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USING MIND MAPPING TECHNIQUES IN TEACHING ENGLISH WRITING SKILLS FOR 10th GRADERS

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Abstract

The study employing a mixed-methods and quasi-experimental design revealed that teaching English writing skills through Mind Mapping Techniques has significantly improved the writing ability of tenth-grade students at Nguyen Khuyen High School. The study involved ninety students who were separated into two groups: the treatment group applied mind mapping and the control group used only traditional teaching methods during eleven weeks of writing lessons. Quantitative data from the pre-tests and post-tests showed that this technique considerably increased students' writing ability in terms of content, vocabulary and organization ideas in the treatment group. Qualitative results from semi-structured interviews and teacher's observations conducted with the treatment group also highlighted the use of mind mapping in classroom activities promoted students' participation and confidence. These findings demonstrated that the application of mind mapping techniques in the grade-10th curriculum contributed to notable progress in English writing skills. The applied approach not only enhances students' writing ability in content, word choice, coherence and cohesion but also fosters active engagement in writing among 10th graders as well as students in other classes.

Keywords: *English writing skills, mind mapping techniques, quasi-experimental design.*

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SỬ DỤNG KỸ THUẬT SƠ ĐỒ TƯ DUY TRONG VIỆC DẠY KỸ NĂNG VIẾT TIẾNG ANH DÀNH CHO HỌC SINH LỚP 10

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Tóm Tắt

Nghiên cứu đã áp dụng phương pháp hỗn hợp kết hợp với thiết kế bán thực nghiệm đã chỉ ra rằng việc dạy kỹ năng viết tiếng Anh có áp dụng kỹ thuật sơ đồ tư duy đã cải thiện đáng kể khả năng viết của học sinh lớp 10 tại Trường Trung học phổ thông Nguyễn Khuyến. Nghiên cứu gồm 90 học sinh được chia thành 2 nhóm: nhóm thực nghiệm có áp dụng sơ đồ tư duy và nhóm đối chứng chỉ sử dụng phương pháp giảng dạy truyền thống trong 11 tuần học các tiết viết. Kết quả định lượng của bài kiểm tra viết trước và sau cho thấy kỹ thuật này giúp khả năng viết của học sinh tiến bộ rõ về nội dung, từ vựng và cách tổ chức ý tưởng ở nhóm thực nghiệm. Dữ liệu định tính từ phỏng vấn bán cấu trúc và quan sát của giáo viên trên nhóm thực nghiệm cũng đã làm nổi việc sử dụng sơ đồ tư duy trong các hoạt động trên lớp giúp tăng cường sự tham gia và sự tự tin của học sinh. Những phát hiện trên chứng minh rằng việc áp dụng sơ đồ tư duy vào chương trình giảng dạy cho học sinh lớp 10 đã góp phần không nhỏ vào sự tiến bộ về khả năng viết tiếng Anh. Phương pháp này không chỉ giúp phát triển nội dung, từ vựng, tổ chức ý mà còn thúc đẩy sự tham gia tích cực vào việc viết ở học sinh khối lớp 10 cũng như học sinh ở các khối học còn lại.

Từ khóa: *Kỹ thuật lập sơ đồ tư duy, kỹ năng viết tiếng anh, thiết kế bán thực nghiệm.*

1. Introduction

Writing is one of the indispensable skills in learning English in the integration period. It plays an important role in students' academic success and their effective communication. The writing skill is also important for high school students, especially for the tenth-grade students, because it may affect their academic achievements. As stated by Kurihara (2017), writing is a crucial skill that can facilitate success in education, employment, and social interaction. Writing skill development could cultivate students' abilities to deliver in real-life contexts.

However, most tenth graders face challenges in English writing, including limited vocabulary, grammatical errors, organizing and developing ideas. Previous studies have also stated that high school students often struggle with generating and structuring content to produce coherent writing. For such a situation, what is expected is an innovative way of teaching to improve students' English as a Foreign Language (EFL) writing skills.

In this respect, there are some techniques to overcome the students' difficulties in writing. One of these techniques is mind mapping, developed by Buzan (2005). A mind map is defined as a visual representation that organizes ideas, words, tasks, and other relationships into a branching structure centered around a central keyword. However, there is still a lack of in-depth studies on the advantages of implementing MMT for teaching writing paragraphs in textbooks for tenth-grade students at high schools, although many studies have been conducted on investigating the use of Mind Mapping Techniques (MMT) for improving EFL writing skills. Motivated by previous studies on the problems facing, this research helps tenth-grade students at Nguyen Khuyen High School apply this technique for writing more effectively and enduringly. This study fills the gap in international works by providing strong empirical evidence from the Vietnamese educational context, especially with the comparative experimental design.

