26 (1), 2025, 280-304

Jurnal Pendidikan MIPA

e-ISSN: 2685-5488 | p-ISSN: 1411-2531

http://jurnal.fkip.unila.ac.id/index.php/jpmipa/

Development of a Heyzine Flipbook Media Integrated with Problem-Based Learning to Improve Natural and Social Learning Outcomes of Elementary School Students

Wisnu Aji Suryo Anggono*, & Deni Setiawan

Department of Elementary School Teacher Education, Semarang State University, Indonesia

Abstract: This study aims to develop and test the effectiveness of Heyzine Flipbook learning media integrated with the Problem-Based Learning model to improve the learning outcomes of natural and social sciences of grade V elementary school students. This development is motivated by the lack of effectiveness of conventional media and the complexity of natural and social science materials that require innovative and interactive media. This research uses the Research and Development (RnD) method of the Borg & Gall model, consisting of 10 stages. The research was conducted in two stages: development and testing. The development stage includes problem analysis and literature study, initial development of Heyzine Flipbook media, expert validation, and revision. The pilot stage tested the effectiveness of the media on 49 fifth-grade students of Bunayya Integrated Islamic Elementary School. Initial data collection includes documentation, interviews, questionnaires, and observations. The instruments used in this study include pretest-posttest to test the effectiveness of the media and expert validation to test the feasibility of the media developed. Data analysis used a T-test, Effect Size Cohen's d and N-Gain. The results of expert validation showed that Heyzine Flipbook media was very feasible to use, with an average score of 93.5%. The effectiveness test showed a significant difference between the pretest and posttest (0.000 <0.05). The effectiveness level of Cohen's Effect Size d reached 1.767 on a small scale and 2.112 on a large scale, significantly improving learning outcomes. The N-Gain average improvement test reached 0.5537 on a small scale with a medium category and 0.5503 on a large scale with a medium category. This proves that Heyzine Flipbook media integrated with Problem-Based Learning is effective in helping students understand the material on Indonesia's location and geographical conditions. Based on the study results, Heyzine Flipbook media is recommended for learning natural and social sciences in elementary school. This media is an interesting and innovative alternative to conventional media. Researchers recommend that heyzine flipbook media integrated with problem-based learning models be applied to learning, especially in class V, to create meaningful learning.

Keywords: media development, heyzine flipbook, learning model, learning outcomes.

▪ INTRODUCTION

A country's education quality determines its progress and development level. A good education will give birth to the next generation, which is brilliant, skillful, and has a strong character (Pane & Dasopang, 2017). Improving education is an effort to build the foundation of an advanced and quality Indonesian society (Defantari & Yulianto, 2024). Education is a dynamic and continuous process or journey experienced and inherent in human life (Isrokatun et al. 2023). Based on Law No. 20 of 2003 Article 1 on the National Education System, the law states that education helps a person become a better individual and benefits their environment. Through education, it can produce qualified and quality human beings (Setiawan et al. 2023). For education to be of the quality targeted by the law mentioned above, it is necessary to develop a comprehensive learning plan or educational curriculum.

Wisnu Aji Suryo Anggono*, & Deni Setiawan
*Email: asawisnu@gmail.com

DOI: http://dx.doi.org/10.23960/jpmipa/v26i1.pp280-304
Received: 04 February 2025
Accepted: 18 February 2025
Published: 14 April 2025

In achieving quality education, a relevant and quality education curriculum is also needed so that its implementation becomes directed and structured, which will increase the quality of Indonesia's human resources (Mahya & Setiawan, 2024). Quality curriculum is a complete and systematic plan containing everything needed to guide the learning process to achieve the stated educational goals (Mahya & Setiawan, 2024).

Indonesia is now adopting a new learning system that is more flexible and learner-centered, namely the Merdeka Curriculum (Angga, Suryana, Nurwahidah, Hernawan, & Prihantini, 2022). The Merdeka Curriculum encourages students to think critically, innovatively, and independently and equips them with the skills needed. This independent curriculum answers the tight competition for human resources globally in the 21st-century era of society 5.0. (Indarta et al., 2022). In other words, the Merdeka Curriculum wants to create individuals who are not only academically intelligent but also have strong characters and can face future challenges (Daga, 2021; Pattipawae et al., 2023).

