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THE EFFECTIVENESS OF MIND MAPPING IN CONSTRUCTING ARGUMENTS IN WRITING AN ARGUMENTATIVE TEXT

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ABSTRACT

The ability to compose and develop ideas in argumentative writing has become a challenge for grade XI students in a private high school in Indonesia, and mind mapping is believed in the literature to be a potential strategy to overcome the challenge. This mixed-method experimental study, therefore, was designed to examine the effectiveness of mind mapping as a prewriting strategy. The study's results, which compared the pre-test and post-test scores analyzed using the Nonparametric-Wilcoxon Signed Rank Test, showed a significant value in the experimental group with Asymp Sig. (two-tailed) 0.003<0.05. The participants also expressed their perceptions of the mind-mapping features through a questionnaire and interview. Data analysis conducted using In Vivo coding in this research showed that the mind-mapping elements with the most significant influence on content exploration, text structure, convenience and interest in writing, time efficiency, and thinking skills were keywords, colors, and branches. Nevertheless, three participants said they did not make any progress for several reasons. The significant finding and the vast majority of positive opinions indicated that mind mapping was an effective strategy for developing ideas in argumentative writing. In further research, it would be interesting to explore how this strategy could be applied to a larger learning community by combining it with other strategies to improve learning outcomes.

Key Words: Argument; argumentative text; mind mapping; perception

ABSTRAK

Tantangan pada penulisan teks argumentatif yang dihadapi pelajar kelas XI di sebuah Sekolah Menengah Atas (SMA) swasta di Indonesia terletak pada kemampuan menyusun dan mengembangkan gagasan. Maka, kendala tersebut diatasi melalui studi eksperimental menggunakan metode campuran dengan menerapkan prewriting berbentuk mind mapping. Hasil penelitian berupa perbandingan nilai pre-test dan post-test yang dianalisis menggunakan Nonparametric-Wilcoxon Signed Rank Test menunjukkan nilai yang signifikan pada experimental group dengan Asymp.Sig.(2-tailed) 0.003<0.05. Partisipan kemudian mengungkapkan persepsinya terhadap penggunaan mind mapping melalui kuesioner dan wawancara yang dianalisis menggunakan teknik In Vivo coding. Dari hasil analisis, diketahui bahwa kata kunci, warna, dan cabang merupakan komponen mind mapping yang paling berdampak pada eksplorasi konten, struktur teks, kemudahan dan minat menulis, efisiensi waktu, serta keterampilan berpikir. Meskipun demikian, terdapat 3 orang partisipan yang mengungkapkan bahwa mereka tidak merasakan perkembangan karena penyebab tertentu. Signifikansi hasil penelitian dan persepsi yang mayoritas positif menyiratkan bahwa mind mapping merupakan strategi yang cocok untuk mengembangkan gagasan pada penulisan teks argumentatif. Maka, pada penelitian selanjutnya, menarik untuk melihat fungsi mind mapping pada komunitas belajar yang lebih besar dan menggabungkannya dengan strategi lain untuk mengoptimalkan hasil belajar.

Kata Kunci: *Argumen; teks argumentatif; mind mapping; persepsi*

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INTRODUCTION

In teaching writing, teachers have a responsibility to help students create a text composition by giving them explicit and systematic guidance (Poch et al., 2020). It is essential to implement appropriate writing techniques to assist students in composing a text either by providing a model (Keen, 2021), assigning a pre-task (Johnson, 2014), or using a prewriting activity (Ellis, 2021). Therefore, teachers must fully understand the target audience, the purpose, and the function of the text beforehand (Bachani, 2015).

In Indonesia, particularly at the senior high school level, which implements a national curriculum, students learn how to write various kinds of text types, which are getting more complex; one of the most challenging ones is argumentative text writing. It requires higher-order thinking skills (Chen et al., 2021) as it involves a cognitive process to think analytically and to organize creative and critical ideas (Aziz & Ahmad, 2017). However, in general, students' cognitive abilities at this level have not developed optimally. They still have limited ideas and cannot state logical arguments. This problem was also encountered by the students in grade XI in one of the private schools in Indonesia. This was identified through observation of the process and the outcomes of the writing activities. The students found that argumentative writing was difficult. Therefore, this experimental study was conducted o an experimental group of 15 students and a control group of 9 students to determine the effectiveness of mind mapping as a prewriting strategy when students were developing argumentative texts.

