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EXPLORING THE EFFECTIVENESS OF MIND MAPS IN ENHANCING IDEA GENERATION DURING PRE-WRITING ACTIVITIES IN ENGLISH FOR SIXTH-GRADE EFL STUDENTS

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Abstract:
Effective idea generation and organization during pre-writing is crucial for developing writing skills, especially for rural EFL learners, Grade 6, with limited resources. Although mind mapping is recognized as a valuable cognitive and visual strategy, its use in rural classrooms is underexplored. This study investigates mind maps' effectiveness in enhancing idea generation and students' attitudes toward their use in English writing among sixth-grade students at Phan Van Cam Secondary School, Vietnam. A six-week, four-lesson intervention with 40 students employed a mixed-methods design. Quantitative data from pre- and post-writing tasks assessed organization, coherence, fluency, and vocabulary, while qualitative data from questionnaires and interviews with six students captured their perceptions. Results show that mind mapping improves idea generation and writing clarity, while boosting motivation and confidence. Despite challenges like limited vocabulary and time, both students and teachers viewed mind maps as engaging and beneficial. The study supports integrating mind mapping into rural EFL instruction and offers practical guidance for educators.

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1. Introduction

In the context of globalization, English has become an important language for communication, education, and international exchange. As a result, developing English proficiency, particularly writing skills, has become a key objective in foreign language education. Writing is a complex cognitive process that requires learners to integrate vocabulary, grammar, and the ability to organize ideas logically (Hyland, 2003; Richards & Renandya, 2002). However, many EFL learners experience difficulties in writing, especially during the initial stage of generating and organizing ideas.

The pre-writing stage plays a crucial role in helping students develop and structure their ideas before writing. Nevertheless, in many classrooms, writing instruction still focuses mainly on the final product rather than the writing process. Consequently, many students struggle to generate relevant ideas and organize them effectively.

One strategy that has gained attention in supporting idea development is mind mapping. As a visual learning technique, mind mapping helps learners connect ideas through keywords, branches, and visual elements, which may enhance memory and organization (Buzan & Buzan, 2006). Despite its potential benefits, limited research has examined its role in supporting idea generation among lower secondary EFL students in Vietnam. Therefore, this study investigates the effectiveness of mind mapping in enhancing idea generation during the pre-writing stage for Grade 6 EFL students.

1.2 Research Objectives and Questions

This study aimed to examine the use of mind mapping in supporting sixth-grade students during the pre-writing stage of English writing lessons. In particular, the research focused on how mind mapping helps students develop ideas before writing and explores students' attitudes toward the use of mind maps in the classroom.

1.2.1 Research Objectives

The study sought to achieve the following objectives:

1) To explore the effectiveness of mind mapping in supporting sixth-grade students' idea development during pre-writing activities in English writing lessons.
2) To investigate students' attitudes toward the use of mind maps in English writing classes.

1.2.2 Research Questions

Based on the objectives above, the study addressed the following research questions:

1) How did mind maps support sixth-grade students in developing ideas during pre-writing activities in English writing lessons?

2) What were students' attitudes toward the use of mind maps in English writing classes?

1.2.3. Research Scope

This study was conducted with Grade 6 students at Phan Van Cam Secondary School in Dong Thap Province during the 2025–2026 academic year. It examined the use of mind mapping in supporting students' idea generation during the pre-writing stage of English writing lessons. The study focused on students' ability to generate and organize ideas before writing and their perceptions of using mind maps. Other aspects of writing, such as grammar accuracy or long-term writing proficiency, were not included in the scope of this research.

1.2.4. Significance of the Study

This study has both theoretical and practical significance for English language teaching at the lower secondary school level. Theoretically, it contributes to existing research on visual learning strategies by examining how mind mapping supports idea generation during the pre-writing stage of the writing process.

Practically, the findings may help English teachers design more effective pre-writing activities in the classroom. If mind mapping proves beneficial, it can be used as a simple strategy to help students organize their ideas before writing. This approach may be particularly useful in classrooms where students have different language abilities or face difficulties in starting writing tasks, especially in rural schools with limited learning resources.

2. Literature Review

2.1 Writing in English as a Foreign Language

2.1.1 The Nature of Writing in EFL

In foreign language learning, writing is widely regarded as one of the most complex skills to develop. Unlike receptive skills such as listening and reading, writing requires learners to mobilize multiple linguistic and cognitive resources simultaneously to produce meaningful texts. According to Hyland (2003), writing is not simply arranging sentences grammatically but a process of constructing meaning through appropriate vocabulary, grammar, and organization.

Writing is also considered a demanding cognitive activity because writers must engage in several processes, including planning, generating ideas, organizing content, and revising texts. These processes require vocabulary knowledge, grammatical competence, and the ability to maintain cohesion and coherence. Many EFL learners experience difficulties integrating these elements, particularly when their language proficiency is limited (Hyland, 2003). Similarly, Kellogg (2008) notes that writing places heavy demands on working memory because writers must manage idea generation, linguistic encoding, and text monitoring simultaneously.

In addition to linguistic accuracy, effective writing requires clear organization and logical connections among ideas. Studies show that many EFL learners struggle to arrange ideas coherently, resulting in texts that lack clarity and structure (Briesmaster & Etchegaray, 2017; Ong & Zhang, 2010). Therefore, writing instruction should not focus solely on grammar and vocabulary but should also support learners in generating and organizing ideas effectively during the writing process (Hayes, 2012).

2.1.2 Challenges in Learning EFL writing

Despite its importance, writing presents many challenges for EFL learners. One of the most common difficulties is generating and developing ideas. Many students feel uncertain when beginning a writing task and struggle to expand their ideas into meaningful content (Graham & Perin, 2007).

Limited vocabulary and linguistic resources also present major obstacles. When students lack sufficient vocabulary, they tend to rely on simple sentence structures or repeat familiar words, which can reduce the quality of their writing (Viera, 2017; Kobayashi & Rinnert, 2008).

In addition, many learners experience difficulties organizing ideas and structuring their texts logically. Poor organization can lead to paragraphs that lack coherence and clarity (Nguyen et al., 2023). Writing anxiety further complicates the learning process, as students may fear making mistakes or receiving negative evaluations (Cheng, 2004).