The existence of essential materials in the merdeka curriculum causes changes in the learning content, one of which is the policy at the elementary school level, namely Natural and Social Sciences subjects. Natural and Social Sciences combines science and social studies subjects; the two subjects have been standing alone. However, these two subjects will be taught simultaneously in the independent curriculum (Indarta et al., 2022). Through Natural and Social Sciences subjects, the Merdeka Curriculum invites students to explore the world around them. Starting from studying the most minor living things to vast natural phenomena and how humans interact with their environment (Kurniawan & Astalini, 2018; Indah et al.,2019). Through this, learners are encouraged to understand how the universe operates and interacts with human life on Earth (Dinahastuti et al.,2023; Milasari & Setyasto, 2023). Natural and social science learning activities for elementary school students have their uniqueness and specialty, so elementary school teachers must continue to innovate in designing effective and enjoyable learning so that students can learn optimally; for example, in providing material, it is necessary to have innovative learning models and media so that students do not feel bored with the material presented and the use of technology to keep up with the times (Nurfadhillah, Ningsih, Ramadhania, & Sifa, 2021).

The development of information and communication technology brings excellent changes. The development of information and communication technology has become an urgency, especially in the field of education (Ainur Rohmah & Rachmawati, 2019; Arciosa, 2022; Jadhav, Gaikwad, & Patil, 2022; Shah, 2022). The rapid development of information and communication technology drives teachers to continue to innovate in the learning process (Buck, Clarke, Torres de Oliveira, Desouza, & Maroufkhani, 2023; S. Li et al., 2023; X. Li, Wang, & Xu, 2022). This opens up vast opportunities for teachers and students to utilize various learning tools in learning activities (Calvin, Mali, & Timotius, 2023; Logayah, Maryani, Ruimat, & Wiyanarti, 2023; Malihah et al., 2023). One of the learning facilities in question is the utilization of learning media.

Learning media is very important in learning, especially for elementary school students (Qorimah et al., 2022; Ramdani et al., 2021). According Nurfadhillah et al. (2021) Learning media is an object that functions to channel the process to the recipient in the educational process. Various learning media, be it in the form of visual or audio-visual media, both digital and non-digital, are effective in overcoming learner boredom and improving the quality of learning (Mulyanto & Mustadi, 2023; Simanjuntak &

Pardede, 2023). Learning media also plays a role in increasing critical thinking and interest in learning (Anggraeni, Widodo, & Supardi, 2023; Castaño-Calle, Jiménez-Vivas, Poy Castro, Calvo Álvarez, & Jenaro, 2022). Learning media can also improve learning outcomes for students (Qorimah et al., 2022; Ristanti & Isdaryanti, 2024). With the presence of learning media, students can be helped in obtaining information or providing knowledge and experiences to students who study it.

There are many innovations in natural and social science learning media, one of which is the use of digital media such as flipbooks and digital books that are more interactive (Yuliani & Setiawan, 2024). Flipbooks are sophisticated electronic media formats that combine animation, text, audio, images, and other interesting features; flipbooks can help learners understand the material better and make learning more fun (Diani & Hartati, 2018; Setiawan et al., 2019). Flipbook presents educational material that learners can use, similar to the opening and closing of book pages, but is presented in a digital format (Apriliyani et al., 2021; Diani & Hartati, 2018; Yuliani & Setiawan, 2024). The main advantage of Heyzine Flipbook lies in its ability to present learning materials in a digital format that resembles printed books but with additional interactive features not found in conventional books. (Sa'diyah, 2021). The "turn the page" feature provides a familiar reading sensation, making students more comfortable and motivated to learn.

Heyzine Flipbook integrates multimedia elements such as images, audio, video, and animation. This interactive content makes learning materials more vivid and helps students understand complex concepts more quickly (Wibowo & Pratiwi, 2018). For example, teachers can insert short explanatory videos on specific pages or add interactive quizzes to test students' understanding after learning a material. A study by Andini & Fitriana (2018) Flipbook modules are more effective than printed books in improving student learning outcomes. This is due to the nature of flipbooks, which are engaging and interactive, and the material's character and the student's learning style (Andini & Fitriana, 2018). With various advantages, Heyzine Flipbook is a relevant learning media supporting 21st-century skills. This flipbook support is a solution to create a more enjoyable and communicative classroom atmosphere and can help students understand the material the teacher presents (Prabowo & Wakhudin, 2024).