A mind map is a conceptual diagram (Wette, 2017) that was first introduced by Tony Buzan (Sbaa et al., 2022) and is often used as a strategy for learning writing (O'hara & Budiyono, 2019). Using the shapes, keywords, branches, line connectors, and other components in a mind map makes organizing ideas and creating a well-structured text easier. It accommodates thinking processes by exposing relevant detailed information, organizing or clustering, and linking ideas (Buzan & Buzan, 2009).

Applying the mind-mapping strategy in writing practices improves students' ability to organize ideas and articulate them in the text (Wette, 2017) because it implements an associative memory model. It accommodates the information processing in the brain and forms interconnections between neurons (Swestyani et al., 2018). Mind mapping enables the activation of the

left brain, which is linked to language processing, and the right brain, which is connected to creativity. Thus, mind mapping in the classroom is ideal because it balances the students' brain functions (Jensen, 2008).

Some prior research has revealed that mind mapping is an effective strategy in teaching writing. At the high school level, it is used as a brainstorming strategy for writing various text types (Riswanto & Putra, 2012). When writing challenges increase, such as in argumentative texts at the university level, the mind mapping strategy can produce a cohesive text (Saputra et al., 2021). Writing essays with a mind map also provides a concrete structure for a specific topic, which enables students to distinguish positive from negative ideas (Vijayavalsalan, 2016).

The mind mapping strategy used in the teaching process has proven effective in increasing the motivation and participation of both high and low-motivated students. A study of students learning to write a hortatory exposition in a vocational high school showed that the mind-mapping strategy positively improved students' post-test results (Ernidawati & Sutopo, 2017). The study revealed that applying the mind map reduced some psychological problems related to EFL self-efficacy and self-confidence in writing (Alluhaybi, 2015).

Using the strategy in writing encouraged students to engage in dynamic idea exploration and discussion. Those who previously were worried and doubtful were better at developing ideas (Saed & AL-Omari, 2014). This brainstorming strategy impacted the students' positive attitudes toward writing (DePorter & Hernacki, 2005).

The role of mind mapping as a potential strategy that can be applied to a classroom context was a solution to the problems underlying this research. This research aimed to determine the implication of using the mind mapping strategy on the experimental group participants' argument development in composing an argumentative text.

The strategy's effectiveness was found by observing the difference between the pre-test and post-test scores of the group of students who used mind mapping and those who did not. This study also revealed the participants' perception of mind mapping as an argumentative text prewriting strategy.

METHOD

This research employed a mixed method approach (Creswell, 2015),

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presenting both qualitative and quantitative data. The methodology used included the research design, site and participants, data collection, and analysis.

Research design

This mixed-method research used a pragmatic worldview as the guiding philosophy. This philosophy emphasizes that the research is problem-centered and practice-oriented and results from implementing a strategy into action (Creswell & Creswell, 2018).

The quantitative objective of this study was to discover the effectiveness of mind mapping as a prewriting strategy and to find the score difference between participants who used mind mapping and those who did not use it. The students' perceptions of mind mapping were then presented qualitatively.

The research design used in this study refers to Creswell (2015). The study started by exploring prior research about using mind mapping as a prewriting strategy. Then, pre-test, intervention, and post-test were conducted on experimental and control groups. The findings of the study were explained qualitatively. The experimental method applied was quasi-experimental as it used a non-equivalent control (comparison) group design because the participants came from two existing classes that could not be randomized (Blair, 2016).

Research site and participants

The study was conducted in two classes of grade XI students in a private high school in Indonesia, one as the control group and the other as the experimental group. The participants came from various backgrounds, which influenced their language proficiency; for example, some students had grown up speaking English, had taken English course classes, or had even lived abroad. In contrast, some participants were not accustomed to speaking English because their previous schools had not adequately accommodated L2 learning. The description of the participants is presented below in Table 1.

Table 1. Participant description

Group	Gender	Proficiency Level
Experimental Group (class XI, N=15)	Male, N=9 Female, N=5	Low, N=4 Intermediate, N=6 Advanced N=5
Control Group (class XI, N=9)	Male, N=5 Female, N=4	Low, N=4 Intermediate, N=3 Advanced N=2

The proficiency level was based on the conversion of school exam scores in

the previous semester, which referred to the minimum mastery criteria of the English subject.

