

JURNAL PENDIDIKAN PROFESI GURU

Jurnal Pendidikan Profesi Guru

Volume 1 (1) 85 – 95 February 2023

The article is published with Open Access at: <https://journal.ar-raniry.ac.id/index.php/ppg/index>

Improving Students' Conceptual Understanding with Problem-Based Learning in Islamic Education at SD Negeri 106218 Pematang Toba

Arifah ✉, SD Negeri 106218 Pematang Toba, Indonesia

Nurhabibi, SD Negeri 102056 Nagur, Indonesia

Nida Aya Sofia, SD Negeri 106218 Pematang Toba, Indonesia

✉ 222arifah@gmail.com

Abstract: This study aims to improve students' Concept Understanding in Islamic Education by using the Problem-Based Learning Model. This study is a classroom action research that uses four steps, namely planning, action, observation and reflection. The subjects of this study were elementary school students. The data of this study were obtained by test and observation techniques. Tests are used to improve students' understanding and observations are used to analyze teacher and student learning activities. The data analysis technique used in this study is descriptive statistics by comparing the results obtained with indicators of research success. The results of the study indicate that learning using the Problem-Based Learning Model can improve students' conceptual understanding. This can be seen from the increase in the percentage of completeness of improving students' conceptual understanding in each cycle with details of the pre-cycle 46.56%, the first cycle 77.57% and in the second cycle increased to 89.77%. Thus, the use of the Problem-Based Learning Model can be used as an alternative to improve student learning outcomes.

Keywords: Problem based learning, understanding conceptual, islamic education.

Received December 5, 2022; **Accepted** January 26, 2023; **Published** February 10, 2023

Citation: Arifah, Nurhabibi, Sofia, N. A. (2023). Improving Students' Conceptual Understanding with Problem-Based Learning in Islamic Education at SD Negeri 106218 Pematang Toba. *Jurnal Pendidikan Profesi Guru*. 1(1). 85–95.



Published by Program Studi Pendidikan Profesi Guru Fakultas Tarbiyah dan Keguruan Universitas Islam Negeri Ar-Raniry Banda Aceh.

INTRODUCTION

Islamic Religious Education (PAI) is one of the fundamental subjects in the education system in Indonesia. This subject not only aims to instill religious knowledge in students, but also to form noble character and morals that become provisions in daily life. Through PAI, students are expected to be able to understand and apply Islamic religious values, such as faith, piety, and commendable morals, in their personal, family, and community lives. One of the challenges in learning PAI is to convey abstract concepts such as destiny, effort, tawakal, and sincerity. These concepts are often difficult for students to understand because the learning methods used are still dominantly centered on lectures. As a result, students tend to be passive and less able to relate learning materials to the context of daily life. At SD Negeri No 106218 Pematang Toba, this problem is also a major concern. Based

on initial observations, many grade VI students showed a low understanding of abstract concepts in PAI.

This is shown through the results of unsatisfactory evaluations and low student participation during the learning process. Therefore, efforts are needed to improve student understanding by applying more innovative and effective learning methods. One approach that can be used is the Problem-Based Learning (PBL) learning model. This model provides opportunities for students to be active in the learning process through relevant problem-solving. By placing students at the center of learning, PBL is expected to increase student engagement and help them understand abstract concepts in more depth. Problem-Based Learning (PBL) is a student-centered learning model, in which they are faced with real, relevant problems to solve.

This approach encourages students to actively think critically, work collaboratively, and develop problem-solving skills. In the context of PAI learning, PBL is very relevant because it is able to connect abstract concepts with real experiences that students face in daily life. For example, the concepts of destiny and effort can be taught through case studies that motivate students to understand how they can plan something seriously while still surrendering to Allah SWT. With PBL, students not only receive information from teachers but also become active in the learning process. They are invited to discuss, analyze problems, and find appropriate solutions based on Islamic values. This process not only improves students' understanding of the material but also helps them internalize religious values into everyday attitudes and behaviors.

