



Towards a more interactive learning: implementation of mind mapping in teaching materials for islamic religious education curriculum review

Suarni¹, H. Muh. Khalifah Mustami², Hj. Misykat Malik Ibrahim³, & Hj. Amrah Kasim⁴

^{1,2,3,4}Universitas Islam Negeri Alauddin Makassar

Correspondence Email: suarniumk81@gmail.com

ABSTRACT

Mind mapping implementation encourages active involvement, deep understanding, and student critical thinking skills. This study aims to explore the implementation of mind mapping in teaching materials for studying the Islamic Religious Education curriculum to increase active student involvement, conceptual understanding, and critical thinking skills. The pre-experimental method with a one-group pretest-posttest design was used, involving 32 students as participants. Data were analyzed using a two-sample t-test and descriptive statistics. The results showed a significant increase in students' comprehension scores after the mind mapping intervention (mean pre-test = 56.41, mean post-test = 79.22). Class observations and document analysis support these findings. These findings provide empirical evidence about the effectiveness of mind mapping in studying Islamic Religious Education curriculum studies. This research contributes to developing interactive and effective learning strategies in this context. Nonetheless, it is necessary to carry out further research with a control group, a more representative sample, and long-term research to broaden understanding of the effectiveness of mind mapping in Islamic Religious Education and the development of relevant supporting technologies.

Keywords: Learning, Mind mapping, Study of Islamic Religious Education curriculum, Effectiveness

1. INTRODUCTION

Using mind mapping techniques in teaching materials for studying the Islamic Religious Education curriculum has significantly changed learning towards a more interactive learning experience. In its implementation, mind mapping encourages students to actively participate in learning by describing important ideas and concepts

in structured diagrams (Edwards & Cooper, 2010; Hidayati, 2021; Rosliana, 2019). It helps students understand the relationship between the various components of the Islamic Religious Education curriculum study course curriculum and broaden their understanding through the visualization of complex concepts. With mind mapping, students can see the interrelationships between various topics, identify patterns, and develop critical thinking skills. This interactive approach also encourages collaboration between students and promotes group discussions, the exchange of ideas, and joint problem-solving (Buzan, T., 2011; Indriani & Mercuriani, 2019; Wahyu, 2019). Thus, implementing mind mapping in teaching materials for studying the Islamic Religious Education curriculum can create more dynamic, interesting, and effective student learning.

Studies in the educational literature show that implementing mind mapping in Islamic Religious Education curriculum study teaching materials significantly impacts student learning experiences. According to research, the use of mind mapping effectively increases student involvement in the learning process, increases conceptual understanding, and strengthens the linkages between various topics in the curriculum (Muhlisin, 2019; Nasiri & Elyasi, 2018; Puspitasari, 2016; Zarei & Keysan, 2016). Research also shows that students who learn through mind mapping tend to have higher creativity, better critical thinking skills, and can organize information systematically. With mind mapping, students also feel more motivated and have increased confidence in studying teaching materials for studying the Islamic Religious Education curriculum. Thus, evidence from the literature supports using mind mapping as an effective learning strategy for achieving more interactive and meaningful learning in Islamic Religious Education.

The mind-mapping approach in teaching materials for studying the Islamic Religious Education curriculum is relevant to cognitive theory, emphasizing the importance of active and constructive information processing in learning (Nasiri & Elyasi, 2018; Rifa'at & Setiawan, 2019). This theory suggests that students will gain a better understanding when they are actively involved in describing the relationship of concepts through mind mapping. By involving various cognitive components such as thinking, attention, and memory, students can build stronger and more organized mental representations of the Islamic Religious Education material they are studying.