The table above shows three proficiency levels among the participants: low, intermediate, and advanced. Despite the different numbers of participants in the experimental and control groups, the distribution of proficiency was balanced. The distribution of language proficiency levels was based on the result of the student's previous semester scores, whose interval was modified from the minimum criteria score for the English subject.

Data collection and analysis

The data collected in this study consisted of the participants' mind maps and argumentative texts, the answers to a questionnaire, and the answers to an interview. The experimental group participants' mind-mapping assignment results, analyzed using Ohassta's rubric (2004), revealed that implementing mind mapping in the prewriting stage helped the participants develop arguments in writing argumentative texts. The argumentative texts in both groups were then evaluated using the argumentative text rubric (Tucker, 2012). A rater with 15 years of experience teaching English at high school and certified by Buzan Supermap™ training assessed these assignments.

In order to determine the effectiveness of using the mind mapping strategy, the pre-test and post-test scores of the experimental and control group participants were compared using the SPSS 29.0 Nonparametric-Wilcoxon Signed Rank Test. This data analysis technique assumed that there was a significant difference between the pre-test and post-test results in research involving a small number of participants.

Then, the closed-ended questionnaire instrument (Nunan & Bailey, 2009) was distributed to acquire the students' perceptions of mind mapping as an argumentative text prewriting strategy. The questionnaire was delivered through Google Forms and analyzed using SPSS 29.0 Descriptive Statistics.

Finally, additional data were obtained from face-to-face interviews with all experimental group participants. The interview was aimed to explore and discover participants' perceptions of the mind-mapping strategy they had used. The interview data were analyzed using NVivo 12 software using In Vivo coding technique.

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FINDINGS AND DISCUSSION

Findings

The ability of the participants to create a mind map during the prewriting stage of writing their argumentative texts was analyzed using Ohassta's rubric (2004). It demonstrated their skill level with the prewriting technique. The rubric's scale ranged from levels 1- 4. Level 4 represented the highest ability to create a mind map in terms of drawing a central image, exploring with adequate knowledge, selecting the appropriate keywords, using color/code/ connection, and developing a good flow of ideas. On the contrary, level 1 in the rubric represented the lowest ability to create mind maps.

The participants' mind-mapping ability level, analyzed by Ohassta's rubric (2004), can be observed in Table 2.

The experimental group participants in this study achieved level 3 in developing mind maps based on the depth of knowledge, central images, keywords, and colors/codes/ \connections criteria. They demonstrated a wide range of content development when creating a mind map. They also showed the ability to select keywords that implied their content comprehension. Furthermore, the participants also created images related to the main idea and consistently used colors/codes and connections in the mind map. Meanwhile, the participants achieved level 4 on the ideas flow criteria. The flow of ideas from complex to simple was stated clearly and accurately. They could connect the ideas from the center of the mind map.

Table 2. Participants' mind map ability level

	Level of mind map				
Partici-pant	Depth of knowledge	Central picture	Key word	Color / code/ connection	Ideas flow
S1	3	3	2	3	4
S2	3	2	2	3	4
S3	3	3	4	4	4
S4	3	4	3	3	4
S5	3	3	2	3	4
S6	3	4	3	3	4
S7	2	1	1	2	3
S8	3	3	4	3	4
S9	2	4	3	3	4
S10	3	3	4	3	4
S11	3	3	4	4	4
S12	2	3	3	2	3
S13	3	4	4	4	4
S14	3	3	4	4	4
S15	3	3	4	3	4
Mean	2,8	3,1	3,1	3,1	3,9

The participants' levels indicated that they understood how mind maps worked and could use them consistently. The participants' average

achievement level implied that they could create an ideal mind map in prewriting an argumentative text. However, during the practice, the participants still received feedback and corrections regarding the length of the keywords, the limited development of branches, and the color settings while creating the mind maps.

Thus, to determine the effectiveness of this strategy, a pre-test and post-test were conducted on the experimental and control groups. The results analyzed by SPSS 29.0 Nonparametric-Wilcoxon Signed Ranks Test are presented in Table 3.

