprehension skills at Pham Ngu Lao high school?
2. What is the twelfth-graders' competence in the post-test reading comprehension skills of the experimental group?

The researcher wanted to emphasize the need for improving cognitive reading comprehension skills by exploiting new teaching techniques. The study was conducted to benefit those who need to employ mind map technique as a resourceful pedagogical practice to enhance their learners' cognitive and metacognitive ability in general, and to sharpen their reading comprehension skills in particular.

2. Materials and Methods

2.1. Research design

The research was done through a quasi-experimental approach, being designed to find out from a cross-section of 90 twelfth-graders at Pham Ngu Lao high school for their perspectives on the implementation of mind mapping techniques to improve their reading comprehension skills. A quasi-experimental approach was implemented to correlate and determine whether mind mapping techniques were really effective in developing twelfth-graders' reading comprehension skills. 90 grade 12 in two classes were selected as respondents, and the results of the pre-test and post-test study design of the experimental group were correlated to compared with that of the controlled one. Based on the findings, the researcher came up with final confirmation of whether mind mapping techniques were effective or not in improving reading comprehension skills of twelfth-graders.

2.2. Participants

After gaining the permission for conducting the action research from Pham Ngu Lao school administrators, together with of twelfth-graders' consent to participate in this study, the researcher selected the total samples of 90 twelfth-graders in K12A1 and K12A2 at Pham Ngu Lao high school in the second term of the academic year 2021-2022 by the designated choice. Particularly, 45 students in K12A1 were appointed as the controlled group, and 45 twelfth-graders in K12A2 were destined as the experimental group. Notably, the majority of the respondents in the experimental group were female (30 females or 66.7%), while 15 male participants made up 33.3%. They all studied English at school solely.

2.3. Research instruments

The pre-test and post-test reading comprehension tests were constructed by the researcher with 3 reading passages per test including 5 comprehension questions after each reading passage. The length and difficulty level of pre-test reading was shorter and easier than that in the post-test in content. Moreover, the reading comprehension questions were designed to test the participants' skimming and scanning techniques for general ideas, detailed questions, reasoning skills, analytical skills, and synthesized skills. In particular, the difficult level in each test was constructed as 5 normal level questions for the first passage, then 5 challenging ones for the second, and finally 5 difficult questions for the third passage, testing Lexical and grammatical questions, Main idea questions, factual information questions, Inference questions, and Reference questions.

2.4. Data analysis

The data were collected, tabulated, analyzed and interpreted using descriptive statistics. This consists of methods for organizing, displaying, and describing data. Likewise, frequency count and percentage were used to treat the profile of K-12 students. For the statistical tools to address pre-test and post-test reading comprehension tests, Paired-Sample T-Test was used to clarify the differences between the results of the before-and-after reading comprehension tests of the controlled and experimental groups. To clarify the index of mastery test, frequency counts were also employed to calculate the disparity of Lexical and grammatical questions, Main idea questions, Factual information questions, Inference questions, and Reference questions.

3. Results and Discussion

3.1. Correlation analysis of strengths and weaknesses of the respondents in the pre-test reading comprehension

Table 1 shows the strengths and weaknesses of the experimental group in taking the pre-test reading comprehension. It is observed on the table that the respondents had problems with their inference questions, which registered 5 indexes of mastery (*ranked 1*), and with a mean of 2.5. This kind of question is the most challenging because inference questions involve readers in the process of drawing of a conclusion based on the available evidence plus previous knowledge and experience. In other words, they belong to the types of questions that involve reading between the lines. That is, the answers are not stated explicitly, but based on clues and readers' own experiences, readers are able to produce a logical conclusion [3], [4]. In its essence, inference questions ask about implicit arguments or ideas. The second weakness is their ability to deal with main idea questions with 16 index of mastery (*ranked 2*) and with a mean of 0.80. The main idea questions ask the readers to identify what the writer is trying to communicate in the text. The purpose of the main idea questions is to encourage readers to synthesize and analyze a block of text to obtain a single idea, and to identify connotative language [1], [5], [8]. As glimpsed from Table 1, twelfth-graders were not good at reasoning skills as the primary purpose of main idea questions evaluated typically their capability to distill broader concepts in the nonfiction texts down to a single idea. Reference questions are ranked the third obstacle with the index of mastery scored 26 and with a mean of 1.3. Basically, the reference questions are intentionally designed to ask the test-takers to identify why the author referred to something in a certain part of the text. A word or phrase is highlighted in the passage, and test-takers are asked what that word refers to. In other words, they ask about relationships between words in the context of conventional grammar. The primary purpose of the reference questions is to assess the reader the ability to use reasoning skills logically [4], [6], [13]. As seen in Table 1, the experimental group was likely to be good at solving lexical and grammatical questions which have a high index of mastery scored 34, and with a mean of 1.7. Meanwhile, the strength of the respondents relative to lexical and grammatical questions indicates that they had the knowledge and skills in determining the word choice, and they also had the competence to identify and analyze sentence structures which were formulated and organized to connote the meaningful paragraphs or sentences. Finally, the respondents had successfully performed with the factual information questions with 52 index of mastery and a mean of 2.6. Factual Information questions actually ask test-takers to recognize information that is explicitly stated in the text. Simply, this kind of question ask the readers to recall specific information such as anecdotes, cited evidence, data, or descriptions used to support the main idea of the passage [8]. Thus, the answers to these questions can be found easily in each passage, which might explain the reasons why the respondents are able to do this type of question successfully. Overall, K-12 students encountered negatively critical thinking and analytical skills when doing reading comprehension tests.