These challenges indicate that writing instruction should not only focus on linguistic knowledge but also provide strategies that help learners generate and organize ideas effectively before writing.

2.1.3 Writing Development in Young EFL Learners

Writing development among younger learners differs from that of adults due to their ongoing cognitive development. Research suggests that younger learners benefit from visual supports and interactive activities that facilitate engagement and comprehension (Tomlinson, 2014).

Scaffolding plays an important role in supporting learners' writing development. Based on Vygotsky's concept of the Zone of Proximal Development (ZPD), scaffolding involves providing guidance and support to help learners accomplish tasks beyond their current ability (Walqui, 2006). In writing instruction, scaffolding may include model texts, guided practice, and visual tools that help students organize their ideas.

Collaborative learning activities can also support writing development by allowing students to discuss ideas and exchange feedback. Such interaction promotes language development and increases learners' confidence in using English (Nation, 2009). In summary, EFL writing requires both linguistic knowledge and cognitive skills. Therefore, providing appropriate instructional support—especially during the pre-writing stage—is essential for helping students develop their writing abilities.

2.2 Process Approach to Writing

2.2.1 Product Approach and Process Approach

Two major approaches in writing instruction are the product approach and the process approach. The product approach focuses on the final written text, emphasizing correct language use and structural patterns. In this approach, students typically analyze model texts and reproduce similar structures (Hyland, 2003; Harmer, 2007).

In contrast, the process approach views writing as a dynamic activity involving several stages, including planning, drafting, revising, and editing. This approach emphasizes idea development and encourages learners to refine their writing through revision (Badger & White, 2006; Harmer, 2007).

The process approach has gained increasing support in EFL education because it helps students generate, organize, and express ideas more effectively.

2.2.2 Stages of the Writing Process

The writing process generally includes four main stages: pre-writing, drafting, revising, and editing (Harmer, 2007; Hyland, 2013).

Pre-writing involves generating ideas and planning the structure of the text. Drafting refers to producing the first version of the text, focusing mainly on expressing ideas. Revising involves reviewing and improving the organization and content of the writing, while editing focuses on correcting grammatical and mechanical errors.

2.2.3 Importance of the Pre-writing Stage

The pre-writing stage is particularly important because it provides the foundation for the entire writing process. During this stage, learners generate ideas, select relevant information, and organize the structure of their writing (Hyland, 2013).

Planning activities such as brainstorming, outlining, and visual mapping can help learners clarify their ideas and reduce difficulties during writing. For EFL learners, effective pre-writing preparation can increase confidence and improve the overall quality of their writing (Graham, 2019).

2.3 Idea Generation in Writing

Idea generation refers to the process of exploring and developing ideas related to a writing topic before drafting. It helps writers determine the main content and organize their thoughts (Hyland, 2013).

Several techniques can support idea generation, including brainstorming, listing, outlining, and visual mapping. Among these strategies, visual tools such as mind mapping are particularly effective because they allow learners to represent relationships among ideas in a clear and flexible structure (Graham, 2019; Teng, 2021).

2.4 Mind Mapping as a Learning Strategy

Mind mapping is a visual technique that organizes information through branching diagrams centered on a main idea (Buzan, 2006). By presenting ideas visually, mind maps help learners recognize relationships among concepts and expand their thinking.

Mind maps typically include a central topic, main branches representing key ideas, and sub-branches containing supporting details. The use of keywords, colors, and images enhances memory and facilitates idea organization (Davies, 2011).

Research indicates that mind mapping can improve idea generation, organization, and coherence in writing. It also encourages creativity and helps learners develop more structured written texts (Al-Jarf, 2009; Yunus & Chien, 2016).

2.5 Previous Studies

Previous studies have shown that mind mapping can significantly improve EFL learners' writing performance. Research by Al-Jarf (2009) found that mind mapping helped students generate more ideas and produce higher-quality compositions. Similarly, Yunus and Chien (2016) reported that mind mapping improved idea organization and coherence in students' writing.

In Vietnam, research on mind mapping has also increased, particularly in relation to vocabulary learning and writing skills. However, most studies focus on university or upper secondary students, while research on lower secondary learners remains limited.

2.6 Research Gap

Although previous research highlights the benefits of mind mapping in writing instruction, several gaps remain.

First, many studies focus mainly on overall writing performance rather than the role of mind mapping in idea generation during the pre-writing stage.

Second, most studies involve university or adult learners, and relatively few focus on younger students at the lower secondary level.

Finally, research on the use of mind mapping in Vietnamese EFL classrooms—particularly among Grade 6 students—remains limited. Therefore, further investigation is needed to explore how mind mapping can support idea generation during pre-writing activities in this context.

2.7 Conceptual Framework

This study proposes a conceptual framework linking **mind mapping**, **idea generation**, and **writing development**. Mind mapping functions as a visual tool that helps learners organize, expand, and connect ideas during the pre-writing stage (Buzan, 2006; Hyland, 2013).

By supporting idea generation and organization, mind mapping prepares learners for the drafting stage and contributes to improved writing quality. The framework, therefore, proposes the relationship:

Mind Mapping → Idea Generation → Writing Development

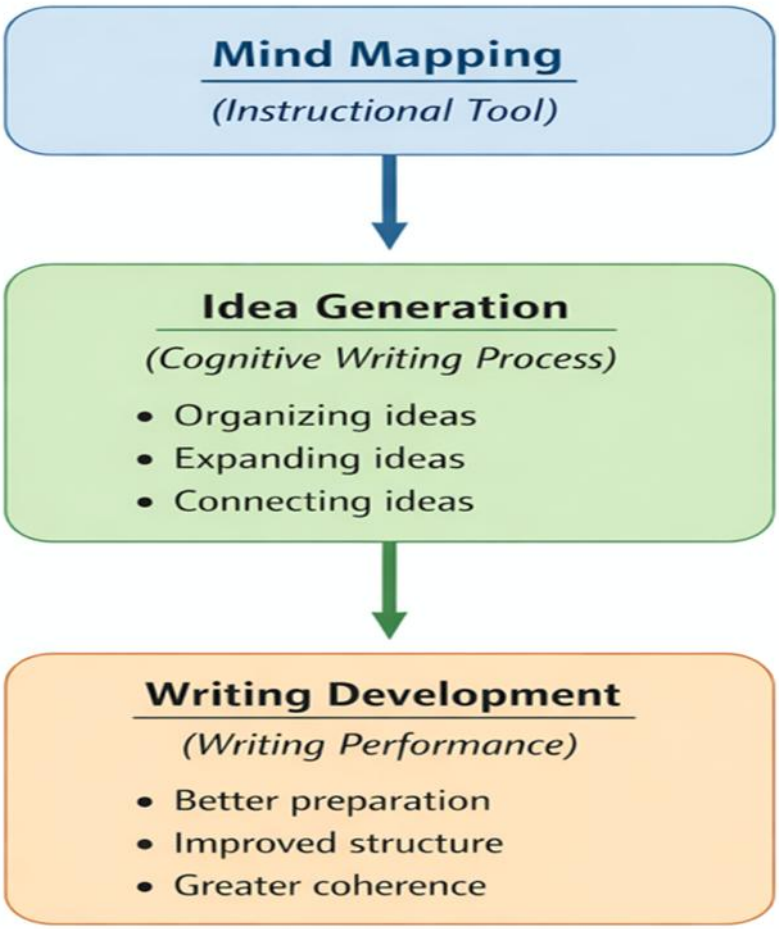

Figure 2.1. Conceptual framework of the study (Adapted from Buzan, 2006; Hyland, 2013)

2.8 Ethical Considerations

Ethical principles were followed throughout the study. Participants were informed about the purpose of the research, and participation was voluntary. Because the participants were secondary school students, special attention was given to protecting their rights and privacy. All personal information was kept confidential, and pseudonyms were used during data analysis and reporting. The collected data were used solely for research purposes (Cohen, Manion, & Morrison, 2018; Creswell, 2018).

3. Research Methodology

3.1. Research Design

This study used a mixed-methods design to examine how mind mapping helped Grade 6 students at Phan Van Cam Secondary School in Dong Thap Province generate ideas during pre-writing in English. According to Creswell (2018), combining quantitative and qualitative data provides a more comprehensive understanding of research problems.

The quantitative data included pre-tests and post-tests to measure students' writing improvement after the intervention. Previous research showed that mind mapping improved organization and clarity in writing (Al-Jarf, 2009).

The qualitative data consisted of questionnaires and semi-structured interviews to explore students' and teachers' experiences. Integrating these methods allowed the study to examine attitudes and perceptions more deeply (Dörnyei, 2007).

3.2 Research Instruments

3.2.1 Writing Tasks

Writing tasks were used to evaluate students' writing improvement. Writing was considered a complex skill requiring logical organization, coherent ideas, and appropriate language use (Hyland, 2022; Graham, 2023).

Students completed writing tasks from Units 1–6 of the Tiếng Anh 6 – Global Success textbook before and after the mind mapping lessons. This allowed a comparison of writing quality over time (Hyland, 2003).

Students' writing was assessed using criteria such as organization, coherence, clarity, and supporting details. These criteria were approved by the school's academic board and followed common EFL assessment practices (Weigle, 2002).

3.2.2 Questionnaires

Questionnaires were used to collect students' views on mind mapping. They served as effective tools for gathering information from many participants and identifying patterns (Cohen, Manion, & Morrison, 2018).

The questionnaire contained closed-ended questions and was presented in both English and Vietnamese to ensure students' understanding.

The questions focused on

- students' understanding of mind mapping,
- their experiences using mind maps compared with other pre-writing methods,
- whether mind mapping helped improve idea generation and writing.

Questionnaires were administered before the pre-test, after the intervention, and after the post-test to observe changes in students' perceptions.

3.2.3 Interviews

Semi-structured interviews were conducted with selected students and teachers to obtain deeper insights into their experiences with mind mapping. Interviews enabled researchers to explore participants' perspectives in detail (Creswell & Poth, 2018; Braun & Clarke, 2022).

Teachers were asked how they implemented mind maps in their lessons, the challenges they encountered, and their views on the technique's effectiveness. Students shared their feelings, difficulties, and opinions about using mind maps in writing.

In total, four teachers and twelve students participated in the interviews, which provided a clearer understanding of the classroom context (Maxwell, 2013).

3.3 Data Collection Procedure

Data collection **took place** in three phases.

3.3.1 Pre-test Phase:

Students completed an initial writing task to assess their baseline writing ability (Hyland, 2003).

3.3.2 Intervention Phase:

Students were introduced to mind mapping as a pre-writing technique. They learned how to create mind maps through demonstrations and guided practice. The intervention was conducted four sessions per week for eight weeks during the first semester of the 2025–2026 school year.

3.3.3 Post-test Phase:

Students completed a post-writing task and questionnaires. Interviews with selected students and teachers were also conducted to gather their experiences with mind mapping.

3.4 Data Analysis Methods

Both quantitative and qualitative methods were used to analyze the collected data.

Pre-test and post-test writing samples were compared to evaluate improvement. The writing was scored using a rubric focusing on organization, coherence, clarity, and supporting details (Weigle, 2002).

Questionnaire data were analyzed using descriptive statistics to identify patterns in students' perceptions of mind mapping.

Interview data were analyzed using thematic analysis following Braun and Clarke (2006). This analysis identified themes related to students' challenges, teachers' opinions, and the benefits of mind mapping in writing preparation.

3.5. Participants

The study involved 40 Grade 6 students learning English as a foreign language at a secondary school in Vietnam. All students used the Tiếng Anh 6 – Global Success textbook.

Grade 6 students were selected because they represented an early stage of developing writing skills and often required support in generating and organizing ideas. Participants were selected through convenience sampling, a method commonly used in educational research when researchers work with accessible classes (Creswell, 2018). The students had relatively similar levels of English proficiency.

What's more, six students participated in interviews to provide deeper insights into their learning experiences. Participation was voluntary, and all collected data were kept confidential.

3.6. Quantitative Data Analysis

Quantitative data were collected through a student questionnaire investigating students' perceptions and attitudes toward mind mapping in pre-writing activities.

Questionnaires were widely used in educational research because they allowed researchers to gather information from many participants efficiently (Cohen, Manion, & Morrison, 2018).

All responses were entered into SPSS (Statistical Package for the Social Sciences) for analysis. Descriptive statistics such as mean, standard deviation, and frequency were calculated to identify trends in students' responses.