After three argumentative writing practice sessions, 11 of the 15 experimental group participants who used mind mapping in the prewriting activity had higher post-test scores, with an average increase of 6.95 points and a favorable rating of 76.50. One participant's score decreased by an average of 1.50 points, and 3 participants had identical scores as their pre-test. The control group showed different results. The post-test scores of 7 out of 9 participants increased by an average of 5.21 points and a positive rating of 36.50. The scores of 2 participants in this group decreased, with an average of 4.25 points and a negative rating of 8.50.

Table 3. Wilcoxon Signed-Rank Test of the experimental and control group pre-tests and post-tests

Ranks				
Group	Pre-test - Post-test	N	Mean Rank	Sum of Ranks
Experimental group	Negative Ranks	1[a]	1.50	1.50
	Positive Ranks	11[b]	6.95	76.50
	Ties	3[c]		
	Total	15		
Control group	Negative Ranks	2[a]	4.25	8.50
	Positive Ranks	7[b]	5.21	36.50
	Ties	0[c]		
	Total	9		

a. Post-test < Pre-test
b. Post-test > Pre-test
c. Post-test = Pre-test

Although most participants in both groups had increased post-test scores, the experimental group participants' scores were 1.74 points higher than that of the control group. The average difference in post-test score reduction in the experimental group was 2.75 points lower than in the control group. The statistical result of the analysis using the SPSS 29.0 Wilcoxon Signed Ranks Test is shown in Table 4.

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Table 4. Wilcoxon Signed Ranks Test's statistics of the experimental and control group pre-test and post-test

Test Statistics (Experimental group)		Test Statistics (Control group)	
	Post-test-Pre-test		Post-test-Pre-test
Z	-2.955[b]	Z	-1.663[b]
Asymp.Sig. (2-tailed)	.003	Asymp.Sig. (2-tailed)	.096
a. Wilcoxon Signed Ranks Test		a. Wilcoxon Signed Ranks Test	
b. Based on opposing ranks.		b. Based on negative ranks.	

The hypothesis is accepted in the Wilcoxon Signed Ranks Test if the Asymp.Sig. The value is 0.05. In contrast, the hypothesis is rejected if the Asymp.Sig.>0.05. As a result, the experimental group statistical test output of Asymp.Sig. (2-tailed) 0.003 indicated that the hypothesis was accepted, i.e., that there was a significant difference in value between the experimental group participants' pre-tests and post-tests. Meanwhile, the hypothesis in the control group was rejected because the statistical test was Asymp.Sig.(2-tailed) 0.096>0.05. This implied that no significant difference existed between the pre-test and post-test scores of the control group participants. In conclusion, it is feasible to state that the mind-mapping strategy significantly improved the experimental group participants' writing skills.

The experimental group participants' perceptions of mind mapping as an argumentative text prewriting strategy were collected through a questionnaire and interviews. The two instruments had two variables that focused on how they perceived the benefits and which component of this mind-mapping strategy contributed the most to the argument development. The data from the questionnaire were analyzed using SPSS 29.0 Descriptive Statistics, and the results are shown in Table 5.

Table 5. Questionnaire Descriptive Statistics

Variable	Descriptive Statistics					
	Questions	N	Minimum	Maximum	Mean	Std.Deviation
Mind map's benefits	Q3	15	3	5	4.13	.516
	Q4	15	3	5	4.13	.516
	Q5	15	3	5	4.33	.617
	Q9	15	3	5	4.13	.743
	Q13	15	3	5	4.40	.632
	Q14	15	3	5	4.27	.704
	Q15	15	4	5	4.47	.516
	Q16	15	3	5	4.27	.704
	Q17	15	3	5	4.07	.799
	Q18	15	3	5	4.07	.799
	Q20	15	3	5	4.13	.834
	Valid N (listwise)	15				
Mind	Q1	15	3	5	4.40	.632

Variable	Descriptive Statistics					
	Questions	N	Minimum	Maximum	Mean	Std.Deviation
map's components	Q2	15	3	5	4.40	.632
	Q6	15	3	5	4.47	.743
	Q7	15	3	5	4.33	.724
	Q8	15	4	5	4.53	.516
	Q10	15	2	5	4.20	.862
	Q11	15	3	5	4.33	.617
	Q12	15	3	5	4.27	.594
	Q19	15	4	5	4.67	.488
	Valid N (listwise)	15				

The questionnaire consisted of 11 questions about the benefits of mind mapping and 9 questions about the mind map components that were useful for developing ideas. The participants selected an option based on their opinion from a Likert scale with options ranging from 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), and 5 (strongly agree). Based on the average range of 4.07 to 4.67 in Table 5, we can conclude that the participants generally expressed positive opinions by selecting the 'agree and strongly agree' options.