Table 1. Index of Mastery of Experimental Group's Pre-test Reading Comprehension Skills

Sub-tests	Number of items	Lowest score	Highest score	Mean	Std. deviation	Index of Mastery	Rank
Lexical and grammatical questions	15	0	15	1.7	.73	34	4
Main idea questions	15	0	15	0.8	.85	16	2
Factual information questions	15	0	15	2.6	.74	52	5
Inference questions	15	0	15	2.5	.79	5	1
Reference questions	15	0	15	1.3	.87	26	3

3.2. Correlation analysis of the respondents' improvements in the post-test reading comprehension

With the researcher's efforts of applying mind mapping techniques as a practical implementation to improve the twelfth-graders' reading comprehension skills, the post-test

reading comprehension tests were implemented after 4 months. Table 2 illustrated the results of the experimental group to compare with the outcomes in the pre-test reading comprehension exam. Generally, the index of mastery of the post-test reading comprehension obtained higher than that of the pre-test reading comprehension. It is obviously observed that the weakest point was still the inference skill with the index of mastery scored 18 (*ranked 1*), and with a mean of 0.9. The successive rank was main idea questions, which had the second index of mastery scored 32, and with a mean of 0.91. The third place was reference questions, which noted the third index of mastery scored 52. Interestingly, the lexical and grammatical questions, and factual information questions shared the same positions (*ranked 4*) with a mean of 2.8, and the index of mastery scored 56. In general, learning with the implementation of mind mapping techniques improves K-12 students' reading comprehension ability. Actually, mind mapping represents visual diagrams, it has successfully motivated the learners to develop reading comprehension skills in an effective way [7], [9], [11]. As mind mapping resembles the way the human brain works, which remember keywords and images, not sentences. Thus, the utilization of keywords, colorful pictures, and symbols in mind mapping enables twelfth-graders to remember information from the text [13]. Reading by using mind mapping also not only can be seen as a receptive skill but it also can be seen as a productive skill. Mind mapping can effectively be used as a useful technique for improving reading comprehension skills [10], [14], [16]. Having some advantages that allow mind mapping techniques to facilitate the learning process, mind mapping has improved the learners' reading comprehension skills and the learning motivation in the twelfth-graders at Pham Ngu Lao high school.

Table 2. *Index of Mastery of Experimental group's Post-test Reading Comprehension Skills*

Sub-tests	Number of items	Lowest score	Highest score	Mean	Std. deviation	Index of Mastery	Rank
Lexical and grammatical questions	15	0	15	2.8	0.43	56	4
Main idea questions	15	0	15	1.6	0.91	32	2
Factual information questions	15	0	15	2.8	0.53	56	4
Inference questions	15	0	15	0.9	0.81	18	1
Reference questions	15	0	15	2.6	0.62	52	3

To demonstrate whether mind mapping techniques have any impact on the improvement of reading comprehension skills, Table 3 illustrates the differences among the tests. As seen the values of mean, it is clearly recognized that the average score of the pre-test experimental group was lower than that of the controlled group. However, there was a sharp change in the average mean scores of the post-test reading comprehension tests. While the mean score in the pre-test reading comprehension test of the controlled group registered 6.2, and a slight change in the post-test mean scored 6.5, a remarkable progress was conversely denoted in the experimental group with the influence of mind mapping techniques intervened reading comprehension skills. In particular, the average mean of the pre-test experimental group generally earned 5.6; whereas the mean score in the post-test experimental group significantly achieved 7.1. The progressive achievement in the reading comprehension results indicates that mind mapping techniques have a beneficial impact on improving the reading comprehension skills, this finding is consistent with other studies such as [12], [14].