The questionnaire data were grouped into four categories:

1) students' perceptions of mind mapping
2) their experiences using it in pre-writing
3) difficulties encountered
4) expectations for future use.

3.7. Qualitative Data Analysis

Qualitative data were collected through semi-structured interviews with students and teachers. Interviews provided opportunities for participants to explain their experiences in detail (Creswell & Poth, 2018; Braun & Clarke, 2022).

All interviews were audio-recorded and transcribed to ensure accuracy. The data were analyzed using thematic analysis following Braun and Clarke (2006).

The analysis involved several steps: familiarizing with the data, generating initial codes, identifying themes, reviewing themes, and reporting the results.

The findings revealed themes related to how mind mapping helped students generate ideas, organize information, and overcome initial difficulties.

3.8. Data Integration

Quantitative and qualitative data were integrated to provide a comprehensive understanding of the impact of mind mapping. In mixed-methods research, quantitative data identified general patterns, while qualitative data explained these findings (Creswell, 2018).

Questionnaire results showed general trends in students' perceptions, while interview data provided deeper explanations of how mind mapping supported idea generation.

The study used triangulation, where qualitative findings supported and interpreted quantitative results. This approach strengthened the reliability of the research findings.

3.9. Reliability and Validity of the Study

Reliability and validity were ensured through several procedures.

For quantitative data, the questionnaire was developed based on previous studies and contained closed-ended questions to maintain consistency (Cohen, Manion, & Morrison, 2018). The data were analyzed using SPSS with descriptive statistics.

For qualitative data, interviews were recorded and transcribed to ensure accuracy. Thematic analysis was applied to identify patterns in participants' responses (Braun & Clarke, 2006).

In addition, data triangulation was applied by combining questionnaires and interviews, which enhanced the credibility and comprehensiveness of the findings (Creswell, 2018).

4. Findings and Discussion

4.1 Quantitative Findings

4.1.1 Results of the Tests

The results of the Independent Samples t-test presented in were used to compare the difference in scores between the pre-test (before mind mapping) and the post-test (after mind mapping). This analysis aimed to determine whether the use of mind maps in the pre-writing stage led to a significant change in sixth-grade students' ability to generate ideas.

First, the descriptive statistics in Table 3.1a indicate a clear difference in the mean scores between the two tests. Specifically, in the pre-test, the 40 students obtained a mean score of M = 3.74 with a standard deviation of SD = 1.22, whereas in the post-test, the mean score increased to M = 7.25 with a standard deviation of SD = 1.15. This increase reflects a noticeable improvement in students' ability to develop ideas after they were guided to use mind maps during pre-writing activities.

The result of Levene's test shows F = 0.00, Sig. = 0.94 > 0.05 (Table 4.1b), indicating that the assumption of equal variances between the two groups is satisfied. Therefore, the results in the row Equal variances assumed were used to interpret the t-test. The obtained test value is t = -13.21, with df = 78 and Sig. (2-tailed) < 0.001. Since the p-value is lower than the 0.05 significance level, the difference between the pre-test and post-test scores is statistically significant. In other words, the improvement in students' scores cannot be attributed to chance but rather reflects the actual effect of the instructional method applied during the experimental process.

Furthermore, the Mean Difference = -3.51 indicates that the post-test scores are approximately 3.51 points higher than the pre-test scores. The 95% confidence interval of the difference ranges from -4.04 to -2.98, and the entire interval does not include the value zero, which further strengthens the reliability of the statistical results.

In conclusion, the results of the independent-samples t-test indicate that the use of mind maps in the pre-writing stage had a positive, statistically significant impact on students' idea-generation ability. After the intervention period, students demonstrated a clear improvement in developing and expanding ideas before writing, thereby

confirming the effectiveness of integrating mind mapping into English writing instruction for secondary school students.

Table 4.1a: Statistical results of pretest and posttest

Group Statistics					
	Index1	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Test: Pre-Post	1	40	3.74	1.22	.19
	2	40	7.25	1.15	.18

Table 4.1b: Comparison results of pretest and posttest

Independent Samples Test										
		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Test: Pre-Post	Equal variances assumed	.00	.94	-13.21	78	<.001	-3.51	.27	-4.04	-2.98
	Equal variances not assumed			-13.21	77.75	<.001	-3.51	.27	-4.04	-2.98

The statistical information presented in Tables 4.1a and 4.1b indicates a substantial change in students' test performance before and after the implementation of mind mapping during the pre-writing stage. Specifically, the post-test mean score was 7.25, which is considerably higher than the pre-test means of 3.74. This notable increase suggests that students demonstrated a clear improvement in their ability to develop and elaborate ideas after participating in learning activities that incorporated mind maps. In addition, the t-test results show that Sig. (2-tailed) The value is lower than 0.001, indicating that the difference between the two testing occasions is statistically significant at a very high level. Therefore, the improvement in students' performance cannot be attributed solely to random variation but is likely associated with the instructional intervention implemented during the experiment. Overall, these findings provide preliminary empirical support for the effectiveness of mind mapping in helping students prepare ideas before writing.

3.1.1.1 Results of test 1 (Pre1 – Post1)

To begin with, the equality of variances between the two score distributions was examined using Levene's Test for Equality of Variances. The analysis produced a

significance value of Sig. = 0.64, which is higher than the conventional threshold of 0.05. This indicates that the assumption of homogeneity of variance was satisfied, allowing the t-test to be interpreted under the assumption of Equal variances.

The independent-samples t-test yielded a t-value of -12.38 with 78 degrees of freedom, and the significance level was Sig. (2-tailed) < 0.001. This statistical outcome confirms that a substantial difference existed between the scores obtained before and after the intervention.

A closer examination of the descriptive statistics further illustrates this pattern. Prior to implementing mind mapping, students achieved an average score of 3.44 (SD = 1.33). Following the instructional period in which mind mapping was incorporated into pre-writing activities, the average score increased considerably to 7.00 (SD = 1.24). The calculated mean difference was -3.56, and the 95% confidence interval ranged from -4.13 to -2.99. Taken together, these findings suggest that introducing mind mapping significantly enhanced students' ability to generate and organize ideas during the initial writing stage.