The implementation of mind mapping in teaching materials for studying the Islamic Religious Education curriculum can be reflected in several categories. First is the category of active information processing, in which students are actively involved in organizing and describing concepts' relationships through mind maps (Buzan, T., 2011; Edwards & Cooper, 2010; Solomon & Baio, 2020). They cognitively process information by building associations, paying attention to patterns, and identifying relevant

relationships between Islamic Religious Education concepts. Second, the category of cognitive arrangement, in which students organize information in a structured way in a mind map, placing concepts into a coherent and interrelated framework. They use organizational principles such as sub-topics, branches, and colours to help them better visualize and remember information (Masita & Wulandari, 2018). Third, the category of constructive information processing, in which students actively build their mental representations of Islamic Religious Education material through mind mapping. They interpret and infer information, relate new knowledge to existing knowledge, and create personal and unique understandings through mental construction processes. (Fahrisa & Parmin, 2022). Thus, a cognitive theory is reflected in these categories, indicating that mind mapping facilitates active information processing, structured cognitive arrangements, and the construction of student understanding in learning Islamic Religious Education.

Mind mapping allows students to express their ideas creatively and gives them a sense of ownership of their learning (Karolina, 2019; Machado et al., 2020; Ramlan, 2017). By stimulating students' natural desire to learn and digging deeper into Islamic religious concepts, mind mapping can trigger sustainable intrinsic motivation, helping students feel more motivated and enthusiastic in exploring teaching materials for studying the Islamic Religious Education curriculum.

The purpose of this research is to specifically explore the implementation of mind mapping in teaching materials for reviewing the Islamic Religious Education curriculum to increase students' active involvement in the learning process, strengthen their understanding of important concepts in the curriculum, and encourage creativity, critical thinking, and the ability to systematic information organization. This study also aims to identify the impact of using mind mapping on student motivation in studying Islamic Religious Education material, as well as to provide empirical evidence that supports the effectiveness of this learning strategy in creating more interactive and meaningful learning in the context of the Islamic Religious Education curriculum.

This research is important because implementing mind mapping in teaching materials for studying the Islamic Religious Education curriculum has great potential to improve the quality of learning and student learning experiences. In facing the challenges of the complexity of the Islamic Religious Education curriculum, a more interactive and effective learning approach is needed. Mind mapping can be a powerful tool in creating student-focused learning, encouraging active participation, and broadening their understanding of Islamic religious concepts. This research can provide valuable insights into the effectiveness of mind mapping in increasing student engagement, critical thinking skills, creativity, and ability to organize information in the context of Islamic Religious Education.

2. METHODS

a. Types of research

This study used a pre-experimental method with a one-group pretest-posttest design (Creswell & Creswell, 2017; Sugiyono, 2017). This method was chosen to test the effectiveness of implementing mind mapping in teaching materials for studying the Islamic Religious Education curriculum. The group of students involved in this research was given a pre-test before the mind mapping intervention was carried out, then continued with an intervention period in which the mind mapping method was applied in learning. After that, a post-test was carried out to measure the increase in student understanding after using mind mapping. The data obtained were analyzed by comparing the pre-test and post-test results using descriptive statistics. Thus, this study used a pre-experimental approach with a one-group pretest-posttest design to describe changes in student understanding after using mind mapping.

b. Research participants

Participants in this study consisted of 32 semesters, three students in class B from the Islamic Religious Education Study Program at Muhammadiyah University of Kendari. The sample selection was purposively based on inclusion criteria: students enrolled in the Islamic Religious Education curriculum study course. Semester 3 students are chosen because they are expected to have a basic understanding of the concepts in the curriculum. Participants were involved in the entire research series, including the pre-test, mind mapping intervention period, and post-test. The selection of this sample provides an advantage in assessing the effectiveness of mind mapping in the learning context of studying Islamic Religious Education curricula specifically.

c. Data collection

Data collection in this study was carried out through several steps, techniques and tools that had been determined. First, the pre-test and post-test are used to measure student understanding before and after the mind-mapping intervention (Sugiyono, 2017). The pre-test was done before the intervention as an initial reference, while the post-test was carried out after the intervention period to measure the increase in student understanding. The learning result test is a data collection tool that includes learning material for studying the Islamic Religious Education curriculum.