The main aim of this study is to apply the mind mapping technique to improve the EFL writing skills of tenth-graders at Nguyen Khuyen High School. In order to achieve the purpose of the current study, answers are sought to the following questions:

- a. Which mind-mapping techniques are appropriate to teach EFL writing skills for 10th graders?
- b. Does using MMT help improve 10th graders' writing ability?
- c. To what extent is the students' writing ability improved?

2. Literature Review

2.1. Mind Mapping: An Overview

There are many definitions of mind mapping that researchers have proposed. One of the earliest definitions offered by Buzan (2005) is that mind mapping uses a diagram that functions as a way to organize ideas, represent words, tasks, and other links that are arranged around a central keyword by branches, and typically it contains words, colors, short phrases, and pictures. Mind mapping, described by Buzan, is a powerful visual technique to provide a universal key for unlocking the brain's potential. Risdayanti (2023) explains that mind mapping helps learners clarify their thoughts and communicate more effectively by externalizing cognitive structures onto paper. According to Saed and Al-Omari (2014), mind mapping is one strategy used in education. Mind mapping can be compared to a picture that conveys the value of a thousand words (Zaid, 1995). Similarly, a mind map that is defined by

Dewi (2020) includes lines, colors, keywords, and interconnected images. This tool allows teachers to utilize it as a pre-writing strategy to assist students in developing and organizing their ideas. In addition, a mind map is a visual strategy that involves writing down a core idea and extending related ideas. This method offers identifying main concepts in own words and exploring the connections and relationships between them to create a visual map of the knowledge. Although previous studies have consistently highlighted the cognitive and pedagogical benefits of mind mapping - such as its ability to promote creativity, improve memory, and organize ideas – most of it remains descriptive. It is the gap which motivates the current study to adopt a quasi-experimental design to measure the influence of mind maps on high school students' English writing ability.

2.2. EFL Writing: A Challenging Skill for High School Learners

Writing is a thinking process in which writers organize their ideas, thoughts, and feelings into a series of logical and connected sentences or paragraphs, creating a clear and comprehensive text (Risdayanti, 2023). Richards and Renandya (2002) note that written language becomes difficult when dealing with clauses. It consists of many important elements, including ideas and content, organization and structure, creativity, writing style, fluency, grammatical accuracy, vocabulary, and appropriate use of rhetorical techniques. Writing is described by Huynh (2014) as a sophisticated skill that requires writers to demonstrate understanding, personal perspective, and effective communication skills. According to Harizaj (2011), to write effectively, writers need to have a good grasp of the language, from the use of words to the application of grammar rules. Richards and Schmidt (2013) describe writing as a multistep process that includes planning, drafting, and revising, followed by editing. According to Harmer (2006), there are four crucial factors that show why developing students' writing proficiency is essential. They are a reinforcement of language knowledge, fundamental language skills, accommodating diverse learning styles, and enhancing cognitive processes.

Because of its multidimensional characteristics, writing is widely recognized as one of the most difficult skills for EFL learners, particularly high school students. Writing, which is described by Brown (2011), is the most challenging skill because writing at the high school level requires higher cognitive and literacy skills. Students who do not plan their writing carefully or rush through the early parts often end with poorly structured and low-quality essays. Likewise, Brown (2001) states that students tend to avoid writing not only in English but also in their own language. In the Vietnamese high school system, specifically, tenth-grade students often have a challenging time acquiring written forms because the majority of students lack regular opportunities for practicing writing skills. Therefore, students should be facilitated by the diagram in mind mapping that represents the way of organizing ideas linked to the central keyword, with branches containing. MMT should be taught and applied frequently so that tenth-grade students can find and organize ideas for English writing effectively.