Through the application of the Problem-Based Learning model in PAI learning in grade VI of elementary school, it is hoped that there will be an increase in student involvement, both intellectually and emotionally. Students will be more motivated to learn, as learning becomes more interesting and relevant to their lives. In addition, the understanding of abstract concepts such as destiny, effort, tawakal, and sincerity can be significantly improved, so that PAI learning not only stops at the theoretical level, but also has an impact on the development of students' character and spiritual attitudes in real life. Therefore, this study was conducted to apply and examine the effectiveness of the PBL model in improving the understanding of the concept of PAI in grade VI of SD Negeri No 106218 Pematang Toba.

METHODS

This research is a classroom action research (PTK) with a qualitative approach. PTK is carried out in several cycles which include planning, implementation, observation, and reflection stages. This study uses 2 variables, namely, 1) Free Variables, Problem-Based Learning learning model; 2) Bound Variables: Students' understanding of concepts in PAI subjects. All students are Muslims in class VI consisting of 12 students. Types of Data, Qualitative data (observation and interviews) and quantitative data (learning evaluation results), Data Sources, Students, teachers, and learning documents. Data Collection Techniques, 1) Observation of the learning process; 2) Interviews with students and teachers; 3) Concept understanding evaluation test.

RESULTS

Islamic Religious Education (PAI) learning in grade VI of SD Negeri No. 106218 Pematang Toba, which consists of 12 students, shows a number of problems in the teaching and learning process. Based on initial observations and the results of previous evaluations carried out on November 30, 2024, it was found that the majority of students had difficulty understanding abstract concepts in PAI materials, such as destiny, effort, tawakal, and sincerity. The learning process at the pre-cycle stage tends to be dominated by the lecture method, where the teacher is the center of learning, while students only listen and take notes.

This approach makes students less active, their participation minimal, and their emotional and intellectual involvement in the learning process relatively low. As a result, students' understanding of the material is not optimal, as can be seen from, 1) Low student evaluation results, with the average student score only reaching 70, below the Minimum Completeness Criteria (KKM) set, which is 75; 2) Lack of participation in class discussions, where only 3-4 students actively answer questions or give opinions, while other students tend to be passive; 3) Difficulty in applying PAI values in daily life, such as understanding the relationship between effort and tawakal or applying the concept of sincerity in daily activities.

This condition indicates the need for a more interactive and relevant approach to students' lives to improve their understanding and engagement. Therefore, interventions with the Problem-Based Learning (PBL) learning model are designed to improve this condition by providing contextual, active, and collaborative learning experiences. The initial ability test is given to find out the ability of students before the implementation of PBL, the initial ability test contains multiple-choice questions that show how students understand the concepts contained in the material of faith in Qada and Qadar with the learning of lecture methods, as well as the learning results of students before the implementation of Problem Based Learning. Remarks: Learning outcomes of students who completed KKM 75, 1) Complete = 9 people; 2) Incomplete = 3 people. The Percentage of Classical Completeness is calculated based on the formula, description, P: Value in process, F: Frequency of students, N: Total number of students.

Based on Table 4.2 In cycle I, the results of the learning evaluation showed a significant improvement compared to pre-cycle conditions. Of the 12 students who took part in the learning, as many as 9 students managed to reach the Minimum Completeness Criteria (KKM) set, which is 75, so that the completion rate reached 75%. The average class score also increased from 70 in the pre-cycle to 80 at the end of the first cycle. However, there are still 3 students who have not reached the KKM with an average score of 65. These students need more attention in understanding the material and need a more supportive learning approach in the next cycle. However, overall, learning with the Problem-Based Learning (PBL) model has succeeded in improving students' understanding and motivation to learn. Observation is used to observe and monitor students during cycle I. Observation was carried out by referring to the observation sheet consisting of 5 things observed, namely: 1) Students actively discussed in groups. 2) Students ask questions to teachers or friends. 3) Students record or document the results of the discussion. 4) Students try to find solutions to the given problems. 5) Students appear enthusiastic and enthusiastic during learning.

Based on the criteria on the observation sheet, the following are the results of the observations made in Cycle I. Based on Table 4.3 which contains the observation sheet used to assess student involvement during the learning process in cycle I, the following results were obtained, 1) Most of the students showed activity in group discussions; 2) Of the 12 students, about 75% of the students were actively involved in exchanging opinions with their group members. However, there were 3 students who contributed less, tended to be passive, and only followed the flow of the discussion without giving ideas. This indicates the need to strengthen student involvement through more optimal group management. Only a small percentage of students ask questions during the learning process. Observations noted that 4 students seemed to dare to ask questions, both to teachers and to peers. However, the majority of students seemed hesitant or did not feel confident to ask questions. It shows the need for strategies to increase students' courage in asking questions, such as providing stimulus or more intensive encouragement from teachers.