Learning models also play a significant role in the learning process (Indah et al., 2019). The problem-based learning model is an innovative and practical approach to developing problem-solving and critical thinking skills. Learners are empowered through structured group activities to maximize their performance in this learning process (Hariyani et al., 2023; Novianti, Bentri, & Zikri, 2020). This learning model emphasizes contextualized learning through various complex activities. This learning model focuses on real-life activities. Like scientists and detectives, learners are trained to think critically and find solutions to problems around them. By applying analytical skills and critical thinking, one can find answers or solutions to problems that exist in everyday life based on practical experience gained during learning (Hariyani et al., 2023; Khakim et al., 2022; Novianti et al., 2020).

The Problem-Based Learning model has five learning steps. The steps contain certain functions that direct learners through several activities that hone their abilities and skills. The problem-based learning model will enhance learners' in-depth learning experience (Affandy et al., 2024). The advantages of the Problem-Based Learning model

for students are that it makes it easier to understand learning material, provides challenges and satisfaction in finding the latest insights, increases learning activities, helps realize knowledge into life, helps expand new knowledge, and trains to be responsible for learning, makes learning fun, develops critical thinking and adaptability to new knowledge, provides opportunities to apply the knowledge they already have in the real world, and develops a lifelong interest in learning (Mayasari et al., 2022; Yunitasari & Hardini, 2021).

Based on the results of observations and interviews conducted by researchers at Bunayya Integrated Islamic Elementary School, Candisari Subdistrict, Semarang City, especially in Natural and Social Learning class V subject activities experiencing problems. Teachers still use blackboard media and lecture methods, which makes students passive when they only need to listen to the teacher's explanation. This learning method is considered inefficient in improving students' learning outcomes, especially in Natural and Social Learning subjects, which must be accompanied by media that is attractive to students. Students are not enthusiastic about learning Natural and Social Learning because it is considered difficult to understand, and they sometimes feel bored.

In addition, teachers still use conventional media. Learning media used by teachers at Bunayya Integrated Islamic Primary School is still dominated by conventional media, such as blackboards, printed books, and simple teaching aids. Teachers rarely or do not use digital-based learning media, even though technological facilities such as computers, projectors, and internet networks are available at school. Technology-based learning media has great potential to improve the quality of learning. For example, teachers can use interactive presentations, learning videos, or educational applications to make learning materials more interesting and easily understood by students. In addition, digital media also allows students to learn independently and collaboratively through various online learning platforms and resources.

This condition is unfortunate because it can hamper students' potential to learn optimally. In fact, students are expected to have good digital literacy skills in today's digital era. The lack of maximum use of innovative and interactive media makes students less motivated and bored when learning occurs. Learning media development that is still less than optimal impacts student learning outcomes. Based on the documentation data of the learning outcomes of fifth-grade students of Bunayya Integrated Islamic Elementary School, it can be concluded that the learning outcomes of Natural and Social Sciences lessons are still low; this can be seen from the number of students who get scores below the Learning Objective Achievement Criteria. This problem is due to the limited time given during learning, so the material delivery is not maximized. This is because students cannot maximally accept the material conveyed by the teacher, which will impact students' learning outcomes.

Responding to the problems mentioned earlier, in this study, researchers developed interactive learning media flipbooks based on the Problem-Based Learning learning model for grade V students of Bunayya Integrated Islamic Elementary School as learning media and supporting learning resources in learning Natural and Social Sciences in grade V of Bunayya Integrated Islamic Elementary School to help the learning process to be more optimal. This flipbook media uses the help of Heyzine Flipbook. Heyzine Flipbook is a platform that can be used to make an ordinary document interactive and engaging

with a flip effect that feels real, in other words, like a physical book whose pages can be flipped virtually, complete with sound effects and animation (Erawati et al., 2022).

This media development is designed to help and support students in participating in learning because this learning media can be used by students independently through existing smartphones/computers, and this flipbook also presents text, images, animations, and videos so that it can help students learn independently and actively. Heyzine Flipbook learning media with a Problem-based learning model integrates interactive elements such as quizzes, videos, audio, and animation. These features make the learning material more interesting and encourage students to be actively involved in the learning process. Research by Mahya & Setiawan (2024) shows that interactive digital resources improve students' conceptual understanding, especially in areas that require problem-solving and critical thinking. Compared to conventional textbooks, Heyzine Flipbook offers more interesting and dynamic visual representations. Images, illustrations, and multimedia can help students understand abstract concepts more efficiently, especially for students with a visual learning style.