The questionnaire results were triangulated with the interview findings. It was analyzed using Nvivo 12 with the In Vivo technique by determining the nodes and child nodes based on the words that appeared most frequently in the interviews. Figure 1 illustrates the visualization of the nodes and child nodes' connection.

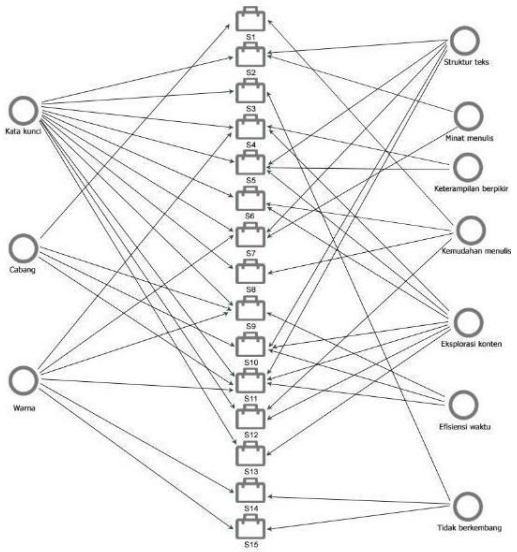

Figure 1. NVivo Visualization

Table 6. NVivo mapping

Nodes	Child nodes	Participant
The most effective mind map components	Keyword	S2, S3, S4, S5, S6, S7, S8, S9, S11, S12, S13
	Branches	S1, S9, S10, S11
	Colors	S4, S7, S9, S11, S14, S15
The benefits of a mind map	Text structure	S2, S5, S7, S10, S11
	Writing interest	S2, S7
	Thinking abilities	S4, S5
	Writing convenience	S1, S6, S8, S12
	Exploration of content	S4, S5, S6, S10, S11, S12, S13
	Time efficiency	S9, S10, S11
	Not seeing any progress.	S3, S14, S15

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A connecting line in the NVivo 12 visualization indicates the connection between cases (student 1/ S1 – student 15/ S15), nodes, and child nodes. Each formed connection represents a sentence about nodes and child nodes from the interview transcription. Table 6 below shows the mapping of nodes and child nodes to make it easier to understand Figure 1.

Table 6 shows the two research-related nodes (1) the most effective mind map components and (2) the benefits of mind mapping. The child nodes formed in the mind map components that were most effective in assisting participants in developing ideas were (1) keywords, (2) colors, and (3) branches. Meanwhile, the benefits of the mind mapping strategy mentioned by the participants consisted of (1) exploration of content, (2) text structure, (3) writing interest, (4) time efficiency, (5) writing convenience, and (6) thinking abilities; however, some of them also said they (7) did not feel they had made any progress. The relationship between the two nodes in the data provided an overview of how the participants perceived the use of mind maps when writing argumentative texts.

Discussion

This section outlines the effectiveness of Buzan's mind mapping as a prewriting strategy for developing arguments in argumentative text writing. The results show how the participants implemented the strategy and its impact on the post-test outcomes. Furthermore, this part also explains the students' perspective of the mind-mapping strategy. The discussion emphasizes how the research findings support or complement prior studies.

Mind Mapping as a Prewriting Strategy

At the beginning of the exercise, the participants first learned how to create a handwritten mind map. They developed mind maps by exploring information through various academic and popular literature on the Internet. The participants in Saputra et al.'s study (2021) also applied similarly and utilized digital sources to find supplementary material. One sample of a participant's handwritten mind map in this research is illustrated in Figure 2.