Most of the students have recorded the results of the group discussion. A total of 9 students well documented the key points generated during the discussion. However, there were 3 students who did not actively record the results of the discussion, so they looked difficult when they had to convey the results of the group. Students show good efforts in

finding solutions to problems given in problem-based learning (PBL). Of the 12 students, 10 students seemed enthusiastic about trying various ways to solve problems, both through discussions and references provided by the teacher. However, 2 students seemed to lack understanding of their role in solving problems, so their contribution in the group was still minimal. In general, the classroom atmosphere looks more dynamic compared to pre-cycle. A total of 8 students seemed excited, active, and showed enthusiasm during the learning. However, the other 4 students tended to be passive and less involved in classroom activities, likely because they were not used to the problem-based learning model.

Overall, the implementation of cycle I showed significant progress in student engagement during learning. Students are getting used to the Problem-Based Learning (PBL) method which requires them to actively discuss, ask questions, and find solutions. However, some aspects such as the courage of students to ask questions and the full involvement of all group members still need improvement. Based on interviews conducted with students after the implementation of cycle I regarding the implementation of problem-based learning (PBL) in cycle I, the following descriptions were obtained, 1) Most of the students gave positive responses to the method problem-based learning. They stated that this method makes learning more interesting and different than usual. Students feel that activities such as discussing and solving problems provide new experiences that involve not only memorization, but also deep understanding.

However, some students also revealed that they need time to adapt to this method because they are not yet used to it; 2) The Ability of PBL Models in Helping to Understand Abstract Concepts. The majority of students stated that the PBL model helped them understand abstract concepts such as destiny, effort, tawakal, and sincerity better. Through problem-solving that is associated with real-life situations, students find it easier to connect theory with practice. One of the students gave an example of how the concept of tawakal is easier to understand when it is associated with planning and business cases. However, there are some students who feel that they are still confused and need more detailed guidance from the teacher to understand these concepts; 3) Discussion Experience in Groups: Most students stated that discussing in groups is a fun and rewarding experience. They feel more confident because they can share ideas and listen to their friends' opinions. Some students also stated that discussions helped them find better solutions than if they were studying on their own.

However, some students expressed challenges, such as difficulty organizing the division of tasks in groups or facing friends who were less actively participating; 4) Challenges in learning with the PBL model, Students identified several challenges faced during learning using the PBL model. The main challenge is to understand the problems posed by the teacher, especially for students who are not yet familiar with this method. In addition, there are students who find it difficult to manage their time during group discussions, so that some problems are not solved completely. Some students also mentioned that they still feel embarrassed to ask questions or express opinions in front of their peers; 5) Relevance of learning to daily life, Most students state that problem-based learning is very relevant to daily life. They feel that the cases presented in the learning help them understand how religious values can be applied in various real-life situations.

One of the students mentioned that this method made them realize the importance of effort and tawakal in facing life's challenges. However, there are also students who feel the need for more examples simple and concrete to better understand the relationship between learning and their lives. The interviews showed that the PBL method in the first cycle had a positive impact on students' understanding and learning experience. Students find this method interesting, relevant, and helps them understand abstract concepts better. However, there are challenges that need to be improved, such as improving guidance from teachers, managing discussion time, and efforts to build students' courage in asking questions or expressing opinions. This will be a concern in cycle II to increase the effectiveness of learning. In the second cycle which was held on December 6, 2024, the

application of the Problem-Based Learning (PBL) learning model in Islamic Religious Education (PAI) learning in grade VI showed a significant increase compared to the previous cycle.

The following are the results of the evaluation of students' learning in Cycle II of the implementation of Problem Based Learning. Remarks: The learning outcomes of students who completed KKM 75 , 1) Complete = 12 people; 2) Incomplete = 0 people. The percentage of Classical Completeness is calculated based on the formula, the description is, 1) P: Value in process; 2) F: Frequency of learners; 3) N: Total number of students.