2.3. The Impacts of Mind Mapping Techniques on Writing Skills

MMT has been widely recognized as a crucial tool for improving students' EFL writing ability because it directly tackles the prevalent difficulties they encounter. Not only does it encourage learners to generate ideas freely and spontaneously, but it also systematically facilitates idea formation and organization (Buzan, 2005). According to Akbar et al. (2024), the hierarchical and associative structure of MMT assists students in classifying main points, developing supporting arguments, and visualizing the relationships between different elements of the writing, which leads to a well-organized and coherent final written product. Using mind maps also brings significant psychological impacts on learners because it reduces pressure and fosters a more positive attitude toward EFL writing skills. By applying MMT during the

writing process, learners are given a less intimidating start compared to a blank page. MMT helps boost confidence, alleviate writing anxiety, and make the writing process more manageable (Ngo & Tran, 2021).

Empirical findings have consistently confirmed these advantages. According to Al Kamli (2019), using drawing as a pre-writing method helps students generate more words and ideas, leading to improved writing quality. Combining visual and linguistic elements in a dual coding mechanism supports learners in planning better strategies, promotes engagement and reduces anxiety during the writing process as well. Likewise, mind mapping has been described by Sundeen (2012) and Fiktorius (2013) as an effective tool that contributes to better writing outcomes by supporting learners in grasping the topic, applying planning skills, and even in the context of exams. Akbar et al. (2024) also agree with the above authors on the contribution of MMT to the richness of content and coherence of writing by effectively supporting the first steps of the ideation and organization process. In addition. Lastly, Al Naqbi (2011) also highlighted that MMT can transform students into more active learners in a process-based writing approach.

In the context of Vietnam, MMT has been proven to be an effective learning tool. Particularly, MMT significantly improves learners' creativity and autonomy, especially among Vietnamese high school and university students (Ngo & Tran, 2021; Vu, Hoang & Lai, 2019). The findings investigated by Doan (2022), Duong (2024), and Tu and Nguyen (2023) have demonstrated that MMT benefits learners in areas such as text comprehension, idea generation, and the development of pre-writing skills. Although numerous studies have confirmed the immediate benefits of MMT, a key limitation in these previous studies is the lack of robust, quasi-experimental studies that specifically compare the long-term effectiveness of MMT with traditional writing teaching methods for 10th graders in the Vietnamese context. Furthermore, these studies have primarily focused on university students or have not used a comparative design. This study, therefore, aims to fill this void by providing unique empirical evidence on the advantages of implementing MMT in high school EFL writing, a topic that requires further, more specific investigation.

2.4. Theoretical Frameworks

Based on several important cognitive theories, mind mapping is an effective tool in supporting learning. Mind mapping takes full advantage of core principles from three main theories. The above theoretical views provide a strong rationale for using MMT to enhance EFL writing skills for tenth graders. The first theory mentioned in this study is Dual Coding Theory. According to Clark and Paivio (1986), the brain processes information using both verbal codes (keywords) and non-verbal codes (images, colors). Mind maps take advantage of the dual coding process by using keywords and images in parallel. This helps information to be stored in the brain more effectively, resulting in a significant improvement in the learner's memory and learning ability. In this study, the Dual Coding Theory is particularly relevant because students in the treatment group were guided to create visual mind maps combining key words and images during the pre-writing stage. Thanks to this process, students can not only effectively organize and generate ideas but also enhance their memory and develop deeper writing content, which fosters coherence and creativity in their writing work.

Secondly, mind mapping helps reduce the cognitive burden on learners' working memory by providing a visual framework for organizing complex writing tasks, a principle supported by Sweller's (1988) Cognitive Load Theory. The application of MMT minimizes the cognitive load on working memory, which permits learners to concentrate their intellectual efforts on advanced cognitive processes like idea formation and development. In this study,

MMT assists in alleviating mental pressure by directing students to generate ideas hierarchically before composing their texts. Consequently, students can focus on sentence construction, grammatical accuracy, and coherence instead of being overwhelmed by fragmented information.

Finally, mind mapping facilitates active learning through the process of integrating new concepts with prior knowledge, in line with the Constructivist Theory introduced by Vygotsky (1978). Learners who actively engage in the learning process tend to understand concepts more deeply and apply their knowledge more effectively in practice. The constructive principle in this research is demonstrated in pair and group work, in which students work together to design mind maps before completing their writing. This approach enables students to develop critical thinking and collaboration skills. They can also create an active learning environment that encourages them to construct knowledge autonomously, rather than just absorb information from teachers. Overall, the combination of the three theories forms a comprehensive and coherent foundation for the current research. These frameworks suggest that applying MMT may enhance students' English writing skills through optimizing both cognitive and emotional aspects of learning.

