

## Students' Perceptions of Using Online Mind Mapping in Academic Essay Writing Instruction

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### ABSTRACT

This study aimed to describe students' perceptions of using online mind mapping as a pre-writing strategy in academic essay writing instruction. The research used a quantitative approach with a descriptive survey design. The research subjects were 48 students from the Bachelor of Nursing Science Study Program at Universitas Bhamada Slawi who were taking the Indonesian Language course and had used the online mind mapping application (Coggle) in academic essay writing instruction. Sampling was done purposively, considering the students' experience in using online mind mapping. The research instrument was a four-point likert scale questionnaire developed based on the constructs of technology perception and writing instruction. The questionnaire indicators included ease of use, idea development and organisation, essay structure composition, material understanding, writing motivation, quality of written results, efficiency of the writing process, and satisfaction with using online mind mapping. The collected data was analysed using descriptive statistics, calculating mean values, percentages, and standard deviations to objectively describe the trends in student perceptions. The research results indicated that students had a positive perception of using online mind mapping as a pre-writing strategy. The average questionnaire score fell within the range of 3.27–3.63, indicating an agreement to strongly agree category. Online mind mapping is perceived as making it easier for students to develop and organise ideas, structure essays more systematically, improve understanding of essay writing material, and boost motivation and efficiency in the writing process. Additionally, students also showed a high level of satisfaction and interest in continuing to use online mind mapping in writing instruction. The implications of this research suggest that online mind mapping has the potential to be sustainably integrated as a pre-writing strategy in academic essay writing instruction at the university level. This finding can serve as the basis for developing technology-based writing instruction, as well as encourage further research with experimental designs to objectively test its impact on writing quality.

**Keywords:** academic essay; online mind mapping; pre-writing

#### *Persepsi Mahasiswa terhadap Penggunaan Mind Mapping Online dalam Pembelajaran Menulis Esai Akademik*

Penelitian ini bertujuan untuk mendeskripsikan persepsi mahasiswa tentang penggunaan mind mapping online sebagai strategi pra-penulisan dalam pengajaran penulisan esai akademik. Penelitian ini menggunakan pendekatan kuantitatif dengan desain survei deskriptif. Subjek penelitian adalah 48 mahasiswa dari Program Studi Sarjana Keperawatan di Universitas Bhamada Slawi yang mengambil mata kuliah Bahasa Indonesia dan telah menggunakan aplikasi mind mapping online (Coggle) dalam pengajaran penulisan esai akademik. Pengambilan sampel dilakukan secara purposif, dengan mempertimbangkan pengalaman mahasiswa dalam menggunakan mind mapping online. Instrumen penelitian berupa kuesioner skala likert empat poin yang dikembangkan berdasarkan konstruk persepsi teknologi dan pengajaran penulisan. Indikator kuesioner meliputi kemudahan penggunaan, pengembangan dan pengorganisasian ide, komposisi struktur esai, pemahaman materi, motivasi menulis, kualitas hasil tulisan, efisiensi proses penulisan, dan kepuasan menggunakan mind mapping online. Data yang dikumpulkan dianalisis menggunakan statistik deskriptif, menghitung nilai rata-rata, persentase, dan deviasi standar untuk secara objektif menggambarkan tren persepsi mahasiswa. Hasil penelitian menunjukkan bahwa mahasiswa memiliki persepsi positif terhadap penggunaan peta pikiran daring sebagai strategi pra-penulisan. Skor kuesioner rata-rata berada dalam kisaran 3,27–3,63, menunjukkan kategori setuju hingga sangat setuju. Peta pikiran daring dianggap memudahkan mahasiswa untuk mengembangkan dan mengatur ide, menyusun esai secara lebih sistematis, meningkatkan pemahaman materi penulisan esai, dan meningkatkan motivasi serta efisiensi dalam proses penulisan. Selain itu, mahasiswa juga menunjukkan tingkat kepuasan dan minat yang tinggi untuk terus menggunakan peta pikiran daring dalam pengajaran penulisan. Implikasi penelitian ini menunjukkan bahwa peta pikiran daring berpotensi untuk diintegrasikan secara berkelanjutan sebagai strategi pra-penulisan dalam pengajaran penulisan esai akademik di tingkat universitas. Temuan ini dapat menjadi dasar untuk mengembangkan pengajaran penulisan berbasis teknologi, serta mendorong penelitian lebih lanjut dengan desain eksperimental untuk secara objektif menguji dampaknya terhadap kualitas penulisan.