Based on Table 4.4 from a total of 12 students in grade VI, all of them managed to achieve a level of learning completeness with a percentage of 100%. This improvement reflects the success of improving problem-based learning strategies (PBL) carried out based on evaluation in cycle I. The results of the learning evaluation show that all students are able to understand abstract concepts in Islamic Religious Education (PAI), such as destiny, effort, tawakal, and sincerity, better. In the final test of the cycle, students demonstrate the ability to apply these values to real cases that are relevant to daily life. They are not only able to answer questions correctly, but also show a deep understanding through the reasons and explanations given.

This success is also supported by the observation of student activities during learning. Students seem to be more active in group discussions, asking questions, and finding solutions to the problems given. In addition, their enthusiasm during the learning process is increasing, which can be seen from their full involvement in every stage of learning. Success factors in the second cycle include improving teacher guidance during discussions, using more concrete cases and in accordance with student experience, and more effective time management. This makes learning more directed, interesting, and meaningful for students. During the second cycle, observations are again used to observe and monitor students during cycle II. Observation was carried out by referring to the observation sheet consisting of 5 things observed, namely, 1) Students actively discussed in groups. 2) Students ask questions to teachers or friends; 3) Students record or document the results of the discussion. 4) Students try to find solutions to the given problems. 5) Students appear enthusiastic and enthusiastic during learning. Based on the criteria on the observation sheet, the following are the results of observations made in Cycle II.

Based on Table 4.5 of the observation results using observation sheets in the implementation of cycle II, learning with a problem-based model (PBL) showed a significant improvement in student involvement compared to the previous cycle. Here is a detailed description of the observation results for each aspect observed. In cycle II, all students were seen actively discussing in their respective groups. They share opinions, give feedback, and complement each other's ideas. Discussion activities are more structured than cycle I, with each group member taking a role in completing the assigned tasks. Most students began to show courage to ask questions, both to the teacher and to their friends in the group. The questions asked are also more in-depth, indicating that students are beginning to understand concepts and are trying to explore the material more critically.

Teachers also provide effective guidance in answering students' questions, so they feel more confident in asking questions. All groups of students were seen taking note of the key points of their discussions. Some students even use creative means, such as creating diagrams or tables to summarize the results of the discussion. This documentation helps students in presenting the results of their group work more clearly. Students' efforts in finding solutions to the problems given seem to be increasingly systematic. They don't just try to answer the problem, but also analyze the various possible solutions and discuss the most suitable alternatives. This shows an improvement in critical and collaborative thinking skills.

The enthusiasm of students can be seen throughout the learning process. They seemed enthusiastic in participating in every stage of learning, from problem exploration

to presentation of discussion results. The classroom atmosphere becomes more lively, with students actively engaged and showing a positive attitude towards learning. Significant increase in observations in this cycle II can be attributed to the improvement of learning strategies carried out by teachers. The cases or problems given are more relevant to the student's experience, so they feel more interested and motivated to participate. Teachers also provide more intensive guidance, especially in facilitating group discussions and motivating students who were previously less active. Overall, the implementation of PBL learning in cycle II succeeded in creating a conducive, interactive, and meaningful learning atmosphere.

All the aspects observed showed improvement, reflecting the success of this method in increasing student participation, understanding, and motivation. Based on interviews with students at the end of the second cycle of learning, a number of responses were obtained that showed a positive response to the application of the problem-based learning method (PBL). The following is a description of the interview results for each question asked, 1) Opinions about the problem-based learning method (PBL), Most students stated that the PBL method used by teachers was very interesting and fun. They feel that learning becomes more dynamic because they are actively involved in the learning process. Students also feel that this method makes them more focused, especially since the material is delivered through problem-solving that is relevant to their lives; 2) The Ability of the PBL Model in Helping to Understand Abstract Concepts, Almost all students revealed that this method is very helpful for them in understanding abstract concepts.

They explain that by using real-life case examples or problems, they can more easily relate the concept to everyday life. One of the students gave an example that through group discussions, he better understood how the concepts of business and tawakal can be applied simultaneously in facing life's challenges; 3) Group Discussion Experience, Students feel happy and motivated when discussing in groups. They mentioned that group discussions provide an opportunity to exchange ideas, learn from friends, and solve problems together. Some students also feel that having a group discussion makes them more confident to deliver opinions and ideas; 4) Challenges in Learning with the PBL Model, Some students mentioned that the main challenge they faced was how to manage the discussion time properly.