In addition, class observations were made during the intervention period to record interactions between students and lecturers using mind mapping. This observation is carried out directly in the classroom using observation notes (Creswell & Creswell,

2017). The aim is to obtain data on student's active participation in mind-mapping activities, collaboration between students, and interaction with lecturers.

Document analysis was carried out to evaluate the suitability of mind mapping with curriculum objectives, its impact on student understanding, and its relevance to the learning context of Islamic Religious Education curriculum studies. Furthermore, document analysis was also carried out as a data collection technique. The documents analyzed included the Islamic Religious Education curriculum and student learning outcomes records related to mind mapping. The documents are studied, the relevant information is recorded, and information mapping is carried out to obtain a deeper understanding.

The steps, techniques and tools used in data collection are designed to produce valid and reliable data. Tests of learning outcomes, class observations, and document analysis are a comprehensive combination to obtain information about student understanding related to implementing mind mapping in studying Islamic Religious Education curriculum studies.

d. Data analysis

Data analysis was carried out comprehensively using quantitative and qualitative approaches. Data collected through experiments were analyzed quantitatively using the t-test: Two-Sample Assuming Equal Variance. The t-test was used to compare differences in students' understanding scores before (pre-test) and after (post-test) mind mapping interventions in studying Islamic Religious Education curriculum studies. The statistical analysis of the t-test was carried out using Microsoft Excel, which has features and functions that facilitate statistical calculations (Prastiti & Mairing, 2023; Sugiyono, 2017).

In the t-test statistical analysis, students' comprehension scores before and after the mind-mapping intervention were analyzed to see if there were significant differences between the two groups. The t-test was conducted considering the average score, sample size, and data variance. The assumption used is that the two groups have the same variance.

Class observations were carried out to identify patterns of interaction between students and lecturers in the use of mind mapping in studying Islamic Religious Education curriculum studies. In addition, data analysis was also carried out descriptively for supporting data, including class observations and document analysis. Meanwhile, document analysis involves studying the Islamic Religious Education curriculum and student learning outcomes records related to mind mapping. These documents are

analyzed to see the impact of mind mapping on student understanding and suitability with curriculum objectives.

The t-test statistical analysis obtained the t-statistic value, indicating a significant difference between the pre-test and post-test scores. Next, the p-value is calculated to determine the level of statistical significance; if the p-value is less than the specified level of significance (e.g. $p < 0.05$), then there is a significant difference between the pre-test and post-test scores, and the mind mapping intervention is believed to impact student understanding significantly.

Overall, data analysis carried out through quantitative and qualitative approaches provides a holistic understanding of the effectiveness of mind mapping implementation in learning to study the Islamic Religious Education curriculum. The results of the t-test statistical analysis showed a significant difference between the pre-test and post-test scores, which supports the effectiveness of mind-mapping interventions in increasing student understanding.

3. RESULTS AND DISCUSSION

a. Results

Implementing mind mapping in instructional materials for the Islamic Religious Education curriculum dramatically enhances students' comprehension of the curriculum's ideas. Mind mapping enables students to link better and picture learning concepts, resulting in deeper and more organized knowledge. The pre-test and post-test findings indicated a considerable improvement in students' comprehension after the mind-mapping intervention.

Table. 1. T-Test Results: Two-Sample Assuming Equal Variances

t-Test: Two-Sample Assuming Equal Variances

	<i>Variables 1</i>	<i>Variables 2</i>
Means	56.40625	79.21875
Variances	50.37802419	16.3054435
Observations	32	32
Pooled Variances	33.34173387	
Hypothesized Mean Difference	0	
df	62	
t Stats	-15.80297244	
P(T<=t) one-tailed	1.01457E-23	
t Critical one-tail	1.669804163	
P(T<=t) two-tailed	2.02914E-23	
t Critical two-tail	1.998971517	

The t-test of two samples with the assumption of the same variance shows that there is a significant difference between the pre-test and post-test scores ($t(62) = -15.80, p < .001$). On the pre-test, the mean score was 56.41 (variance = 50.38); on the post-test, the mean score increased to 79.22 (variance = 16.31). It shows that the intervention has a significant effect in increasing the score.