**Kata kunci:** esai akademik; mind mapping online; pra-menulis

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## INTRODUCTION

Academic essay writing is a fundamental competency in higher education. It serves as a primary medium for conveying ideas critically, logically, and argumentatively. These skills reflect students' academic literacy, including their ability to analyze, evaluate, and synthesize information (Hyland, 2016). Writing is essential for expressing ideas and constructing arguments systematically (Graham & Harris, 2018). However, many students struggle to organize ideas during the pre-writing stage. Visual techniques such as mind mapping help organize ideas and are more effective than conventional methods (Wahid & Sudirman, 2023). Writing skills reflect students' level of academic literacy and require high-level thinking skills such as analysing and evaluating scientific information (Fu & Relyea, 2024; Wette, 2017). Various studies show that many students experience difficulties in the pre-writing stage, including determining the main idea, organising the structure of ideas, and constructing the flow of argumentation (Salamah & Hesti, 2023; Waliyudin, 2022). This issue has implications for the low quality of students' academic writing and the immaturity of the rhetorical structure in the essays they produce. These weaknesses are evident in students' inability to identify main ideas, structure arguments logically, and integrate scientific references correctly, resulting in texts that are less coherent and poorly organised (Harmer, 2015).

Advances in educational technology have introduced digital strategies to support writing, including online mind mapping (Sassi et al., 2023). Mind mapping visually represents ideas and helps organize relationships between concepts (Buzan, 2018; Nesbit & Adesope, 2006). When it comes to the structure of essay frameworks, converting mind mapping into a digital format allows for greater flexibility in terms of revisions, interactivity, and cooperation (Al-Inbari et al., 2023; Alqasham & Al-Ahdal, 2021). Both manual and digital mind mapping have been shown to improve students' levels of motivation, inventiveness, and writing quality, according to research (Noviyanti, 2024; Wahid & Sudirman, 2022). Nonetheless, the findings of the literature study indicate that the majority of studies concentrate on manual mind mapping and prioritize the end written product over comprehensive pre-writing phases (Pribadi & Susilana, 2021).

Additionally, previous studies have been dominated by participants from school to university levels with a linguistics background, while non-language students, particularly from programs like nursing, have rarely been the focus of research. In fact, the healthcare field requires proficient academic literacy skills, especially in writing scientific essays, research reports, and publications. Non-language fields like nursing also face intensive demands related to academic scientific writing skills, including in preparing research-based reports and essays (Fonseca et al., 2020; Li et al., 2025). Furthermore, the successful adoption of online mind mapping in learning is highly influenced by users' perceptions of the benefits and ease of use of the learning technology (Davis, 1989; Marangunic & Granic, 2015). The research results of Pebriani et al. (2025), show that mind mapping is suitable as a pre-writing strategy because it helps students plan and organise ideas systematically before writing. Additionally, the results of classroom action research also prove that the continuous use of Mind Mapping improves students' writing scores and enhances the learning environment for writing (Karminah et al., 2017). The mind mapping technique has been proven to help improve narrative writing skills by making it easier for students to organise their ideas in a structured way. Using mind mapping makes the flow of writing clearer and improves the quality of students' writing results (Zakiah & Rustono, 2017; Khuzaemah & Herawati, 2017).

Based on the literature review, there are several gap analyses that highlight four main points. First, research on mind mapping as a pre-writing strategy is still limited and focuses more on the written results rather than the development of cognitive thinking processes in idea generation (Putri & Murti, 2022). Second, research on students' perceptions of online mind mapping use is still scarce,

even though the perception dimension is important for evaluating the effectiveness of learning technology implementation (Marangunić & Granić, 2015; Widodo, 2016). Third, previous research has been predominantly conducted in language studies programs, while the need for studies among non-language students, such as nursing, has not been widely developed (Hasanah, 2020). Fourth, no thorough study exists that describes how students evaluate the usefulness, practical benefits, and relevance of online mind mapping for academic writing learning (Chen, 2020; Hizam, 2024). Thus, there is an urgent need for study into students' perspectives of adopting online mind mapping as a pre-writing approach in essay writing teaching.