Some groups also experienced initial difficulties in dividing tasks and responsibilities, although these challenges could be overcome after receiving direction from teachers. In addition, there are students who feel they need more guidance in analyzing complex problems; 5) Relevance of Learning to Daily Life, All students agree that this problem-based learning is very relevant to daily life. They argue that this model helps them see how religious values can be applied in a variety of real-life situations, such as working hard while still surrendering to God. Students also stated that this learning experience motivates them to become more responsible and reflective individuals in facing life's challenges. The results of the interviews showed that students responded very positively to the implementation of PBL in cycle II. They not only enjoy the learning process but also experience immediate benefits in understanding abstract concepts and applying them in daily life. The challenges faced by students are technical and can be overcome with more intensive teacher guidance.

Overall, the implementation of PBL has succeeded in creating meaningful, relevant learning, and building students' collaboration skills and critical thinking. The implementation of classroom action research (PTK) conducted to improve students' understanding of concepts through the Problem-Based Learning (PBL) method in Islamic Religious Education (PAI) learning in grade VI showed significant development from pre-cycle to cycle II. Based on Graph 4.1 In the pre-cycle stage, student learning outcomes showed a very low level of completeness, with only 41.7% of students achieving the minimum completeness criteria (KKM). Most students have difficulty understanding abstract concepts such as destiny, effort, tawakal, and sincerity. Learning is conventional with a lecture approach, so students tend to be passive and less actively involved. The

observation results showed that students rarely discussed, did not ask questions, and were less enthusiastic during learning.

In cycle I, the PBL method began to be applied. Learning outcomes showed an increase with 75% of students achieving KKM. Students begin to engage in group discussions, although not yet optimally. Some Students still feel embarrassed to ask questions or express opinions, and there are difficulties in managing the time of discussions. The results of interviews and observations indicate that students find learning more interesting than before. However, they also revealed challenges such as a lack of confidence in discussing and difficulty understanding concepts without further help from teachers.

Teachers also noted that more intensive mentoring is needed to ensure all students are actively engaged. In cycle II, the application of the PBL method has been improved. The students' learning outcomes reached 100% completeness, showing that all students managed to understand the abstract concepts taught. Students become more active in discussing, asking questions, and finding solutions to given problems. The results of the interviews showed that students felt more confident and understood abstract concepts such as *tawakal* and sincerity better through group discussions and contextual examples given. Observations showed an increase in students' enthusiasm during learning. Challenges in cycle I, such as shyness and difficulty managing time, have been successfully overcome through better mentoring strategies and more structured time allocation.

Overall, the application of the PBL method has succeeded in improving students' learning outcomes, participation, and understanding of concepts from pre-cycle to cycle II. The change in learning strategy from lectures to PBL allows students to be more active and motivated to learn. This problem-based learning not only helps students understand abstract concepts cognitively, but also encourages the internalization of religious values in daily life. This success shows the importance of choosing the right learning method to help students develop their potential to the fullest, both intellectually and spiritually. This is also the basis for teachers to continue to evaluate and improve learning methods to achieve more optimal results in the future.

DISCUSSION

The findings of this study indicate that Problem-Based Learning (PBL) effectively enhanced students' understanding of key concepts in the sixth-grade class at SD Negeri No 106218 Pematang Toba. The implementation of PBL allowed students to engage deeply with the material by addressing real-life problems related to the subject matter. This hands-on approach encouraged students to think critically, apply their knowledge, and collaborate with their peers, which significantly contributed to a more comprehensive understanding of the concepts being taught. The increase in students' post-test scores reflects the positive impact of PBL on their ability to analyze and solve problems independently. One of the key advantages of using PBL in this study was its focus on active learning and student-centered instruction.

By working through problems, students were able to connect theoretical knowledge to practical situations, making the learning experience more relevant and meaningful. This approach also fostered a sense of ownership over their learning process, as students took the lead in discovering solutions and collaborating with one another. The opportunity to engage in discussions and share different perspectives within groups helped them develop a deeper understanding of the content. Additionally, the results suggest that PBL promotes critical thinking and problem-solving skills.