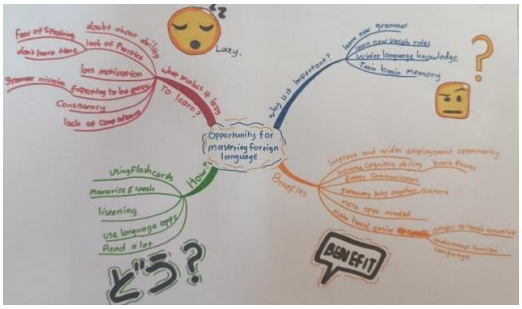

Figure 2. A sample of a handwritten mind map

Figure 2 displays how the participant first put down the main topic, followed by the subtopics. Further, the branches were written clockwise to make it easier for the brain to separate similar ideas and scopes, and each group had a similar color. The flow of ideas from general to specific was represented by the shape of branches curved from thick to thin. The information became more complex and detailed as additional branches were formed. This participant's technique was close to the one that Buzan introduced.

As all participants had a common interest in technology, they were also introduced to digital mind mapping through various apps such as Xmind and Canva. The samples of Xmind and Canva mind maps which were created by the participants in this study, are shown in Figures 3 and 4.

Figure 3. A sample of an Xmind digital mind map

Figure 4. A sample of the Canva digital mind map

Figures 3 and 4 show that the participants could create mind maps independently. Although using a digital mind map was operated based on a similar principle that Buzan introduced, each application had its unique features.

The participants had different preferences when creating mind maps, whether done manually by handwriting or digitally by using an application. Despite the difference, the benefits of both mind mapping creation methods

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were the same; the participants used mind maps as a prewriting strategy to explore ideas that impacted text quality and time efficiency. By using the mind maps in the prewriting stage, the participants could complete writing assignments within 90 minutes. This showed that they had made significant progress because most participants could not complete their assignments on time.

The most critical aspect of producing the mind maps was how the participants used them to express their thoughts on a particular topic. This point was also stated by Saputra et al. (2021) that the mind map components helped students express their ideas. They generally demonstrated this ability during the mind-mapping exercise process and showed a capability to implement the mind-mapping components based on Buzan's procedure.

Mind Map Implications of mind mapping for Argumentative Text Writing

Overall, the participants demonstrated adequate skills when creating a mind map. The experimental group participant post-test results improved significantly after using mind maps to construct arguments in their argumentative texts. In contrast, there was no significant increase in scores among the control group participants. This finding showed that mind mapping was more effective as a prewriting strategy than other methods. Aligned with the experimental study by Riswanto & Putra (2012), mind mapping increased the participants' post-test scores.

The ability to create an appropriate mind map influenced the depth of content, the direction of developing ideas, and the efficiency of time when the participants wrote argumentative texts. This affected the significance of the increased scores of participants who used mind mapping during the prewriting stage.

Mind mapping, as well as improving writing scores, also had a positive impact on participant attitudes toward writing. Even though argumentative text writing in senior high school was considered difficult, the participants found it easier to write after they first created a mind map to write the text. As the participants were able to develop complex writing, they developed a more positive attitude toward productive skills learning (Vijayavalsalan, 2016).

Participant Perceptions about the Benefits of Mind Mapping

The participants shared 7 benefits of mind mapping as explained in the findings. They stated that the structure of the argumentative text was affected by the argument framework they developed in the mind map. Based on the questionnaire, 46.7% of the participants agreed, and another 46.7% strongly agreed that grouping ideas on the mind map branches made writing more accessible. This finding supports Vijayavalsalan's (2016) study, which claimed that mind mapping increases thinking capacity by allowing students to categorize ideas orderly and logical. The participants could better distinguish the ideas for their text through their mind map's precise structure.

The keywords from each mind map branch were transformed into well-structured text. This writing development made the participants aware of their improvement and helped them gain better confidence in writing. However, there are some noteworthy points to consider; even though mind mapping supported the text structures, specific skills were required to connect each idea. Participants had to be able to turn the keywords into sentences and ensure that all information was linked together.

Mind mapping, in terms of content exploration, allowed the participants to express and categorize all their ideas following the writing plan. 40% of the participants said they strongly agreed, and 33.3% agreed that they came up with new ideas while making mind maps. The content exploration stage started by choosing a topic and was followed by the participants exploring various sources, mainly through technology, to search for data that would be developed in the mind map.

Developing well-classified and structured ideas enabled the participants to write more quickly. Forty-six point seven percent (46.7%) of the participants strongly agreed, and 40% agreed they could use their time more efficiently. Compared to other prewriting strategies, the clear-listed points on the mind map prevented time wasted due to a writing block.