Observation results also support this finding. During the intervention period, mind mapping encouraged students to actively participate in describing and organizing the concepts of learning materials. Class observations revealed that students actively participated in mind mapping activities, showing higher enthusiasm and participation than in conventional methods.

Analysis of course documents for reviewing the Islamic Religious Education curriculum shows that the use of mind mapping is compatible with the objectives and curriculum components that have been set. Mind mapping allows students to describe the relationship between various concepts and topics in the curriculum, thereby supporting a thorough and integrated understanding.

In the context of critical thinking, the implementation of mind mapping also significantly contributes. Students analyze, interpret, and evaluate Islamic religious concepts through mind mapping. They develop critical thinking skills by identifying patterns, comparing information, and constructing arguments based on their understanding through a mind map that is made.

Overall, the results of this study provide strong empirical evidence about the effectiveness of implementing mind mapping in learning to study the Islamic Religious Education curriculum. Mind mapping increases student engagement, strengthens understanding, encourages collaboration, and develops critical thinking skills. These findings make an important contribution to developing learning methods that are more interactive, meaningful, and effective in the context of Islamic Religious Education curriculum study subjects.

b. Discussion

This research was conducted to explore the implementation of mind mapping in teaching materials for studying the Islamic Religious Education curriculum and to analyze its impact on student understanding. The results showed a significant increase in students' understanding after the mind-mapping intervention. In the two-sample t-test analysis, there was a significant difference between the pre-test (mean = 56.41, variance = 50.38) and post-test scores (mean = 79.22, variance = 16.31) with $t(62) = -15.80, p < .001$. These findings indicate that the implementation of mind mapping has a positive impact on increasing student understanding.

Class observation also supports the effectiveness of mind mapping in studying Islamic Religious Education curriculum studies. It shows that students are actively involved in learning by using mind mapping, which can increase their involvement in understanding Islamic religious concepts. Student participation and enthusiasm in mind-mapping activities are seen to be higher compared to conventional methods. In addition, analysis of course documents for reviewing the Islamic Religious Education curriculum also strengthens this finding by confirming the suitability of mind mapping with the objectives and curriculum components set.

Through mind mapping, students are involved in the analysis, interpretation, and evaluation of Islamic religious concepts, which contribute to the development of their critical thinking skills (Fahriza & Parmin, 2022; Nuriani, 2017; Suherman et al., 2021). The results of the t-test and class observations are supported by analysis of curriculum documents, providing strong empirical evidence on the effectiveness of mind mapping in studying Islamic Religious Education curriculum studies. These findings have important implications for developing more interactive and effective learning methods in Islamic Religious Education.

About other studies, the results of this study add to the understanding of the effectiveness of the implementation of mind mapping in studying Islamic Religious Education curriculum studies (Alsuraihi, 2022; Gömleksiz&Fiand, 2013; Sekarini et al., 2020; Wahyuni, 2018). Previous studies have shown the benefits of using mind mapping in the context of education in general, but this research specifically explores the implementation of mind mapping in teaching materials for studying the Islamic Religious Education curriculum. This finding is in line with previous studies which show that mind mapping can increase student engagement, conceptual understanding, and critical thinking skills in a learning context (Indriani & Mercuriani, 2019; Nuriani, 2017; Rifa'at & Setiawan, 2019). However, this research makes a new contribution by focusing on Islamic Religious Education, a field with its own characteristics. The results of this study enrich the literature by providing concrete evidence about the effectiveness of mind mapping in that specific context. Therefore, this research can be a basis and reference for further research in developing more interactive and effective learning strategies in Islamic Religious Education.