Table 3. *Description of Correlated Pre-test and Post-test Reading Comprehension Skills between Experimental Group and Controlled One*

	N	Mean	Std. Deviation
Pre-test Experimental Group	45	5.6	1.48
Pre-test Controlled Group	45	6.2	0.77
Post-test Experimental Group	45	7.1	1.22
Post-test Controlled Group	45	6.5	0.70

To clarify the progress in applying mind mapping techniques to improve reading comprehension skills, Table 4 points out that there was no difference between the scores of the pre-test reading comprehension skills as the calculated P -value was less than 0.05, the conclusion is that, statistically, the mean difference between the paired observations was significantly the same, which indicates that grade 12 in the controlled group has made little improvement in reading comprehension skills. On the contrary, the values in the post-test reading comprehension indicate that there was dissimilar to the correlative analysis. It is clearly illustrated in the table that the P -value (0.17) was higher than the confidence level (0.05), which means the difference in these groups. This corroborates the above findings that mind mapping techniques are sure to help learners improve their reading comprehension skills. The effectiveness of using mind mapping techniques in improving reading comprehension among the respondents affirms the findings of researchers such as [10], [12], [13] who somehow share the same conclusion in this regard.

Table 4. *The Correlation Analysis of Experimental Group and Controlled Group*

	N	Correlation	Sig.
Pre-test Experimental Group vs Pre-test Controlled Group	90	0.585	0.00
Post-test Experiment Group vs Post-test Controlled Group	90	0.409	0.17

4. Conclusion and Implications

4.1. Conclusion

The quasi-experimental study was implemented to find out the effectiveness and informants' opinions of using mind mapping techniques in teaching and learning at a high school in Hung Yen province. It is concluded that basing on the careful process of the practical implementation of before-and-after research design including the contrastive analysis of the results between the controlled group and experimental group, the findings affirm the beneficial practices of using mind mapping techniques in teaching and learning, especially in improving K-12 students' reading comprehension skills in terms of English language teaching (ELT). The affirmative conclusion is made according to the comparison of the results from the post-test reading comprehension test of the experimental group, who underwent the practical application of mind mapping techniques during their reading lessons, with that of the controlled group to contrast the differences. Consequently, the outcomes prove that it is beneficial to apply mind mapping techniques to improve reading comprehension skills. In general, K-12 students did not have any difficulties with explicit information such as factual information questions or lexical and grammatical questions. However, they had problems with critical or analytical questions, which require twelfth-graders to synchronize, analyze, and produce the answers in the pre-test results. After studying with mind mapping techniques, twelfth-graders have somehow received better at reading comprehension skills relating to five question types influencing the achievement of reading comprehension results.

4.2. Implications

It is difficult to confirm which pedagogical techniques prove the utmost effectiveness because different learners might have dissimilar learning styles. In this manner, mind mapping techniques have demonstrated their practicality in improving learners' reading comprehension skills in ELT. However, in order to enhance the productivity, the following implications might take into account.

To meet the target of Pham Ngu Lao high school's mission statement that is "a reliable avenue for the sustainable knowledge conveyance", teachers, especially those who are teaching English, enhance the exploitation of innovative pedagogical approaches such as mind mapping techniques to achieve great success in helping learners to get fruitful achievements in their learning process.

More on-the-job training programs should be conducted to train teachers on how to utilize the new educational initiatives in their teaching practices.

High school learners are encouraged to use mind mapping to represent what they are able to achieve during the learning process. By getting used to using mind mapping techniques, they could train their brains to become organized and successful at memorizing the knowledge they obtain in or outside school settings. To implement mind mapping techniques, it should be flexible to apply or it might be demotivated learners' interests and the fruits do not come to teachers' expectations. Teachers are also advisable to be tactful to integrate other pedagogical techniques to complement what mind mapping method fails to convey, especially in improving high school students' reading comprehension skills.

4.3. Limitations

Due to the scope of the study and the researcher's inadequate research experience, the study is constrained to one of four basic skills of English acquisition. Besides, the respondents of the study are limited to a small number of respondents so the results might be unconvincing to a certain extent. As mentioned above, the study is only confined to reading comprehension skills, which does not reflect the overall productivity of using mind mapping techniques in language teaching.

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