Combining the Heyzine Flipbook and the Problem-Based Learning model will create a dynamic and interactive learning environment. Heyzine Flipbook provides an engaging and accessible platform to present learning materials, while Problem-Based Learning provides structure and challenges that encourage students to think critically and solve problems, such as in natural and social science lessons. Thus, it can improve students' understanding and retention of complex topics and prepare them for the challenges of the digital era.

This research is also reinforced by several relevant previous studies by Mahesti, Saputra, & Fatmawati (2023) The use of Heyzine Flipbook media obtained by the test results showed an increase in the analytical thinking ability of students through a paired T-test sig. 0.00 <0.05, the health biotechnology e-module media through Heyzine Flipbook can improve analytical thinking skills. Another study by Djarwo & Handasah (2020) showed that The use of flipbooks in the learning process has a positive response; this can be seen from the results that the digital learning media flipbook based on problem-solving is very suitable with a score of 82.3% and 84.8% for reading test results. In another study by oleh Pigai & Yulianto (2024) , Flipbook is feasible and effective for teaching and learning activities, especially in grade IV science subjects about the parts of the plant body and their functions. In research conducted by (Nursafitri & Ansori, 2024) , the N-Gain results reached 0.66 in the moderate category and were interpreted as being able to improve student learning outcomes in grade 5 Natural and Social Science lessons. There is also research by (Hapsari & Zulherman, 2021) that obtained the results of material expert and teacher validation in the “Very Valid” category for the results of 86% and 85.57%, respectively. With the help of flipbooks and applying Problem-Based Learning models in chemistry modules, it produces feasible, practical, and effective categories with previous research (Djarwo & Handasah, 2019)

Based on this background, researchers will develop learning media using Heyzine Flipbook with the Problem-Based Learning model to improve the learning outcomes of fifth-grade students of Bunayya Integrated Islamic Elementary School. Researchers will discuss three problem formulations, including (1) Heyzine Flipbook-based learning media design with a problem-based learning model, (2) the feasibility of Heyzine Flipbook-based learning media with a problem-based learning model, (3) the

effectiveness of Heyzine Flipbook-based learning media with a problem-based learning model to improve the learning outcomes of Natural and Social Sciences on the material of the location and geographical conditions of the Indonesian region for grade V students of Bunayya Integrated Islamic Elementary School.

Researchers will examine the development of Heyzine Flipbook learning media through research and development using the problem-based learning model in Natural and Social Science lessons. Researchers will analyze student needs, teacher needs, and facility availability in the first problem formulation regarding the design of Heyzine Flipbook-based learning media with the Problem-Based Learning model. This analysis will be the basis for determining the appropriate content and features for learning media. Furthermore, researchers will validate the learning media by involving learning media experts and material experts in formulating the second problem regarding the feasibility of Heyzine Flipbook-based learning media with the Problem-Based Learning model. This validation aims to assess the quality and feasibility of learning media regarding design, content, and effectiveness.

Finally, in the third problem formulation regarding the effectiveness of Heyzine Flipbook-based learning media with the Problem-Based Learning model to improve learning outcomes in Natural and Social Sciences, the revised learning media will be implemented in learning in class V of Bunayya Integrated Islamic Elementary School. Furthermore, researchers will evaluate the effectiveness of learning media in improving student learning outcomes in Natural and Social Sciences. This evaluation can be done using pre-tests and post-tests to measure the improvement of students' learning outcomes after using the learning media. The evaluation data will be analyzed to determine whether the Heyzine Flipbook learning media with the Problem-Based Learning model is efficacious in improving the learning outcomes of Natural and Social Sciences on the material of the location and geographical conditions of Indonesia's territory in grade V students of Bunayya Integrated Islamic Elementary School. By using the R&D method, this research is expected to produce Heyzine Flipbook learning media with a Problem-Based Learning model that is feasible and effective and contributes to improving student learning outcomes on the material of the location and geographical conditions of the Indonesian territory.

▪ METHOD

Participants

The research subjects in this study were fifth-grade students of Bunayya Integrated Islamic Elementary School. The small group test was conducted on 18 students of the VA class of Bunayya Integrated Islamic Primary School. The extensive group product test was conducted on 31 students of class VC of Bunayya Integrated Islamic Elementary School, so the total sample was 49. The reason for choosing the population at Bunayya Integrated Islamic Elementary School is because both are parallel classes, are in one school, and the academic ability of students is almost the same as seen from the results of the first-semester exam scores in natural and social science subjects which show an average value that is not much different, the school environment conditions are the same. Teachers of relatively the same quality teach them. Sampling is also based on the homogeneity test from the results of the first-semester exam scores in natural and social science subjects, which obtained a homogeneity test result of 0.331. It can be seen that

classes VA and VC have the same variant, or the data is homogeneous. With these results, classes VA and VC can become research samples because classes VA and VC have similar or homogeneous characteristics.