3.1.1.2 Results of test 2 (Pre2 – Post2)

A similar analytical procedure was conducted for the second test pair. The homogeneity of variance assumption was first evaluated through Levene's Test, which yielded a significance value of 0.72, again exceeding the 0.05 criterion. This confirms that the variability of the two datasets was statistically comparable, and the interpretation could therefore rely on the Equal variances assumed output.

The t-test analysis revealed a t-value of -9.83 with df = 78, accompanied by a two-tailed significance level below 0.001. Such a finding indicates that the difference observed between the two testing occasions is statistically meaningful.

In terms of descriptive statistics, the average score recorded in the pre-test stage was 3.83 (SD = 1.57). After students were exposed to mind mapping activities during the learning process, their performance improved notably, reaching 7.09 (SD = 1.40) in the post-test. The difference between the two sets of scores amounted to -3.26, with a 95% confidence interval ranging from -3.92 to -2.60. These figures suggest that mind mapping helped students expand and elaborate their ideas more effectively when preparing to write.

3.1.1.3 Results of test 3 (Pre3 – Post3)

Further evidence of this improvement can be observed in the third comparison. As with the previous analyses, the assumption of equal variances was examined first. Levene's test produced a significance value of 0.84, indicating that no significant variance difference existed between the two groups. Consequently, the interpretation of the t-test results was again based on the assumption of Equal variances.

The statistical test generated a t-value of -13.57 with 78 degrees of freedom, while the probability level remained below 0.001. This outcome provides strong statistical confirmation that the difference between the two testing stages is highly significant.

From a descriptive perspective, students initially obtained an average score of 3.78 (SD = 1.22) in the pre-test. After engaging in mind mapping activities, their performance increased substantially, reaching 7.48 (SD = 1.22) in the post-test. The difference between the two measurements was -3.70, with a 95% confidence interval of -4.24 to -3.16. Notably, this represents the largest improvement among the four test pairs, suggesting that the mind mapping strategy was particularly effective in helping students' structure and connect their ideas before writing.

3.1.1.4 Results of test 4 (Pre4 – Post4)

Finally, the fourth comparison was conducted to determine whether the pattern observed in the previous tests remained consistent. The preliminary variance analysis through Levene's Test produced a significance value of 0.63, which again exceeds the threshold of 0.05. This confirms that the assumption of equal variances was met, and the Equal variances assumed output was therefore used for interpretation.

The independent samples t-test produced a t-value of -12.12 with 78 degrees of freedom, and the significance level remained below 0.001. This indicates that the difference between the two testing occasions is statistically significant.

Examining the descriptive statistics reveals a clear shift in students' performance. Before the intervention, the average score stood at 3.94 (SD = 1.26). After mind mapping had been incorporated into the pre-writing stage, the average score increased markedly to 7.45 (SD = 1.33). The difference between the two measurements reached -3.51, with a 95% confidence interval extending from -4.09 to -2.94. This pattern once again highlights the positive influence of mind mapping on students' ability to generate ideas in preparation for writing tasks.

In conclusion, the results of the four test pairs consistently demonstrate that all Sig. (2-tailed) values are smaller than 0.001, indicating that the differences between the pre-tests and post-tests in all four comparisons are statistically significant at a very high level. In addition, the mean scores of all post-tests are considerably higher than those of the pre-tests, with mean differences ranging from 3.26 to 3.70 points.

These findings clearly suggest that the application of mind mapping in the pre-writing stage has produced a significant positive effect on sixth-grade students' ability to generate ideas when writing in English. Mind maps not only help students organize their ideas in a visual and structured manner but also enable them to expand and connect ideas more logically before beginning the writing process. Therefore, mind mapping can be considered an effective pedagogical tool for enhancing the teaching and learning of writing in the context of English as a Foreign Language at the lower secondary school level.

Table 4.2a: Statistical results of pairs of the pretest and posttest

Group Statistics					
	Index1	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Test: Pre1-Post1	1	40	3.44	1.33	.21
	2	40	7.00	1.24	.20
Test: Pre2-Post2	1	40	3.83	1.57	.25
	2	40	7.09	1.40	.22
Test: Pre3-Post3	1	40	3.78	1.22	.19
	2	40	7.48	1.22	.19
Test: Pre4-Post4	1	40	3.94	1.26	.20
	2	40	7.45	1.33	.21

Table 4.2b: Comparison results of pairs of the pretest and posttest

Independent Samples Test										
		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Test: Pre1-Post1	Equal variances assumed	.22	.64	-12.38	78	<.001	-3.56	.29	-4.13	-2.99
	Equal variances not assumed			-12.38	77.62	<.001	-3.56	.29	-4.13	-2.99
Test: Pre2-Post2	Equal variances assumed	.13	.72	-9.83	78	<.001	-3.26	.33	-3.92	-2.60
	Equal variances not assumed			-9.83	76.97	<.001	-3.26	.33	-3.92	-2.60
Test: Pre3-Post3	Equal variances assumed	.04	.84	-13.57	78	<.001	-3.70	.27	-4.24	-3.16
	Equal variances not assumed			-13.57	78.00	<.001	-3.70	.27	-4.24	-3.16
Test: Pre4-Post4	Equal variances assumed	.24	.63	-12.12	78	<.001	-3.51	.29	-4.09	-2.94
	Equal variances not assumed			-12.12	77.72	<.001	-3.51	.29	-4.09	-2.94

The results displayed in Tables 4.2a and 4.2b further reinforce the improvement identified in the overall analysis. Across all four test pairs, the average post-test scores are markedly higher than the corresponding pre-test scores. For instance, in the Pre1–Post1 pair, the mean score increased from 3.44 to 7.00, while in the Pre3–Post3 comparison, the mean rose from 3.78 to 7.48. Such increases suggest that students made noticeable progress in

generating and expanding ideas after being introduced to mind mapping in pre-writing activities. Moreover, the t-test results reveal that all Sig. (2-tailed) values are below 0.001, confirming that the observed differences are statistically significant. These findings indicate that incorporating mind maps into the writing preparation stage can effectively help students structure their ideas and develop content more systematically before beginning the writing process.

3.1.2 Results of the Questionnaires

Based on the descriptive statistics presented in Table 4.3, a noticeable difference can be observed between the survey results collected before and after the implementation of mind mapping in pre-writing activities.