The contribution of this research lies in its attempt to provide theoretical, empirical, and practical perspectives. Theoretically, this research expands the study of technology-based academic literacy through the integration of online mind mapping in the pre-writing stage. Empirically, this research presents actual data regarding the perceptions of nursing students, which have been under-represented in writing skills research. Practically speaking, the findings of this research have the potential to serve as a reference in designing more interactive, adaptive, and technology-aligned writing learning strategies. Considering this context and these gaps, this study aims to determine students' perceptions of using online mind mapping as a pre-writing strategy in academic essay writing instruction.

Based on the background and research gaps that have been outlined, this study aims to describe students' perceptions of using online mind mapping as a pre-writing strategy in academic essay writing. Student perceptions were examined, including ease of use, idea development and organization, essay structure construction, material understanding, writing motivation, quality of written output, efficiency of the writing process, and satisfaction with using online mind mapping. This research is expected to make a theoretical contribution to the development of technology-based academic literacy studies, particularly regarding the use of online mind mapping in the pre-writing stage. Empirically, this study presents a factual overview of non-language students' perceptions. Practically, the results of this research can serve as a basis for consideration by lecturers and higher education institutions in designing more effective, adaptive, and digitally aligned academic essay writing instruction.

## METHOD

This study used a quantitative approach with a descriptive survey design. The descriptive survey design was chosen because this study aims to describe students' perceptions of using online mind mapping in academic essay writing instruction. The quantitative approach allowed for the structured measurement of respondents' perceptions through numerical data, so the research results can be statistically analyzed and objectively interpreted (Creswell, 2018; Sugiyono, 2019). This study involved students from the Bachelor of Nursing Science program at Universitas Bhamada Slawi the academic year 2024–2025. The study comprised 48 students enrolled in an Indonesian language course centered on academic essay writing. Participants were selected through purposive sampling based on their experience using online mind mapping (the Coggle app) as a pre-writing technique during the learning process. This method was chosen because it works well for survey research that needs participants to have particular traits related to the study's goals (Pallant, 2020).

The research instrument used was a student perception questionnaire developed using a four-point likert scale: strongly agree, agree, disagree, and strongly disagree. The instrument development was carried out through a systematic process that began with the determination of theoretical constructs, referring to the theory of technology user perception in the Technology Acceptance Model (TAM), which emphasizes the ease of use and usefulness of technology (Davis, 1989), as well as theories of writing and academic literacy that place pre-writing as an important stage in the writing process (Graham & Harris, 2018; Hyland, 2016). Based on this construct, perception indicators were derived, including ease of use, idea development and organization, essay structure composition,

material understanding, writing motivation, quality of written output, writing process efficiency, and user satisfaction. The indicator was then broken down into 10 questionnaire statements formulated in positive sentences for easy understanding by respondents.

To ensure the accuracy of the data obtained, this study applied data validity testing through instrument validity and reliability. The validity of the instrument was tested using content validity by assessing the alignment between the statement items, indicators, and theoretical constructs being measured. Content validity aims to ensure that the instrument truly represents students' perceptions of using online mind mapping. Next, the instrument's reliability was tested using Cronbach's Alpha coefficient, with a minimum value of  $\geq 0.70$  as an indicator of adequate internal consistency (Taber, 2018; Tavakol & Dennick, 2011). Additionally, data accuracy is maintained by administering questionnaires directly in the classroom (offline) to minimise filling errors and ensure complete responses.

Data collection was carried out by distributing questionnaires to all respondents after they participated in academic essay writing lessons using online mind mapping. The collected data was then analysed using descriptive statistics, in accordance with the research objective of mapping student perceptions. The data analysis stages include data editing to check the completeness of responses, data coding and tabulation by converting questionnaire responses into numerical scores, and descriptive statistical calculations such as mean, percentage, and standard deviation. The analysis results were then interpreted by linking the empirical findings to the technology perception and writing learning theories used as the research foundation (Pallant, 2020; Sugiyono, 2019).

## RESULT AND DISCUSSION

### Result

This section presents the research findings obtained through the analysis of questionnaire data regarding students' perceptions of using online mind mapping in academic essay writing instruction. Data analysis is presented descriptively based on frequency distribution, percentage, and the average value of each statement item in the questionnaire. An initial summary of respondent characteristics by gender is provided in the following data, which forms the basis for comprehending the profile of study participants and aids in the interpretation of further findings. In all, 48 students participated in this survey as respondents, like Table 1.

	Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	2	4.2	4.2	4.2
	Female	46	95.8	95.8	100.0
	Total	48	100.0	100.0	

Based on table 1, 46 responders, or 95.8% of the total were female students. Only two (4.2%) of the responses were men. This percentage shows that the majority of research participants were female students, who together made up all 48 respondents. The overall makeup of nursing programs, which often contain a higher proportion of female students than male students, is also reflected in this data.

The table 2 contains a descriptive statistical analysis of 48 respondents on 10 statement items about students' perceptions of online mind mapping in academic essay writing teaching. The mean score is 3.27–3.63. This range suggests that students generally like utilizing online mind mapping for assisting them write. Q6 had the highest average score (Mean = 3.63; SD = 0.53), demonstrating that most students think online mind mapping helps arrange ideas and structure writing. Q2 and Q5, with the lowest mean scores (Mean = 3.27; SD = 0.64), indicate higher diversity in evaluations of the online mind mapping application's simplicity of use and feature optimization.

**Table 2. Descriptive Analysis of Students' Perceptions Regarding the Use of Online Mind Mapping**

Item	N	Mean	Std. Deviation	Minimum	Maximum
Q1	48	3,42	0,58	2.00	4.00
Q2	48	3,27	0,64	2.00	4.00
Q3	48	3,33	0,56	2.00	4.00
Q4	48	3,33	0,60	2.00	4.00
Q5	48	3,27	0,64	2.00	4.00
Q6	48	3,63	0,53	2.00	4.00
Q7	48	3,52	0,50	3.00	4.00
Q8	48	3,42	0,58	2.00	4.00
Q9	48	3,50	0,62	2.00	4.00
Q10	48	3,52	0,62	2.00	4.00

The lowest and best scores for all items were 2.00 and 4.00, indicating strongly disagree to agree student responses. The standard deviation values of 0.50 to 0.64 indicate comparable solutions. Overall, our statistics indicate that students think online mind mapping is a valuable and relevant way to learn that can help them write academic papers.

#### *Ease of Use of Online Mind Mapping*

**Table 3. Frequency Distribution of Item Q1**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	4.2	4.2	4.2
	Agree	24	50.0	50.0	54.2
	Strongly Agree	22	45.8	45.8	100.0
	Total	48	100.0	100.0	

Table 3 suggest that when it comes to the simplicity of use of online mind mapping, the majority of respondents rated the application positively. A total of 24 (50.0%) respondents agreed, while 22 (45.8%) strongly agreed that online mind mapping is simple to employ in academic essay writing. Meanwhile, only two respondents (4.2%) disagreed, and none chose the "strongly disagree" category. This research demonstrates that students' perceptions of the ease of use of online mind mapping are quite positive, implying that this application has the potential to improve the effectiveness of the writing learning process.

#### *The Role of Mind Mapping in Developing and Organizing Ideas*

**Table 4. Frequency Distribution of Item Q2**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	10.4	10.4	10.4
	Agree	25	52.1	52.1	62.5
	Strongly Agree	18	37.5	37.5	100.0
	Total	48	100.0	100.0	

The data in table 4 above shows that the majority of respondents have a positive perception of the function of online mind mapping in the pre-writing process. Data shows that 25 respondents (52.1%) agreed, and 18 respondents (37.5%) strongly agreed that online mind mapping helped them develop and organize ideas before writing academic essays. Meanwhile, 5 respondents (10.4%) disagreed, and no respondents chose the strongly disagree category. These findings indicate that the use of online mind mapping is perceived as effective in supporting the elaboration of ideas and the

organization of students' thought structures, thus contributing to the improvement of the quality of academic essay writing.

### *Ease of Structuring Academic Essays*

**Table 5. Frequency Distribution of Item Q3**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	4.2	4.2	4.2
	Agree	28	58.3	58.3	62.5
	Strongly Agree	18	37.5	37.5	100.0
	Total	48	100.0	100.0	

According to the statistics in the Table 5, the majority of respondents are enthusiastic about using online mind mapping as a tool to help them prepare academic essay outlines. Of the 48 respondents, 28 (58.3%) agreed, and 18 (37.5%) strongly agreed that using online mind mapping made it easier for them to plan and structure academic text writing. Only two respondents (4.2%) disagreed, and none chose the "strongly disagree" choice, giving a cumulative percentage of positive responses of 100%.