3. Methodology

3.1. Participants

The study included 90 grade 10 students from Nguyen Khuyen High School, a rural school. The students were divided into two groups. All had similar rural backgrounds. Most lived with their grandparents as their parents worked in other provinces. This socio-economic background often meant limited support for learning at home and limited exposure to English outside the classroom.

Table 1. Demographic information of participants

Characteristic	Control group (10A10)	Treatment group (10A6)	Total
Number of Students	46	44	90
Gender (Male/Female)	15M/ 31F	19M/25F	34M/56F
Average Age	15	15	15
Initial English Proficiency (based on previous GPA)	Low-Intermediate	Low-Intermediate	Low-Intermediate
Initial Writing Skill Level (based on pre-test)	Low	Low	Low

3.2. Data Collection Instruments

3.2.1. Pre/ Post-tests

The study employed the results of the pre-tests and post-tests to evaluate students' writing performance. The pre-tests determined students' initial writing abilities, and the post-tests measured their advancement following the MMT intervention. The writing assessment scale was modified from Saddler and Andrade's (2004) writing rubric to suit the learning objectives of the tenth-grade EFL curriculum. The scale focused on four essential aspects of writing performance, including Organization (2 points), Content (4 points), Grammar (2 points), and Vocabulary (2 points). The pre- and post-tests were scored and noted by the researcher under the writing rubric based on the scoring criteria of Saddler and Andrade (ibid).

This detailed rubric was crucial in ensuring that the research outcomes were both objective and reliable. Additionally, students were not permitted to use any material during the tests so that the teacher could validate their true ability.

3.3.2. Semi-structured Interviews

The researcher employed semi-structured interviews in person to collect qualitative data. As Karatsareas (2022) mentioned, this interview format allowed participants to express their opinions, experiences, and perspectives in their own words, thanks to open-ended questions and follow-up questions for clarification. Six students from the treatment group were interviewed individually. Each participant had 10 – 15 minutes to provide detailed responses. The method aimed to collect a deeper understanding of students' views and experiences with MMT and to provide a complementary foundation for quantitative data. Using open-ended questions, the interviews enabled students to freely share their challenges in English writing and their views on the effectiveness of MMT.

3.2.3. Observation Classrooms

a. Teacher Observation Checklists

The Teacher observation checklist was utilized as a qualitative tool to record and analyze systematically the delivery of MMT in the writing lessons of the treatment group, and to note student engagement and interaction in these lessons. Its design was informed by principles of structured observation (Sántha, 2017). The main function of this checklist was to track the teacher's fidelity to the intended MMT instructional methods; note the level and quality of MMT incorporation into the writing instruction; record student engagement, interaction, and visible behaviors concerning the use of MMT (Ponitz et al., 2009); and note any obstacles or enablers in the actual application of MMT in a natural classroom environment.

b. Researcher's Reflective Journal

The reflective journal served as a tool of self-observation and self-reflection (Russell & Kelly, 2002), which facilitated a better understanding of the teaching-learning process, as well as the dynamism during implementing MMT in the real-life classroom setting. By becoming more reflexive, researchers can enhance the trustworthiness and transparency of their qualitative findings (Jasper, 2005). The primary purpose of maintaining this reflective diary was to note the instant responses, feelings, and thoughts regarding what happened in the classroom, how students reacted, and whether certain MMT teaching methods were effective.

3.3. Data Collection Procedures

This study employed a quasi-experimental research design to evaluate the effectiveness of MMT. It involved two intact groups from Nguyen Khuyen High School: a treatment group, which received MMT-integrated writing instruction, and a control group, which received traditional instruction. The intervention spanned eleven weeks, aligning with the English 10 curriculum.

Data collection was executed in two phases. In the pre-experimental phase, a writing pre-test was administered to both groups to establish a baseline and ensure their initial equivalence. The experimental phase then commenced, lasting eleven weeks. The control group followed the textbook's conventional approach, while the treatment group's instruction was augmented with MMT. A dedicated lesson was provided at the beginning of this phase to teach students how to use MMT for writing, ensuring they could translate visual ideas into a linear essay format. Throughout this period, both groups participated in writing post-tests related to specific curriculum units to measure their progress. The pre-tests and post-tests were

scored using a pre-established analytical rubric to ensure consistency and objectivity in the evaluation of writing skills.