Before the use of mind mapping, the pre-questionnaire results from 40 students indicate a mean score of 3.83 with a standard deviation of SD = 0.31. The minimum value recorded is 3.42, while the maximum value reaches 4.92. This mean score suggests that, at the initial stage, students demonstrated only a moderate level of perception and attitude toward their ability to generate ideas during pre-writing activities. In addition, the relatively small standard deviation indicates a limited dispersion of the data, meaning that most students tended to report fairly similar perceptions of their learning experiences prior to the intervention.

After integrating mind mapping into classroom instruction, the post-questionnaire results reveal a clear improvement. The mean score increased to 4.27 with a standard deviation of SD = 0.24, while the minimum and maximum values were 3.33 and 4.58, respectively. The increase in the mean score indicates that students tended to express more positive evaluations of their ability to generate and expand ideas when participating in pre-writing activities supported by mind mapping. Overall, the descriptive statistics provide preliminary evidence that integrating mind mapping in the pre-writing stage may lead to positive changes in students' perceptions and learning experiences regarding idea generation before writing.

Table 4.3: Descriptive statistics of pre- and post-questionnaire

Descriptive Statistics					
	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
Pre-questionnaire	40	3.42	4.92	3.83	.31
Post-questionnaire	40	3.33	4.58	4.27	.24

The descriptive statistics presented in Table 4.3 reveal a positive shift in students' perceptions following the implementation of mind mapping in pre-writing activities. In particular, the post-questionnaire mean score was 4.27, compared with 3.83 in the pre-questionnaire. This increase suggests that students tended to express more positive evaluations of their ability to generate and develop ideas when writing. Furthermore, the relatively small standard deviations (0.31 before the intervention and 0.24 afterward) indicate that responses were not widely dispersed, suggesting that most students shared

similar views of their learning experience. Taken together, these descriptive results suggest that introducing mind mapping improved students' perceptions of the idea-generation process during the writing preparation stage.

The Independent Samples t-test was employed to compare the results of the pre- and post-questionnaires. The results presented in Tables 3.4a and 3.4b indicate that mind mapping effectively supports sixth-grade students' idea generation during the pre-writing stage.

First, the Group Statistics results (Table 4.4a) reveal a noticeable difference in the mean scores between the two survey stages. Specifically, before the implementation of mind mapping, the 40 participating students obtained a mean score of M = 3.83 with a standard deviation of SD = 0.31. After mind mapping was integrated into the pre-writing activities, the mean score increased to M = 4.27 with a standard deviation of SD = 0.24. This increase suggests an initial improvement in students' perceptions and evaluations of their ability to generate ideas during writing activities.

To determine whether this difference was statistically significant, an Independent Samples t-test was conducted. The result of Levene's Test for Equality of Variances shows a significance value of Sig. = 0.52 (> 0.05), indicating that the variances between the two groups are not significantly different. Therefore, the Equal variances assumed row was used to interpret the t-test results.

The results of the test (Table 4.4b) indicate a t-value of −7.09, with df = 78 and a significance level of Sig. (2-tailed) < 0.001. This finding demonstrates that the difference between the pre- and post-questionnaire means is statistically significant at a very high level. In addition, the mean difference is −0.44, with a 95% confidence interval ranging from −0.56 to −0.31, suggesting that the increase in the mean score after the intervention is stable and reliable.

Therefore, the results of the independent samples t-test indicate that applying mind mapping in the pre-writing stage produced a significant change in students' perceptions and evaluations of their ability to generate ideas when writing. These findings suggest that mind mapping can be an effective instructional tool for helping students organize and expand their ideas before completing writing tasks.

Table 4.4a: Statistical results of pre- and post- questionnaire

Group Statistics					
	Index1	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Questionnaire: Pre-post	1	40	3.83	.31	.05
	2	40	4.27	.24	.04

Table 4.4b: Comparison results of pre- and post- questionnaire

Independent Samples Test										
		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Questionnaire: Pre-Post	Equal variances assumed	.41	.52	-7.09	78	<.001	-.44	.06	-.56	-.31
	Equal variances not assumed			-7.09	73.19	<.001	-.44	.06	-.56	-.31

The findings reported in Tables 4.4a and 4.4b highlight a noticeable difference between students' responses before and after the application of mind mapping in classroom instruction. The mean score increased from 3.83 in the pre-questionnaire to 4.27 in the post-questionnaire, indicating that students developed more favorable perceptions of their ability to generate ideas when mind maps were used during pre-writing activities. The Independent Samples t-test further confirms this observation, as the Sig. (2-tailed). The value is lower than 0.001, demonstrating that the difference between the two survey stages is statistically significant. In addition, the 95% confidence interval does not include zero, which strengthens the reliability of the statistical result. Overall, these findings suggest that integrating mind mapping into the pre-writing stage improved students' perceptions of idea development in English writing tasks.

4.1.2.1. Analysis of the Pre1 – Post1 Pair

The results of a detailed comparison of the pre- and post-questionnaire content pairs are shown in Tables 4.5a and 4.5b. The comparison between Pre1 and Post1 provides initial evidence of the impact of mind mapping on students' perceptions related to the surveyed aspect. The descriptive statistics indicate that the mean score prior to the intervention was M = 3.93 (SD = 0.65). Following the implementation of mind mapping activities, the mean increased to M = 4.58 (SD = 0.41). This upward shift in the average score suggests that students tended to report more favorable responses after experiencing the instructional approach.

Before examining the t-test results, the assumption of equal variances was assessed using Levene's Test for Equality of Variances. The test produced a value of F = 6.98 with Sig. = 0.01, which is lower than the conventional significance threshold of 0.05. This result

indicates that the variances between the two groups are not equal. Consequently, the row "Equal variances not assumed" was used when interpreting the t-test output.

The statistical test yielded t = -5.37, with Sig. (2-tailed) < 0.001, demonstrating that the difference between the pre- and post-intervention scores is statistically significant. The calculated mean difference of -0.65 indicates that the post-test score exceeds the pre-test score by approximately 0.65 points. Furthermore, the 95% confidence interval, which ranges from -0.89 to -0.41, does not include zero, reinforcing the conclusion that the observed change is statistically reliable.