This finding strongly indicates that online mind mapping makes a significant contribution to helping students structure logical and systematic flows in academic essay writing. The visualization of ideas provided through the concept of mind mapping allows students to identify relationships between ideas, determine argument priorities, and map important sections within the structure of academic essay texts, such as the introduction, content, and conclusion. Thus, the use of online mind mapping not only simplifies the writing planning process but also enhances the effectiveness and quality of students' critical thinking processes in producing structured scientific works.

### *Application Feature Support in Systematically Planning Writing Content*

**Table 6. Frequency Distribution of Item Q4**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	6.3	6.3	6.3
	Agree	26	54.2	54.2	60.4
	Strongly Agree	19	39.6	39.6	100.0
	Total	48	100.0	100.0	

The Table 6 displays the analysis results which reveal that the majority of respondents believe the online mind mapping application's capabilities are beneficial in helping written content preparation operations. Out of 48 responses, 26 (54.2%) agreed, while 19 (39.6%) strongly agreed. Only three respondents (6.3%) disagreed with the statements offered, and none chose the strongly disagree category. The findings imply that the features offered by online mind mapping applications, including idea grouping, content hierarchy arrangement, and writing structure visualization, are considered capable of helping students organize their ideas systematically and in an organized manner. Application skills in clearly facilitating the relationship between main ideas and sub-ideas contribute to improving the effectiveness of academic writing planning before the actual writing process takes place. Overall, these results confirm that using online mind mapping is a relevant and potentially effective learning strategy for improving the quality of scientific writing drafts in the context of higher education.

## *The Effectiveness of Online Mind Mapping in Brainstorming and Managing Ideas*

**Table 7. Frequency Distribution of Item Q5**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	10.4	10.4	10.4
	Agree	25	52.1	52.1	62.5
	Strongly Agree	18	37.5	37.5	100.0
	Total	48	100.0	100.0	

The findings indicate that a majority of participants provided favorable ratings. 52.1% expressed agreement, while 37.5% strongly concurred that online mind mapping facilitated their ability to organize and convey ideas. 10.4% of participants indicated their disagreement with the statement. The data suggests that a majority of participants believe that online mind mapping facilitates the ideation process before writing. Consequently, the use of online mind mapping has gained popularity and proves to be beneficial for educational writing.

### *Improving Understanding of Essay Writing Material through the Use of Online Mind Mapping*

**Table 8. Frequency Distribution of Item Q6**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	1	2.1	2.1	2.1
	Agree	16	33.3	33.3	35.4
	Strongly Agree	31	64.6	64.6	100.0
	Total	48	100.0	100.0	

The majority of respondents provided responses that were of a very high quality, as indicated by the data in table 8. Sixty-four point six percent of responders were in complete agreement that employing online mind mapping helped them better understand the topic concerning essay writing. The total number of positive responses was 97.9%, with 33.3% agreeing. Only 2.1% disagreed. Based on these findings, it appears that the utilization of online mind mapping is quite advantageous in terms of supporting students in better comprehending the concepts and frameworks associated with essay writing. Because of this, mind mapping with the use of the internet has the potential to be an efficient method of education that can assist students in significantly improving their academic literacy.

### *Improving Student Motivation in Essay Writing*

**Table 9. Frequency Distribution of Item Q7**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	23	47.9	47.9	47.9
	Strongly Agree	25	52.1	52.1	100.0
	Total	48	100.0	100.0	

The results show that all respondents indicated a positive assessment tendency. A total of 52.1% of respondents strongly agreed and the other 47.9% agreed that using online mind mapping contributed to increased motivation in their essay writing activities. No respondents were found to give negative assessments. This finding indicates that online mind mapping has a substantial influence on strengthening student engagement and interest during the writing process. Thus, this strategy can be categorised as an effective approach to improving learning motivation, particularly in developing academic essay writing skills.

### *Contribution to the Quality of Written Output Produced*

**Table 10. Frequency Distribution of Item Q8**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	2	4.2	4.2	4.2
	Agree	24	50.0	50.0	54.2
	Strongly Agree	22	45.8	45.8	100.0
	Total	48	100.0	100.0	

The data table 10 indicates that the majority of respondents provided favorable ratings. Fifty percent of respondents concurred, with 45.8% expressing strong agreement that utilizing online mind mapping enhanced the quality of their work. Only 4.2% disagreed. The results show that mind mapping helps pupils write more efficiently and well. The data indicates that online mind mapping is an efficient method for enhancing writing quality in students' academic essays.