3.4. Data Analysis

3.4.1. Quantitative Data Analysis (for writing test scores)

Quantitative data obtained from the post-intervention written tests were analyzed using SPSS Statistics software in this study. The researcher conducted an independent samples t-test with the initial test scores for both groups to ensure that the two study groups had similar initial proficiency. If the test results showed that there was no statistically significant difference, this confirmed that any change in the final test scores was likely due to the new teaching method. To measure the statistical significance of the score changes between the initial and the final tests, the researcher also applied a paired-samples t-test for both the treatment and control group. Lastly, the researcher conducted a second independent sample t-test to compare the post-test results of the two groups in order to address the main research question. This would provide a strong evidence for the effectiveness of MMT as a teaching tool if the Treatment Group's results showed a statistically significant improvement.

3.4.2. Qualitative Data Analysis (for Interviews and Observations)

In this study, thematic analysis was used as a qualitative data processing method to analyze the information collected from interviews and teacher observations. The thematic analysis process involved six main stages: familiarizing with the data, generating initial codes, identifying themes, refining themes, finalizing and naming themes, and writing the final report, as detailed in Clarke and Braun's (2017) study. This analysis aimed to thoroughly explore students' perceptions toward MMT as well as evaluate its strengths, weaknesses, and effectiveness in improving writing skills.

4. Results and Discussions

4.1. Quantitative Data Findings

4.1.1. Comparative analysis of test results between the control and treatment group

a. Analysis of learning trajectory in the control group

As illustrated in the line graph, participants in the control group who received writing instruction through traditional teaching methods started at a Weak proficiency level (scores 1-4). While post-test scores showed a slight, inconsistent improvement (scores 3-7), they did not demonstrate a clear or sustained progress, indicating that the traditional approach had a limited, non-lasting impact.

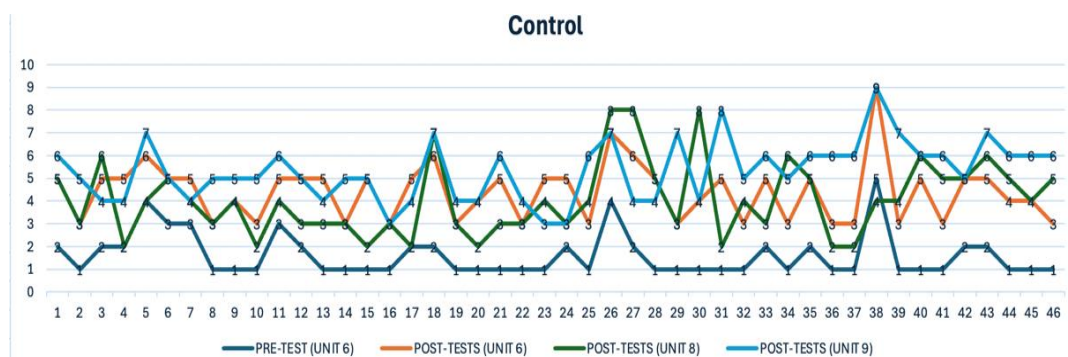


Fig 1. Analysis chart of learning trajectory in the control group

b. Analysis of learning trajectory in the treatment group

The graph for the treatment group shows a considerable and stable improvement in student performance. While pre-test scores were initially low (1-5), post-test results consistently ranged from 8 to 10. Many students achieved the highest scores. This sharp contrast with the control group's minor progress highlights MMT's effectiveness in not only improving writing skills but also ensuring a lasting impact on academic performance.