Taken together, these results suggest that introducing mind mapping during the pre-writing stage led to a noticeable improvement in students' perceptions of the learning experience for this item. The effectiveness of this approach may stem from its ability to support learners in visualizing relationships among ideas and structuring information more systematically before beginning the writing task.

4.1.2.2. Analysis of the Pre2 – Post2 Pair

A different pattern emerges when examining the Pre2–Post2 indicators. The descriptive results show that the mean score before the intervention was M = 3.31 (SD = 0.82), whereas the mean score after the intervention increased slightly to M = 3.47 (SD = 0.38). Although this change reflects a modest improvement, the magnitude of the increase appears relatively limited.

The Levene's Test result yielded F = 25.56 with Sig. < 0.001, indicating a substantial difference in variances between the two groups. In light of this finding, the interpretation of the t-test relies on the results reported in the "Equal variances not assumed" row.

The t-test produced a t value of -1.14, with a Sig. (2-tailed) value of 0.26, which is greater than the commonly accepted threshold of 0.05. This outcome indicates that the difference between the pre-test and post-test mean scores is not statistically significant. The mean difference of -0.16 further confirms that the change between the two stages is relatively small. In addition, the 95% confidence interval, ranging from -0.45 to 0.12, includes zero, suggesting that the observed difference may have occurred by chance.

These findings imply that applying mind mapping did not produce a statistically significant effect on the aspect represented by the Pre2–Post2 indicators. Several factors may explain this result. First, the survey item may reflect a dimension less directly influenced by mind-mapping strategies. Second, students' perceptions regarding this aspect may already have been relatively stable prior to the intervention, leaving limited room for measurable change. Finally, the relatively short experimental period may have limited the observable impact of the instructional method across all aspects of the learning process.

4.1.2.3. Analysis of the Pre3 – Post3 Pair

The analysis of the Pre3–Post3 pair once again reveals a clear improvement following the intervention. According to the descriptive statistics, the mean score before mind mapping was M = 4.38 (SD = 0.51). After the instructional activities incorporating mind maps were

implemented, the mean score increased to M = 4.82 (SD = 0.35). This increase indicates that students expressed stronger agreement with the surveyed statement after participating in the intervention.

The assumption of equal variances was tested using Levene's Test, which yielded F = 12.88, Sig. < 0.001. Since the significance value is below 0.05, the variances between the two groups cannot be considered equal. Therefore, the results reported under the "Equal variances not assumed" condition were used in the interpretation of the t-test.

The t-test results indicate t = -4.52 with Sig. (2-tailed) < 0.001, demonstrating a highly significant difference between the pre-intervention and post-intervention scores. The mean difference of -0.44 suggests that the post-test mean is approximately 0.44 points higher than the pre-test mean. Moreover, the 95% confidence interval, which ranges from -0.64 to -0.25, does not cross zero, providing further evidence of a statistically significant change.

These findings indicate that mind mapping had a positive, measurable effect on the aspect represented by the Pre3–Post3 indicators. By encouraging students to represent and connect ideas visually, mind maps may have supported more effective idea development and preparation prior to writing.

When the results from all three indicator pairs are considered together, the analysis reveals that the influence of mind mapping on students' pre-writing activities varies across the dimensions examined. In particular, both the Pre1–Post1 and Pre3–Post3 comparisons demonstrate statistically significant improvements ($p < 0.001$) after the intervention. These results suggest that integrating mind mapping enhances students' perceptions and learning experiences during the idea-generation stage of writing. The findings are consistent with earlier research indicating that visual organizational tools can help learners structure and elaborate ideas more effectively.

By contrast, the Pre2–Post2 comparison does not show a statistically significant change. Although a slight increase in the mean score was observed after the intervention, the difference was not large enough to confirm a meaningful effect. This result suggests that the impact of mind mapping may be more closely associated with processes directly related to idea generation and organization than with all aspects of the learning experience.

In summary, the findings indicate that integrating mind mapping into pre-writing instruction can meaningfully enhance idea generation among lower secondary EFL learners. Through visual organization and the establishment of connections among ideas, mind mapping provides practical support for students as they prepare content before composing written texts. As such, it represents a useful pedagogical tool for improving the effectiveness of pre-writing instruction in English language classrooms at the secondary level.

Table 4.5a: Statistical results of pairs of the pre- and post- questionnaire

Group Statistics					
	Index1	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Questionnaire: Pre1-Post1	1	40	3.93	.65	.10
	2	40	4.58	.41	.06
Questionnaire: Pre2-Post2	1	40	3.31	.82	.13
	2	40	3.47	.38	.06
Questionnaire: Pre3-Post3	1	40	4.38	.51	.08
	2	40	4.82	.35	.06

Table 4.5b: Comparison results of pairs of the pre- and post- questionnaire

Independent Samples Test										
		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**95% Confidence Interval of the Difference**	
									Lower	**Upper**
Questionnaire: Pre1-Post1	Equal variances assumed	6.98	.01	-5.37	78	<.001	-.65	.12	-.89	-.41
	Equal variances not assumed			-5.37	65.65	<.001	-.65	.12	-.89	-.41
Questionnaire: Pre2-Post2	Equal variances assumed	25.56	<.001	-1.14	78	.26	-.16	.14	-.45	.12
	Equal variances not assumed			-1.14	54.82	.26	-.16	.14	-.45	.12
Questionnaire: Pre3-Post3	Equal variances assumed	12.88	<.001	-4.52	78	<.001	-.44	.10	-.64	-.25
	Equal variances not assumed			-4.52	69.66	<.001	-.44	.10	-.64	-.25

The results summarized in Tables 4.5a and 4.5b show that the impact of mind mapping varies across the questionnaire's measured aspects. In particular, the comparisons between Pre1–Post1 and Pre3–Post3 show clear increases in the mean scores after the intervention, and the statistical tests indicate that these changes are significant. These results suggest that mind mapping positively influenced students' perceptions of organizing and developing ideas before writing. By contrast, the Pre2–Post2 comparison shows only a slight increase in the mean score, and the difference is not statistically significant. This outcome suggests that the effect of mind mapping may be more evident

in idea generation and organization than across all dimensions of the learning experience. Overall, these findings provide further evidence that mind mapping can help students prepare their ideas more effectively before engaging in writing tasks.