### *Efficiency and Ease of the Writing Process with Online Mind Mapping*

**Table 11. Frequency Distribution of Item Q9**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	6.3	6.3	6.3
	Agree	18	37.5	37.5	43.8
	Strongly Agree	27	56.3	56.3	100.0
	Total	48	100.0	100.0	

The statistics table 11 show that most of the people who answered said yes. 56.3% of those who responded highly agreed, while 37.5% indicated that using online mind mapping makes the process of writing essays more efficient and simple. Only 6.3% of respondents indicated they disagreed. This finding suggests that online mind mapping is regarded as an effective tool that improves the writing process, notably in the quick and logical organization of ideas. The findings indicate that online mind mapping is an effective technique for improving the efficiency and ease of the writing process for students.

### *Satisfaction and Interest in Using Online Mind Mapping*

**Table 12. Frequency Distribution of Item Q10**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	6.3	6.3	6.3
	Agree	17	35.4	35.4	41.7
	Strongly Agree	28	58.3	58.3	100.0
	Total	48	100.0	100.0	

The data table 12 indicates that the majority of respondents provided a favourable evaluation. 58.3% of respondents highly agreed, and 35.4% stated that they were satisfied and were inclined to continue utilizing online mind mapping in the essay writing process. Merely 6.3% of respondents expressed disagreement. The data suggest that online mind mapping enhances both the technical sides of writing and offers an attractive, motivating learning experience, hence encouraging continued usage among students. The results indicate a significant degree of student pleasure and engagement with online mind mapping, suggesting that this approach may be viable for writing teaching.

## Discussion

The research findings demonstrate that students enrolled in the Bachelor of Nursing Science study program at Universitas Bhamada Slawi continuously maintain a favorable view of utilizing online mind mapping for academic essay writing education. The average score for all of the questions on the questionnaire shows this, as it falls in the "agree to strongly agree" range. This implies that online mind mapping is a useful learning method, especially for pre-writing. This finding suggests that pre-writing is crucial to academic writing because it sets the stage for quality (Graham & Harris, 2018; Hyland, 2016).

From the perspective of ease of use, students perceive that online mind mapping is easy to understand and operate within the context of writing instruction. According to the Technology Acceptance Model (TAM), customers are more likely to adopt technology if they think it's easy to use (Davis, 1989). This notion of easiness is critical in lowering initial obstacles to the use of educational technologies. The research by Hanggrasawani et al. (2024) also shows that students accept digital mind mapping because its interface is intuitive and does not require complex technical skills. Thus, ease of use allows students to focus their attention on the substance of their writing, rather than on the technical aspects of the application.

In terms of idea generation and organization, students regarded online mind mapping as a useful tool for systematically expanding, categorizing, and connecting ideas before writing an essay. This finding is consistent with Buzan (2018) claim that mind mapping promotes non-linear and associative thinking, allowing ideas to evolve more extensively and structurally. Prameswati et al. (2022) research also shows that implementing online mind mapping can improve students' creativity and result in more concise notes, although limitations were still found, such as limited internet access, varying student enthusiasm, and relatively longer correction times. Consistent with the findings Yan & Kim (2023), it was reported that digital mind mapping helped improve EFL students' reading strategy awareness, although it did not have a significant impact on reading comprehension scores.

Regarding the aspect of structuring academic essays, students perceive that online mind mapping makes it easier for them to create a logical and coherent writing outline. This finding supports the writing process theory that places planning as a fundamental stage in producing coherent and argumentative academic texts (Hyland, 2016). Research by Laila et al. (2023), shows that using mind mapping helps students systematically connect main ideas with sub-ideas, making the flow of writing clearer. In the context of nursing students, the ability to structure writing coherently is relevant because academic writing in the healthcare field demands clarity of thought, accuracy of argumentation, and consistency of scientific logic.

Regarding the application's feature support indicator, students rated the visualization, idea grouping, and content hierarchy arrangement features in online mind mapping as facilitating systematic content planning for writing. This aligns with D'Antoni & Zipp (2016), who stated that digital mind mapping helps students understand the relationships between concepts and design academic content more effectively. Thus, online mind mapping works as both a visual medium and a method of honing the cognitive skills required for academic writing. Nurani & Saputri (2020), found that adopting mind mapping considerably improves writing skills, notably in organizing thoughts. Meanwhile, Sakkir & Sakkir (2023) discovered that visualizing concepts using mind mapping helps students understand the relationships between ideas and reduces overlap in academic writing.