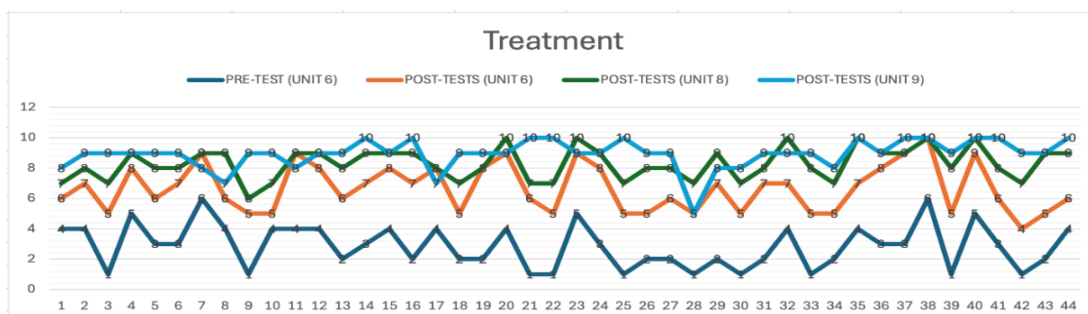


Fig 2. Analysis chart of learning trajectory in the treatment group

4.1.2. Analysis of pre-test score distribution across treatment group

The pre-test score crosstabulation revealed a significant methodological limitation: the control and treatment group were not equivalent at the study's outset. The control group was almost entirely Weak (93.5%), while the treatment group had a more varied distribution, including Poor, Weak, and Average students. This pre-existing difference, known as a selection threat, prevents solely attributing post-test improvements to the MMT intervention. To enhance internal validity, the researcher must use a statistical technique like Analysis of Covariance (ANCOVA), using pre-test scores as a covariate. This will statistically adjust for the initial differences, ensuring the conclusions about MMT's effectiveness are more credible.

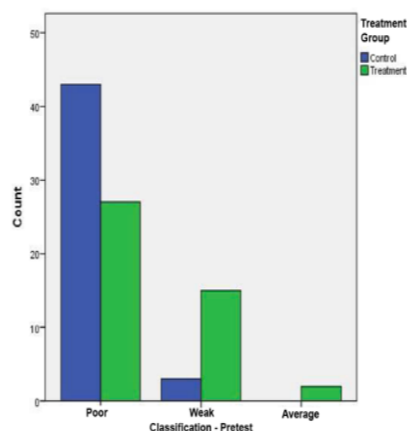


Fig 3. Analysis chart of pre-test score distribution across the treatment group

4.1.3. Analysis of post-test score distribution across the treatment group

The post-test analysis showed a significant achievement gap between the two groups. The control group was concentrated in the Poor and Average categories, while the treatment group saw a remarkable shift, with 75% rated Excellent and 23% Good. This substantial improvement strongly suggests MMT was the primary cause, despite the initial baseline difference. This outcome aligns with previous research on the benefits of visual pre-writing strategies like mind mapping in EFL. A statistical analysis, such as a Chi-square test, is still necessary to formally confirm this relationship and solidify the conclusion that MMT significantly enhanced student performance.

4.1.4. Analysis of Mind Mapping intervention results in English writing instruction

a. Post-Intervention (Posttest) results evaluation

The post-test results show a significant difference between the two groups.

The majority of the control group stayed within the lower-to-average proficiency range, with 41.3% rated Weak and 39.1% rated Average. The treatment group, on the other hand, showed remarkable progress after applying MMT, as 75% of students achieved Good level and 22.7% reached Fair. Just one student (2.3%) remained at the Weak level. The results offer strong empirical evidence that MMT is considerably more successful at enhancing English writing skills than traditional methods.

b. Qualitative comparison between the two groups

The two groups demonstrated a clear difference in their post-test performance. The intervention led to a dramatic shift in proficiency. 80.4% of the control group (37/ 46 students) were at the weak/ average proficiency levels, whereas only 2.3% of the treatment group (1/44 students) remained in that same range. In contrast, the proportion of students achieving fair/good proficiency in the treatment group (43/44 students, 97.7%) overwhelmingly surpassed that of the control group (9/46 students, 19.6%). This data indicates a strong upward trend within the intervention group.

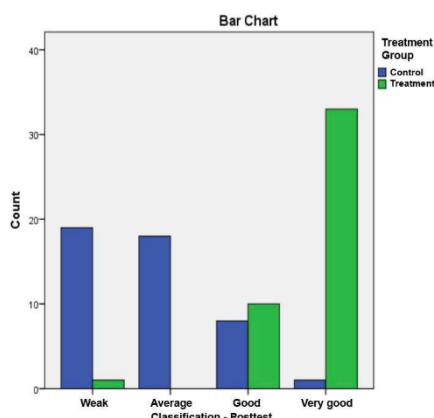


Fig 4. Analysis chart of qualitative comparison between the two groups

c. Analysis of academic performance transformation

The crosstabulation table reveals a significant positive transformation in student proficiency levels. Of the 70 participants initially classified as Poor, a notable 31.4% advanced to Good in the post-test. The most remarkable progress was seen in the Weak group (18 participants), with 100% showing improvement, and two-thirds reaching the Good level. The Average group also saw a 100% transition to Good. These findings demonstrate that the intervention was highly beneficial for learners of all initial proficiencies, strongly supporting its positive and significant influence on academic outcomes.