The mind map strategy reduced the participants' burden when writing texts. 73.3% of the participants strongly agreed with the statement, and 20% agreed. Since a brief overview of the ideas to be developed was already available, the participants enjoyed the writing process more. It dispelled their previous thought of argumentative writing as a complex skill. In line with a study conducted by Saed & AL-Omari (2014), the participants eventually had

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better motivation because they could overcome writing difficulties and produce more organized texts.

The findings of this study also support the results of the previous research by Ernidawati & Sutopo (2017), who discovered that both high and low-motivated students could use a mind map to develop ideas in writing. However, some participants in this study thought that the mind map was ineffective for them. The factors could be related to their proficiency level and learning modality. If the participants lack language skills, they are likely unable to create mind maps and prefer to develop ideas by stacking notes.

Participants Perceptions About the Most Effective Mind Map Components

Even though Buzan & Buzan (2009) stated that ideally, a mind map contained branches, pictures, colors, keywords, and symbols, this research showed that the participants only used three of the components effectively, namely (1) the keywords, (2) colors, and (3) branches. The keywords in the mind map assisted them in widening their arguments. Using the keywords made developing sentences in the text more accessible, according to 47% of the participants who agreed or strongly agreed with this statement. They overcame writing challenges and could recall the sources they had read. Since each word in the mind map could be interpreted from different angles, it helped to strengthen participants' critical thinking and creative writing abilities.

The participants mentioned that the mind map's branches, in addition to the keywords, were essential for the creation of ideas. Sixty percent (60%) strongly agreed, while 33.3% agreed that they could develop more branches in their mind maps after repeatedly practicing. The mind map's branches contained the main points of arguments that they would explain in the text. The connection between the branches and the main topic also helped them comprehend the direction of the development of their writing. The branches made it simpler to comprehend how the various components of the mind map connected.

The other component mentioned by the participants as the most substantial one in the mind map was colors. The mind map had color groupings that represented a topic development. Since each group of branches shared the same color, it was easier for the brain to concentrate on related claims, making the idea clusters stand out clearly. The variety of colors

also increased writing motivation, especially for visual learners.

CONCLUSIONS AND SUGGESTION

The result of this experimental study provides an overview of the potential of mind mapping as a prewriting strategy when writing argumentative texts. Related to the research applied, the use of mind mapping at the prewriting stage contributed to a significant impact on the post-test scores of the experimental group participants. Thus, the implications of the various components in the mind map were proven to uplift the quality of the argumentative texts produced and were a good strategy for developing ideas.

The participants shared their perceptions of the most effective mind map components when developing ideas and the impact felt after using the strategy. Overall, most participants mentioned that they had significantly improved their writing skills, and it was easier to write an argumentative text by creating mind maps in the prewriting stage. This research also found that the participants only needed 2-3 components of keywords, branches, and colors to create effective mind maps.

When using a mind map and its components, the participants practiced exploring content which involved thinking skills to organize their ideas in a clear structure. The concrete structure in the mind map helped the participants distinguish the ideas in the text. When the writing structure is presented in a systematic flow, it is easier for participants to develop their ideas, which also impacts time efficiency.

Due to the various advantages of mind mapping, it is recommended to implement this strategy in the classroom writing processes. It enables students to write an informative and firmly structured text. Mind mapping can be classified as a student-oriented strategy because it allows students to explore the information they want to know freely. Therefore, they can find and learn new knowledge independently.

The participant perspectives on mind mapping in this study showed the importance of considering the application of mind mapping in writing practice. It is necessary because the participants might have their own learning modalities and preferences affecting their writing. Mind mapping would be preferable among the participants with visual learning modality. On the other hand,

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participants with different learning modalities, such as auditory and kinesthetic, might choose different ways to develop ideas before writing the text. These factors must be considered so that mind mapping can be used effectively in a classroom setting by paying attention to all students' learning characteristics. If there are 3 writing exercises, the teachers can probably direct the students to create a mind map in 1-2 prewriting activities to combine various brainstorming strategies, especially mind mapping.

Long-term use of mind mapping has the potential to help students understand material with higher complexity. In future research, it would be interesting to test the mind mapping strategy in larger groups and combine it with other strategies to contribute to student writing skills development.

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