Students were not just memorizing information but were encouraged to analyze, question, and explore solutions in a structured yet flexible environment. This emphasis on inquiry and reflection helped students develop essential skills that are valuable beyond the classroom, such as analytical thinking, teamwork, and decision-making. Therefore, PBL proves to be a powerful teaching strategy, as it not only improves understanding of

academic content but also fosters skills that support lifelong learning and personal growth.

CONCLUSION

Based on the results of the classroom action research (PTK) that has been carried out, it can be concluded that the application of the Problem-Based Learning (PBL) method can effectively increase students' understanding of concepts in Islamic Religious Education (PAI) learning in grade VI. The following are the concluding points summarized from this study, 1) Improvement of Learning Outcomes, In the pre-cycle stage, the student completion rate only reached 41.7%, indicating a very low understanding of concepts, In the first cycle, the application of the PBL method increased the completion rate to 75%, with most students starting to be actively involved in learning, In the second cycle, the completion rate reached 100%, indicating that all students managed to understand abstract concepts such as destiny, effort, tawakal, and sincerity well; 2) Increased Student Engagement, Students become more active in discussing, asking questions, and finding solutions to problems given during learning, The implementation of PBL increases student enthusiasm, which can be seen from the observation results that students are more enthusiastic and interested in learning; 3) Relevance to Daily Life, Students feel that problem-based learning methods are relevant to their lives because they can relate religious concepts to real situations they experience; 4) Effectiveness of PBL in Understanding Abstract Concepts, The PBL model helps students to understand abstract concepts through group discussions, independent exploration, and active learning experiences. Thus, the problem-based learning method has proven to be an effective approach to improve students' understanding of concepts, especially in PAI learning that involves religious values that need to be internalized.

REFERENCES

- Abbas, J. (2020). Service Quality in Higher Education Institutions: Qualitative Evidence from the Students' Perspectives Using Maslow Hierarchy of Needs. *International Journal of Quality and Service Sciences*, 12(3), 371–384.
- Abdullah, A. (2010). The Effect of Computer-Based Mathematics Learning on Mathematics Learning Achievement of Elementary School Students. *Al-Bidayah: Jurnal Pendidikan Dasar Islam*, 2(2), 171–191.
- Adiansha, A. A., Sani, K., Sudarwo, R., Nasution, N., & Mulyadi, M. (2021). Brain-based Learning: How does Mathematics Creativity Develop in Elementary School Students? *Premiere Educandum: Jurnal Pendidikan Dasar Dan Pembelajaran*, 11(2), 191–202.
- Alghazali, M. I. (2019). The Effect of Picture Story Media and Reading Literacy on Learning Outcomes of Elementary School Students. *JTP-Jurnal Teknologi Pendidikan*, 21(3), 269–282.
- Apriliani, S. P., & Radia, E. H. (2020). Development of Picture Storybook Learning Media to Increase Reading Interest of Elementary School Students. *Jurnal Basicedu*, 4(4), 994–1003.
- Arsyad, A. (2011). *Learning Media*. Jakarta: PT Raja Grafindo Persada.
- Cahyati, S. Y., & Rhosalia, D. R. (2020). Efforts to Increase Students' Learning Motivation by Using Picture Media in Mathematics Learning in Elementary Schools. *PENSA*, 2(1), 9–16.
- Carden, J., & Cline, T. (2015). Problem Solving in Mathematics: The Significance of Visualisation and Related Working Memory. *Educational Psychology in Practice*, 31(3), 235–246.