Based on the quantitative findings, it can be concluded that the application of mind mapping in the pre-writing stage had a positive effect on students' idea-generation process. The statistical analyses indicate a clear improvement in students' ability to generate, develop, and organize ideas after participating in learning activities that incorporated mind mapping. These results suggest that using a visual organizational tool during the writing preparation stage can help learners approach writing tasks more structurally and effectively.

In addition to the improvement reflected in the test results, the questionnaire data also reveal noticeable changes in students' perceptions and learning experiences. After the experimental period, students tended to express stronger agreement with the importance of organizing ideas before writing, and they demonstrated more favorable attitudes toward pre-writing activities involving mind mapping. This finding indicates that mind mapping not only facilitates the development of writing-related skills but also increases students' confidence and engagement in the learning process.

Shortly, the quantitative evidence provides convincing support for the effectiveness of integrating mind mapping into pre-writing activities in English writing instruction for lower secondary school students. The use of this strategy enables learners to approach writing preparation more visually and systematically, allowing them to establish connections among ideas before composing their texts. Mind mapping can be regarded as a valuable pedagogical approach for enhancing the effectiveness of pre-writing instruction in English language classrooms at the secondary level.

4. Discussion

4.1 Discussion of Quantitative Findings

The quantitative findings provide empirical evidence that supports the research framework and research questions presented in Section 2. The results demonstrate that the use of mind mapping in the pre-writing stage significantly improved Grade 6 students' ability to generate and organize ideas before writing.

Regarding *Research Question 1*, which examined whether mind mapping improves students' idea-generation ability in writing tasks, the results of the pre-test and post-test comparisons show a clear improvement. The mean score increased from 3.74 in the pre-test to 7.25 in the post-test, and the statistical test confirmed that the difference was highly significant ($p < 0.001$). This finding indicates that students were able to develop and expand their ideas more effectively after learning how to use mind maps during pre-writing activities. The consistent improvement across the four test pairs (Pre1–Post1, Pre2–Post2, Pre3–Post3, and Pre4–Post4) further confirms that the strategy helped students organize and elaborate their ideas in different writing tasks.

In relation to *Research Question 2*, which explored students' perceptions of mind mapping in pre-writing activities, the questionnaire results also show a positive change. The mean score increased from 3.83 before the intervention to 4.27 after the intervention, and the difference was statistically significant ($p < 0.001$). This suggests that students developed more positive attitudes toward generating and organizing ideas when mind maps were used. In particular, the improvements observed in the Pre1–Post1 and Pre3–Post3 comparisons indicate that students felt more confident in structuring and expanding their ideas during the preparation stage of writing.

However, the Pre2–Post2 comparison did not show a statistically significant difference. This result suggests that the influence of mind mapping may vary depending on the specific aspect of the learning process being measured. While mind mapping clearly supports idea generation and organization, its impact on other dimensions of students' perceptions may be less direct.

These findings are consistent with the theoretical discussion presented in Section 2, which emphasized the role of mind mapping as a visual strategy that helps learners organize ideas and establish connections among concepts before writing. The results of this study provide further empirical support for previous research indicating that visual organizational tools can facilitate idea development in EFL writing.

Another important contribution of this study lies in its application to lower secondary school students, particularly Grade 6 learners who are at an early stage of developing writing skills. The findings suggest that introducing mind mapping at this level can help students approach writing preparation more systematically and confidently.

In summary, the quantitative findings confirm that the use of mind mapping positively influences both students' idea-generation ability and their perceptions of the pre-writing process. These results support the theoretical framework presented in Section 2 and demonstrate the practical value of integrating mind mapping into English writing instruction at the lower secondary school level.

5. Conclusion and Recommendations

5.1 Conclusion

This study investigated the effectiveness of mind mapping in supporting sixth-grade students' idea generation during the pre-writing stage of English writing. The conclusions are mainly drawn from the quantitative results, including the pre-tests, post-tests, and questionnaires.

The test results show a clear improvement in students' writing performance after the implementation of mind mapping. The post-test scores were significantly higher than the pre-test scores, and the statistical analysis indicated that the differences were highly significant ($p < 0.001$). This finding suggests that the use of mind mapping helped students generate, organize, and expand ideas more effectively before writing.

The questionnaire results also reveal a positive change in students' perceptions of the pre-writing process. After the intervention, students reported more favorable attitudes toward idea generation and expressed greater confidence when preparing to write. The increase in the mean scores between the pre- and post-questionnaires further supports the effectiveness of the instructional strategy.

Taken together, the quantitative findings indicate that integrating mind mapping into pre-writing activities can significantly improve students' ability to develop ideas and prepare content for writing tasks. Therefore, mind mapping can be considered a useful instructional strategy for teaching English writing at the lower secondary school level.

5.2 Implications

The findings of this study provide several pedagogical implications for English language teaching.

First, teachers should pay greater attention to the pre-writing stage in the writing process. Providing students with activities that support idea generation before writing can help them approach writing tasks more effectively.

Second, mind mapping can be used as a practical instructional tool to help students organize and expand their ideas. By visually connecting main ideas and supporting details, students can structure their thoughts more clearly before writing.

Third, teachers should provide clear guidance and examples when introducing mind mapping. Step-by-step instructions and model mind maps can help students understand how to apply this technique effectively in their writing preparation.

5.3 Limitations

Despite the positive results, several limitations should be acknowledged.

Firstly, the study involved only 40 sixth-grade students from one school, which may limit the generalizability of the findings to other contexts.

Secondly, the intervention period was relatively short, which may not fully capture the long-term impact of mind mapping on students' writing development.

Thirdly, the quantitative analysis mainly focused on idea generation during the pre-writing stage and did not examine other aspects of writing performance, such as grammar, vocabulary, or overall writing quality.

5.4 Further Research

Future studies may expand this research in several directions.

First and foremost, the researchers may conduct studies with larger samples and different educational contexts to confirm the effectiveness of mind mapping in EFL writing instruction.

Second, future research may investigate the long-term impact of mind mapping on students' writing development over an extended period.

Third, further studies may examine how mind mapping influences other aspects of writing, such as organization, language use, or overall writing quality.

Last but not least, researchers may explore the integration of mind mapping with other pre-writing strategies to determine how different techniques can work together to support students' writing development.

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