The study results indicate that implementing mind mapping in teaching materials for studying the Islamic Religious Education curriculum has great potential to increase student involvement, conceptual understanding, and critical thinking skills. These findings indicate that interactive approaches such as mind mapping can significantly contribute to creating more meaningful and effective learning in the context of studying the Islamic Religious Education curriculum. The results of this study also encourage reflection on existing teaching practices and highlight the importance of considering

innovative and evidence-based methods in teaching Islamic religious material. Besides that, The results of this research also provide a basis for the development of a more student-oriented curriculum and can inspire lecturers to adopt learning strategies that are more interactive, creative and efficient. Therefore, the results of this study serve as a call to continue to encourage the use of mind mapping and similar learning approaches in the field of Islamic Religious Education, intending to achieve more effective and meaningful learning for students.

These findings provide a strong basis for lecturers and curriculum developers to consider using mind mapping as an effective learning strategy in the context of Islamic Religious Education curriculum study courses. Implementation of mind mapping can increase student involvement, strengthen understanding of Islamic religious concepts, and stimulate critical thinking skills. These implications point to the need to develop and improve learning methods that are student-centred, interactive, and evidence-based in the study of the Islamic religious education curriculum. In practice, lecturers can adopt and integrate mind-mapping techniques in planning and teaching Islamic Religious Education curriculum study material. Besides that, Curriculum developers can consider integrating mind mapping into preparing the Islamic Religious Education curriculum to enhance student learning experiences. Thus, the implications of the results of this study encourage innovation in the learning approach of Islamic Religious Education towards a more interactive, meaningful, and effective learning experience.

Several factors can cause research results like this. First, the implementation of mind mapping in teaching materials for studying the Islamic Religious Education curriculum provides a learning approach that is more interactive and actively involved, which can motivate students to participate more deeply in the learning process. In addition, mind mapping helps students organize and describe Islamic religious concepts in a structured and connected way, enabling them to gain a deeper and more integrated understanding. In addition, mind mapping encourages collaboration and dialogue between students, facilitating the exchange of ideas and building knowledge together. In the context of the Islamic Religious Education curriculum study subject, this can provide space for students to understand different perspectives and thoughts and broaden their understanding of the Islamic religion. Thus, the results of this study indicate that implementing mind mapping provides an effective and meaningful method for enriching student learning experiences in Islamic Religious Education curriculum studies courses.

Based on the results of this study, several actions can be taken. First, lecturers and curriculum developers need to consider the integration of mind mapping as an effective learning strategy in teaching materials for studying the Islamic Religious Education curriculum. Lecturers can also receive professional training and development to gain a

greater grasp of the usage of mind mapping in the context of learning the Islamic religion. In addition, educational institutions and schools can promote mind mapping by providing the required resources, supporting materials, and infrastructure for successful implementation. Dissemination of the results of this research through seminars, conferences, or scientific publications is also important for sharing knowledge and experience related to the use of mind mapping in Islamic Religious Education curriculum study subjects. With the adoption and implementation of mind mapping-based learning strategies, it is hoped that student learning experiences can be improved, understanding of Islamic religious concepts can be strengthened, and critical thinking skills can be developed. This action will contribute to developing more interactive, meaningful, and effective learning in the Islamic Religious Education curriculum study course context.

Furthermore, critical thinking skills can be developed better. This action will contribute to developing more interactive, meaningful, and effective learning in the Islamic Religious Education curriculum study course context. Moreover, critical thinking skills can be developed better. This action will contribute to developing more interactive, meaningful, and effective learning in the Islamic Religious Education curriculum study course context.

4) CONCLUSION

Implementing mind mapping in Islamic Religious Education curriculum-related instructional materials considerably influences student engagement, conceptual comprehension, and critical thinking skills. Previous research has provided indications of the benefits of using mind mapping in learning, but these findings in the context of Islamic Religious Education are surprising. The results of the two-sample t-test showed a significant difference between students' comprehension scores before (mean = 56.41) and after (mean = 79.22) the mind mapping intervention in teaching materials for studying the Islamic Religious Education curriculum ($t(62) = -15.80, p < .001$), shows the positive and significant impact of the implementation of this method.