d. Analysis of student proficiency shifts before and after intervention

The bar chart provides a compelling visual representation of the significant improvement in student proficiency. Among the 70 students who began at the Poor level, a notable portion progressed, with 10 reaching Fair and 22 achieving Good. All 18 students who began at the Weak pre-test level showed significant progress, advancing to higher proficiency levels; 12 of them achieved a Good rating. Both students in the Average group also progressed to Good. This shows that the intervention was effective in moving a large number of students from lower to higher proficiency bands

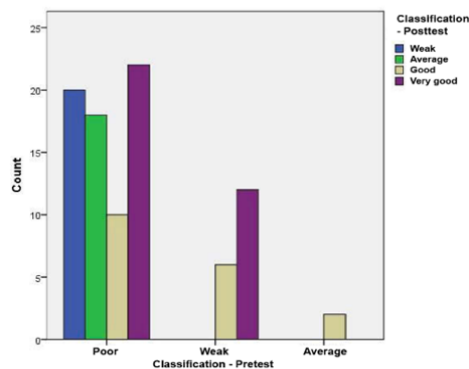


Fig 5. Analysis chart of posttest overall results analysis

e. Analysis of post-intervention academic performance by gender

The post-test results reveal a clear gender-based disparity in academic achievement. While the intervention improved overall performance, females consistently outperformed their male counterparts, especially in the higher proficiency bands. Specifically, females held a distinct advantage at the Good level, with 46.4% of them achieving this proficiency, compared to only 23.5% of males. Similarly, females were more likely to reach the Average level (28.6% vs. 5.9% for males). Conversely, a substantial proportion of males (41.2%) were in the Weak category, whereas only 10.7% of females were at this level. While the Fair level showed a more even distribution between genders, the overall trend suggests that the intervention's effectiveness was uneven, with females benefiting or performing noticeably better.

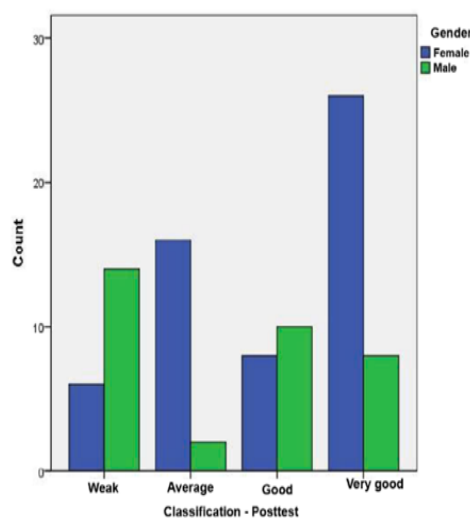


Fig 6. Analysis chart of post-intervention academic performance by gender

4.2. Qualitative data findings

4.2.1. Results of semi-structured interviews

The interview results showed that all students found writing to be the most difficult skill in learning English. All also confirmed that they had difficulty in generating and organizing ideas. However, their evaluation of MMT in writing was very positive. They said that after being instructed, they quickly realized that MMT was an easy-to-understand and very useful method of learning to write. The interview data confirmed that MMT directly addressed these challenges because students appreciated its ability to help them brainstorm and organize their ideas more clearly during the pre-writing stage. This qualitative evidence strongly supported the quantitative results, demonstrating that MMT effectively helped students overcome initial anxiety and difficulties with writing structure.

4.2.2. Results of classroom observations

The results of observations and notes from teachers from the qualitative data analysis showed a positive change in the classroom environment. While the classroom was described as quite quiet and students often had difficulty with ideas and lacked the spirit of participation in traditional writing lessons, the classroom environment was quite dynamic and interactive in the MMT writing lessons. After some initial confusion, most students soon became more enthusiastic, proactive, and better at organizing their thoughts, which allowed them to solve old problems effectively. The application of MMT helped students not only enhance their writing skills but also gain more confidence through each writing lesson.