- Dasopang, M. D., Erawadi, A. S., Lubis, A. A., & Hasibuan, H. (2020). Analysis of Students' Mental Health after Terror Cases in Indonesia. *Systematic Reviews in Pharmacy*, 11(2), 939–943.
- Desi, D., & Lumbantoruan, J. H. (2020). Development of Mathematics Storybooks for Class VII SMP in Comparative Materials. *EduMatSains: Jurnal Pendidikan, Matematika Dan Sains*, 1(1), 23–34.
- Hanan, R. A., Fajar, I., Pramuditya, S. A., & Noto, M. S. (2018). Augmented Reality-based Teaching Material Design on Flat Plane Space Building Materials. *Prosiding Seminar Nasional Matematika Dan Pendidikan Matematika (SNMPM)*, 2(1), 287–299.
- Hunt, P. (2006). *Understanding Children's Literature*. Routledge.
- Jameson, M. M. (2013). The Development and Validation of the Children's Anxiety in Math Scale. *Journal of Psychoeducational Assessment*, 31(4), 391–395.
- Januariyansah, S., & Rohmantor, D. (2018). The Role of Digital Classroom Facilities to Accommodate Learning Process Of The Z and Alpha Generations. *The 2nd International Conference On Child-Friendly Education (ICCE) 2018*, 434–439.
- Johnson, R. B., & Christensen, L. (2014). *Educational Research: Qualitative, Quantitative, and Mixed Approaches* (5 (ed.)). Sage Publication.
- Kato, H. (2012). Introduction to Augmented Reality. *Kyokai Joho Imeji Zasshi/Journal of the Institute of Image Information and Television Engineers*.
<https://doi.org/10.3169/itej.66.53>
- Koesnandar, A. (2019). Interactive Multimedia Learning Software Development. *Jurnal Teknodik*, 10(18), 75–88.
<https://doi.org/http://dx.doi.org/10.32550/teknodik.v0i0.548>
- Laurens, T., Batlolona, F. A., Batlolona, J. R., & Leasa, M. (2017). How does Realistic Mathematics Education (RME) Improve Students' Mathematics Cognitive Achievement? *Eurasia Journal of Mathematics, Science and Technology Education*, 14(2), 569–578.
- Lee, K. (2012). Augmented Reality in Education and Training. *TechTrends*, 56(2), 13–21.
<https://doi.org/10.1007/s11528-012-0559-3>
- Lestari, D. (2014). Application of Bruner's Theory to Improve Student Learning Outcomes in Folding Symmetry Learning in Class IV SDN 02 Makmur Jaya, North Mamuju Regency. *Jurnal Kreatif Online*, 3(2), 129–141.
- Lidinillah, D. A. M. (2008). Problem Solving Learning Strategies in Elementary School. *Jurnal Pendidikan Dasar*, 10(2), 1–5.
- Lubis, A. H. (2019). Efforts to Improve Learning Outcomes of Elementary School Students through Cooperative Learning Model with Numbered Heads Together Type. *FORUM PAEDAGOGIK*, 11(2), 127–143.
- Lubis, A. H., & Dasopang, M. D. (2020). Development of Augmented Reality-Based Picture Storybooks to Accommodate Generation Z. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, 5(6), 780–791.
- Lubis, A. H., & Dasopang, M. D. (2021). Online Learning during the Covid-19 Pandemic: How is It Implemented in Elementary Schools? *Premiere Educandum: Jurnal Pendidikan Dasar Dan Pembelajaran*, 11(1), 120–134.
- Lubis, A. H., & Wangid, M. N. (2019). Augmented Reality-assisted Pictorial Storybook: Media to Enhance Discipline Character of Primary School Students. *Mimbar Sekolah Dasar*, 6(1), 11–20. <https://doi.org/10.17509/mimbar-sd.v6i1.16415>