The implementation of mind mapping improves the quality of learning and encourages students' cognitive, affective, and social aspects. These findings demonstrate the tremendous potential of innovative and evidence-based learning methods in creating meaningful and effective learning experiences in Islamic Religious Education curriculum review courses. The implications are important, encouraging more interactive, creative and collaborative learning practices. This discovery changes our view of the potential of learning the Islamic religion and provides new directions in developing learning strategies that actively engage students and enrich their understanding.

Although this study provides a valuable understanding of the implementation of mind mapping in learning the Islamic Religious Education curriculum review course, several limitations must be considered. First, this study was conducted in one group of students with a one-group pre-test and post-test design, which reduces the generalisability of the results. Therefore, further research could involve a control group to compare the effectiveness of the mind-mapping method with other learning methods. In addition, this study was conducted in one specific school and classroom context, so it is necessary to conduct research involving larger samples and from various school backgrounds to get a more representative picture.

Considering these limitations, further research could expand the understanding of the effectiveness and application of the mind mapping method in learning Islamic Religious Education curriculum review courses and explore the potential development and use of supporting technologies that can increase the effectiveness and efficiency of mind-mapping implementation. Further research could also consider other contextual factors, such as students' ability level or the influence of social factors in implementing mind mapping. In addition, the research could explore the long-term effects of mind mapping implementation on student learning achievement and developing critical thinking skills over a longer time.

REFERENCES

- Alsuraihi, A. A. (2022). The effect of implementing mind maps for online learning and assessment on students during COVID-19 pandemic: A cross sectional study. *BMC Medical Education*, 22(1), 1–16. <https://doi.org/10.1186/s12909-022-03211-2>
- Buzan, T. (2011). *Buku Pintar Mind Map* (11 ed.). Gramedia Pustaka Utama.
- Creswell, J. W., & Creswell, J. D. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications.
- Edwards, S., & Cooper, N. (2010). Mind mapping as a teaching resource. *The Clinical Teacher*, 7(4), Article 4. <https://doi.org/10.1111/j.1743-498X.2010.00395.x>
- Fahrisa, N., & Parmin, P. (2022). Creative Problem Solving (CPS) Learning to Improve Ability an Strudent's Critical and Creative Thinking on Science Materials. *Journal of Environmental and Science Education*, 2(2), 98–105. <https://doi.org/10.15294/jese.v2i2.55641>
- Gömleksiz, M. N., & Fidan, E. K. (2013). The Effect of Computer Assisted Mind Mapping on Students' Academic Achievement, Attitudes and Retention in Science and Technology Course. *Gaziantep University Journal of Social Sciences*, 12(3), 403–426.