4.3. Discussions

The research findings revealed that the treatment group showed a significant improvement in both writing scores and writing quality. First of all, a clear alignment between

organization and content was observed. After the intervention phase, this group's scores on the above two criteria increased considerably from low to higher levels. This quantitative evidence has contributed to clarifying and strengthening the results of qualitative analysis. Specifically, interviews revealed that students highly valued MMT's ability to resolve writing anxiety and organize their thoughts. As noted by Akbar et al. (2024), MMT provided effective support during the initial stages of idea formation and organization, which made a crucial contribution to the coherence of the final product. The improvement in content scores aligned with the findings of Al Kamli (2019), who highlighted that pre-writing outlining helped learners generate more ideas, words, and more detailed sentences.

Secondly, there was a complementary and discrepant relationship between grammar and vocabulary. While there was some improvement in the scores for grammar and vocabulary, it was uneven and less significant compared to organization and content. Although MMT did not directly teach grammar, it served a complementary role by providing students with a visual framework for building ideas, which indirectly gave them more time to focus on word choice and sentence structure. Harizaj (2011) emphasized that effective writing depends on language proficiency. In addition, Tony Buzan's (2005) argument for the use of images and colors in mind maps to improve vocabulary retention was also considered. However, the uneven improvement in grammar and vocabulary scores suggested that the MMT teaching method was not a comprehensive solution. This was consistent with the view that MMT needed to be integrated with other intensive language teaching methods to maximize its benefits.

Finally, an inconsistent result was observed concerning effectiveness by gender: The quantitative analysis showed a significant difference in MMT's effectiveness by gender, with female students achieving considerably higher results than male students. This finding was a point of difference that requires careful discussion. While one can hypothesize that female students tend to favor more cooperative and visual learning methods, as some studies have indicated, the qualitative data in this study were not deep enough to fully confirm that hypothesis. This highlighted the need for future studies to conduct more in-depth interviews with both male and female students to shed light on the psychological and learning factors behind this difference.

5. Conclusion and Policy Implications and Suggestions

5.1. Pedagogical Implications and Suggestions

These findings have important pedagogical implications for teaching writing skills to secondary school students. The study found that incorporating images and colors in mind maps helps students construct knowledge more visually. This supports multisensory learning theory, which asserts that learning is more effective when students use both hemispheres of the brain simultaneously. Moreover, when flexibly integrated into writing lesson, MMT brings some psychological benefits, including helping students overcome their fear of writing, enhance their creative thinking, and engage more actively in classroom environment.

This study's findings lead to four main recommendations for future research to help establish a stronger methodology. A primary recommendation is to standardize students' initial abilities by using detailed pre-tests with specific criteria. By making sure the groups' writing levels are standardized, this step eliminates differences in initial skills that may affect the final results. Furthermore, future research should analyze the influence of gender in more detail. A comparison of MMT's effectiveness on male and female students would allow researchers to investigate if gender plays an important part in the development of writing skills using this technique. Thirdly, research should expand the application of MMT to other skills besides writing. Evaluating the effectiveness of MMT in improving skills such as reading

comprehension, vocabulary retention, and critical thinking would provide a more comprehensive view of its potential. Finally, it is necessary to compare MMT with other prewriting techniques, such as outlining or free writing. Such a comparison would help identify the specific advantages of MMT and its suitability in different contexts, making more valuable contributions to the field of teaching.

5.2. Conclusion

This research successfully proved MMT's effectiveness in enhancing the English writing abilities of 10th graders. Since many students struggled with organizing their ideas before the intervention, a clear need for effective pre-writing strategies was obvious. Following the MMT intervention, the treatment group achieved significantly higher writing scores than the control group, excelling specifically in coherence, the depth of their ideas, and the organization of their text. This result was strongly supported by reliable qualitative data. Students said that MMT helped them feel more confident and creative in writing and found it easier to organize their ideas logically. Teachers also noted that teaching became more lively and intuitive thanks to MMT.

From a theoretical perspective, the results will consolidate or extend existing theories on cognition and writing pedagogy, and highlight how MMT enables to optimize the writing process and reduce anxiety for students. Practically, the study brings practical benefits to many subjects. For teachers, it is a solid pedagogical foundation, providing specific strategies for integrating MMT into writing activities. For 10th-grade students, MMT is a powerful pre-writing tool, helping them overcome difficulties in ideas, structure, and cohesion, thereby increasing confidence and reducing anxiety. For policymakers and program developers, the empirical data from this study can be the basis for formally integrating MMT into the national curriculum, thereby improving the quality of teaching and learning English writing skills at the high school level. In conclusion, this study noted that MMT is a useful tool for boosting English writing proficiency and should be considered for inclusion in the formal curriculum.

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