- Lubis, A. H., Yusup, F., Dasopang, M. D., & Januariyansah, S. (2021). Effectivity of Interactive Multimedia with Theocentric Approach to the Analytical Thinking Skills of Elementary School Students in Science Learning. *Premiere Educandum: Jurnal Pendidikan Dasar Dan Pembelajaran*, 11(2), 215–226.
- Ma, J. Y., & Choi, J. S. (2007). The Virtuality and Reality of Augmented Reality. *Journal of Multimedia*, 2(1), 32–37. <https://doi.org/10.4304/jmm.2.1.32-37>
- Maskur, R., Nofrizal, N., & Syazali, M. (2017). Development of Mathematics Learning Media with Macromedia Flash. *Al-Jabar: Jurnal Pendidikan Matematika*, 8(2), 177–186.
- Matulka, D. I. (2008). *A Picture Book: Understanding and Using Picture Books*. Greenwood Publishing.
- Mawanto, A., Siswono, T. Y. E., & Lukito, A. (2020). Development of Picture Story Media to Train Students' Creative Thinking Skills in Class II Fractions. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 4(1), 424–437.
- Morsanyi, K., Busdraghi, C., & Primi, C. (2014). Mathematical Anxiety is Linked to Reduced Cognitive Reflection: A Potential Road from Discomfort in the Mathematics Classroom to Susceptibility to Biases. *Behavioral and Brain Functions*, 10(1), 1–13.
- Mulyono, D., & Hidayati, A. N. (2020). Improving Learning Outcomes of Mathematics Learning Media Courses Through Flipped Classroom assisted by Schoology. *JTP- Jurnal Teknologi Pendidikan*, 22(2), 88–95.
- Nee, A. Y. C., Ong, S. K., Chryssolouris, G., & Mourtzis, D. (2012). Augmented Reality Applications in Design and Manufacturing. *CIRP Annals*, 61(2), 657–679.
- Nincarean, D., Alia, M. B., Halim, N. D. A., & Rahman, M. H. A. (2013). Mobile Augmented Reality: The Potential for Education. *Procedia - Social and Behavioral Sciences*, 103(1), 657–664. <https://doi.org/10.1016/j.sbspro.2013.10.385>
- Nurgiyantoro, B. (2018). *Fiction Study Theory*. Yogyakarta: UGM press.
- Palmarini, R., Erkoyuncu, J. A., Roy, R., & Torabmostaedi, H. (2018). A Systematic Review of Augmented Reality Applications in Maintenance. *Robotics and Computer-Integrated Manufacturing*, 49(1), 215–228.
- Pingge, H. D., & Wangid, M. N. (2016). Factors Affecting Learning Outcomes of Elementary School Students in Tambolaka City District. *Jurnal Pendidikan Sekolah Dasar Ahmad Dahlan*, 2(1), 107–122.
- Prasad, K. S. (2011). Learning Mathematics by Discovery. *Academic Voices: A Multidisciplinary Journal*, 1(1), 31–33. <https://doi.org/https://doi.org/10.3126/av.v1i0.5307>
- Putri, A. R., & Mustadi, A. (2020). Connecting Science with Story Tale: How Sainsmatika Story Tale Book Decrease Science Anxiety of 4th Graders Student. *SEJ (Science Education Journal)*, 3(2), 57–66.
- Santrock, J. W. (2011). *Educational Psychology* (5th ed.). McGraw-hill Companies.
- Saputri, F. I. (2016). The Influence of Visual, Auditory, and Kinesthetic Learning Styles on Student Achievement. *Jurnal Prima Edukasia*, 3(01), 25–36.
- Tian, J., & Siegler, R. S. (2017). Fractions Learning in Children with Mathematics Difficulties. *Journal of Learning Disabilities*, 50(6), 614–620.
- Ula, N., Hartatik, S., Nafiah, N., & Akhwani, A. (2020). Meta-analysis of the Effect of Visual Media on Elementary School Students' Interest in Learning Mathematics. *AKSIOMA: Jurnal Matematika Dan Pendidikan Matematika*, 11(1), 82–92.

- Wagiran. (2014). *Educational Research Methodology: Theory and Implementation*. Deepublish.
- Wangid, M. N., Rudyanto, H. E., & Gunartati, G. (2020). The Use of AR-Assisted Storybook to Reduce Mathematical Anxiety on Elementary School Students. *International Journal of Interactive Mobile Technologies (IJIM)*, 14(6), 195–204.
- Waskitoningtyas, R. S. (2016). Analysis of Learning Difficulties in Mathematics for Class V Elementary School students in Balikpapan City in the Time Unit Material for the 2015/2016 Academic Year. *JIPM (Jurnal Ilmiah Pendidikan Matematika)*, 5(1), 24–32.
- Williamson, B., Potter, J., & Eynon, R. (2019). New Research Problems and Agendas in Learning, Media and Technology: The Editors' Wishlist. In *Learning, Media and Technology* (Vol. 44, Issue 2, pp. 87–91). Taylor & Francis.
- Wolfolk, A. (2016). *Educational Psychology* (13th ed.). Pearson Education Inc.
- Zuchdi, D. (2012). *Skilled Reading and Noble Character*. Yogyakarta: Multi Presindo.