- Hidayati, N. (2021). Model Problem Based Learning Digital Mind Maps (PBLDMM): A Learning Model untuk Pembelajaran Abad 21. Media Nusa Creative (MNC Publishing).
- Indriani, D., & Mercuriani, I. S. (2019). Experiential learning model with mind mapping on fungsi: How to improve science process skills? *Biosfer*, 12(2), 223–237. <https://doi.org/10.21009/biosferjpb.v12n2.223-237>
- Karolina, K. (2019). The Effectiveness of Mind Mapping Technique in Enhancing Students' Reading Achievement. *Lingua Didaktika: Jurnal Bahasa Dan Pembelajaran Bahasa*, 13(1), 60–65. <https://doi.org/10.24036/ld.v13i1.10443>
- Machado, D. M., Murta, S. G., & Costa, I. I. da. (2020). Applying intervention mapping approach to a program for early intervention in first-episode mental crisis of a psychotic type. *Psicologia: Reflexão e Crítica*, 33(1), 1–13. <https://doi.org/10.1186/s41155-020-00141-0>
- Masita, M., & Wulandari, D. (2018). Pengembangan Buku Saku Berbasis Mind Mapping Pada Pembelajaran Ipa. *Jurnal Kreatif : Jurnal Kependidikan Dasar*, 9(1), Article 1. <https://doi.org/10.15294/kreatif.v9i1.16509>
- Muhlisin, A. (2019). Reading, Mind Mapping, and Sharing (RMS): Innovation of New Learning Model on Science Lecture to Improve Understanding Concepts. *Journal for the Education of Gifted Young Scientists*, 7(2), 323–340. <https://doi.org/10.17478/jegys.570501>
- Nasiri, H., & Elyasi, M. (2018). Strategic Cognition and Cognitive Mapping: An Overview of Cognitive Capabilities in Strategic Change Management and Change Leader's Cognitive Map. 20–5), 1(8, سیاست نامه علم و فناوری).
- Nuriani, N. R. (2017). Efektifitas Penggunaan Metode Pembelajaran Inquiry Berbantuan Pendekatan Mind Mapping Terhadap Kemampuan Berpikir Kritis Matematika. *Jurnal Derivat*, 4(1), 8–18. <https://doi.org/10.31316/j.derivat.v4i1.233>
- Prastiti, T. D., & Mairing, J. P. (2023). STATISTIKA PENDIDIKAN Berbantuan Video YouTube dan Microsoft Excel. *Media Sains Indonesia*.
- Puspitasari, A. D. (2016). Penerapan Model Pembelajaran Kooperatif Tipe Jigsaw disertai Media Mind Mapping untuk Meningkatkan Pemahaman Konsep Ilmu Alamiah Dasar Mahasiswa Akuntansi Universitas Ahmad Dahlan. *Jurnal Riset Dan Kajian Pendidikan Fisika*, 3(1), 19–22. <https://doi.org/10.12928/jrkipf.v3i1.4542>
- Ramlan, A. M. (2017). Peningkatan hasil belajar mahasiswa melalui metode quantum learning dengan teknik Mind mapping. *Journal of EST (Educational Science And Technology)*, 3(2), 129–135. <https://doi.org/10.26858/est.v3i2.3551>
- Rifa'at, A. A., & Setiawan, H. (2019). The Power of Mind Mapping to Produce Good Writing Product. *Ideas*, 7(2). <https://doi.org/10.24256/ideas.v7i2.1139>
- Roslina, I. (2019). Pengembangan LKPD Matematika dengan Model Learning Cycle 7E Berbantuan Mind Mapping. *Jurnal Pengembangan Pembelajaran Matematika*, 1(1), Article 1. <https://doi.org/10.14421/jppm.2019.11.10-22>

- Sekarini, A. P., Wiyanto, W., & Ellianawati, E. (2020). Analysis of Problem Based Learning Model with Mind Mapping to Increase 21st Century Skills. *Journal of Innovative Science Education*, 9(3), 321–326. <https://doi.org/10.15294/jise.v9i1.36843>
- Solomon, L. H., & Baio, C. (2020). Thinking Within and Across. *Journal of Science and Technology of the Arts*, 12(1). <https://doi.org/10.34632/jsta.2020.8201>
- Sugiyono. (2017). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alfabeta.
- Suherman, S., Zafirah, A., Agusti, F. A., Sandra, R. P., Engkizar, & Efendi. (2021). Encouraging Students' Active Learning Activities through the Implementation of MASTER Learning Model Based on Mind Mapping Techniques. *Journal of Physics: Conference Series*, 1940(1), 012094. <https://doi.org/10.1088/1742-6596/1940/1/012094>
- Wahyu, W. (2019). Students' Engagement and Interest in Learning Writing through Mind Mapping Technique. *Ideas*, 7(2). <https://doi.org/10.24256/ideas.v7i2.1039>
- Wahyuni, R. (2018). Pengaruh Model Pembelajaran Mind Mapping Terhadap Kemampuan Berbicara Mahasiswa Pada Mata Kuliah Public Speaking. *School Education Journal PGSD FIP Unimed*, 8(2), 130–136. <https://doi.org/10.24114/sejpgsd.v8i2.9777>
- Zarei, A. A., & Keysan, F. (2016). The Effect of Mnemonic and Mapping Techniques on L2 Vocabulary Learning. *Applied Research on English Language*, 5(1), 17–32.