In this study, the indicator of understanding essay writing material received the highest average score, indicating that online mind mapping is very advantageous for students in understanding the concepts and structure of academic essays. This conclusion supports Nesbit & Adesope (2006) meta-analysis, which indicated that using concept maps and mind mapping improves conceptual understanding and information retention. Additionally, Elhawwa (2022) research reported that digital mind mapping facilitates students in organizing ideas, expressing them, and planning their writing creatively and systematically. Consistent with the findings of Alqasham & Al-Ahdal (2021), it was

found that the application of digital mind mapping as an interactive brainstorming technique significantly improved the interest and attitudes of EFL students towards writing skills, especially for students with below-average initial writing abilities.

Regarding the aspect of writing motivation, all respondents showed a positive response to the use of online mind mapping. This finding aligns with Wette (2017) research, which states that learning approaches supporting planning and idea visualization can reduce writing anxiety and boost students' confidence. Thus, online mind mapping not only contributes to the cognitive aspect but also the affective aspect of writing instruction. Bhattacharya & Mohalik (2020) research indicates that digital mind mapping software enhances learning effectiveness by visually facilitating the development, analysis, and organization of ideas, thereby making it easier for learners to understand and recall information.

Students also perceive that using online mind mapping contributes to improving the quality of the essays they produce. Although the quality of writing was not objectively measured in this study, this positive perception indicates that online mind mapping is seen as effective in helping to structure, logically and systematically organise arguments, which is an important indicator of academic writing quality. From an efficiency perspective, online mind mapping is considered capable of speeding up the planning process to essay writing. This finding aligns with the research by Novak & Cañas, (2008), which states that concept mapping can reduce cognitive load in organising ideas, thus helping students start writing faster and reducing confusion in developing ideas. Consistent with the findings of Sari et al. (2023), it also shows that digital mind mapping in collaborative learning increases student engagement cognitively, emotionally, and behaviourally.

In terms of pleasure and interest in using indicators, students expressed a strong willingness to continue using online mind mapping. This data corroborates the Technology Acceptance Model (TAM), which posits that perceived usefulness and ease of use significantly impact the intention to consistently utilize technology (Mei et al., 2018). According to Sairo et al. (2021), digital mind mapping improves writing skills while also assisting pupils in organizing thoughts and thinking creatively. Rosdiana & Mayusandra, (2024) revealed similar findings, demonstrating that utilizing Mindomo is effective for enhancing writing abilities, encouraging brainstorming, and methodically organizing thoughts. Thus, online mind mapping has a high potential for long-term integration into academic essay writing education at universities.

Although the research results show a very positive perception among students, this study has limitations because it only measures perception without objectively comparing the quality of writing. Therefore, the findings of this study are not intended to claim a causal improvement in writing ability, but rather as an empirical basis for developing an online mind mapping-based writing learning design. The main contribution of this study lies in providing up-to-date empirical evidence regarding nursing students' perceptions of using online mind mapping in academic essay writing learning, which is still relatively limited in its study within the context of non-language study programs.

## CONCLUSION

This study concludes that the research objective has been achieved. Students perceive online mind mapping as beneficial for idea development and organization, systematically structuring essays, improving material comprehension, writing motivation, writing process efficiency, and the quality of written work. This positive perception indicates that online mind mapping is relevant and acceptable as a technology-based pre-writing strategy that supports the enhancement of students' academic literacy, particularly in the context of academic essay writing instruction in higher education. This study is limited to students' perceptions only using a descriptive survey design, lacking objective measurement of writing quality improvement or comparison with alternative pre-writing procedures. The research findings are further limited by the small sample size and limited responder reach to a single study program. Future studies should employ experimental or quasi-experimental designs,

involve more participants from various study programs, and objectively measure writing quality. Thus, future research should include objective writing quality assessment, experimental or quasi-experimental methods, and a wider spectrum of study program participants. This recommendation is expected to strengthen the empirical evidence regarding the effectiveness of online mind mapping as a pre-writing strategy and support the development of more comprehensive technology-based academic writing instruction.

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