Research Design and Procedures

This research uses the research and development (RnD) method. The research and development (R&D) method produces specific products and tests their effectiveness. According to Borg & Gall (Milasari & Setyasto, 2023) , development research becomes a process for developing and validating educational products. This development research applies the Borg and Gall model, which is divided into 10 stages: Potential and Problem Analysis, Data Collection, Product Design, Product Validation, Design Revision, Scale Trial, Product Revision, Large-scale Scale Trial, and Final Product Revision.

The initial stage carried out by researchers is to determine the potential problems in the school by conducting observations, interviews, and documenting the learning outcomes of fifth-grade students at Bunayya Integrated Islamic Elementary School. The next stage is to collect data and information to plan the product to be developed using a questionnaire of student and teacher needs. After analyzing the needs questionnaire, the researcher designs the product to be developed, starting from the design, material, and language used. The product design is adjusted to the learning outcomes in the decision in phase C. Namely, learners understand Indonesia's location and geographical conditions through conventional/digital maps. After the product has been designed, validation is carried out by experts who are competent in their fields, namely media and material experts, by filling out the validation sheet prepared by the researcher using a Likert scale.

The next stage is design revision. Products that expert validators have assessed are then revised based on the suggestions given by expert validators. After the product was revised, it was continued by testing the product on students on a small scale in class VA, consisting of 18 students, using a purposive sampling technique based on different levels of cognitive ability. At the product trial stage, learning was carried out using interactive media based on Heyzine Flipbook with a Problem-based learning model using a projector at school. After carrying out the learning, teachers and students were asked to fill out a response questionnaire regarding using interactive media based on Heyzine Flipbook with the Problem-based learning model.

Furthermore, the results of the response questionnaire are analyzed, and if there is input, it can be used as material to revise the products that have been tested. The final stage The final trial stage was carried out by testing the developed product on a larger scale. Researchers conducted a trial of its use to all VC class students, totaling 31 students, to determine the effectiveness of the products developed based on student learning outcomes.

Instruments

Data collection in this study used two instruments, namely test and non-test instruments.

Instruments Test

The test instrument uses formative test techniques such as pretests and posttests containing multiple-choice questions. Pretests were conducted to obtain data on students' initial abilities, as shown by the pretest results, and posttests were conducted to obtain

data on students' final abilities, as shown by the posttest results after receiving treatment. The posttest was conducted to determine student learning outcomes after completing a series of learning programs using Heyzine Flipbook media with a problem-based learning model. The number of pretest and posttest questions was 30 multiple-choice questions with four alternative answers. The questions used in the pretest-posttest are the result of the researchers' development by adjusting the indicators of learning objectives that have been determined, where there are 10 indicators of learning objectives for the test questions used. Indicators of test/evaluation questions developed include students' cognitive abilities, with questions developed consisting of cognitive levels C4 (Analyzing) and C5 (Evaluating). From the validity test, 30 valid and reliable questions can be used in the pretest and posttest. All 30 items were declared valid and reliable, so they can be used as a valid and consistent measuring instrument to measure students' cognitive abilities at the C4 (Analyzing) to C5 (Evaluating) level related to the indicators of the learning objectives set.

Instruments Non-Test

Non-test techniques include observation, interviews, questionnaires, and documentation. In the observation, researchers observed the learning process carried out in the classroom by observing the entire series of learning processes. In the interview instrument, there are four indicators of questions. With each indicator, there are six questions for teachers and three indicators of questions for students. With each indicator, there are five questions. The study's questionnaires amounted to four, including media needs questionnaires for teachers and students and questionnaires for validators from media experts and material experts. In the teacher needs questionnaire, there are five indicators of questions, with each indicator having five questions, and for the student needs questionnaire, there are four indicators of questions, each having four questions.

Furthermore, material and media experts will fill out the questionnaire. The material expert questionnaire consists of 4 aspects of assessment, which include aspects of suitability, completeness aspects, competency aspects, and language aspects. In these aspects, there are 14 indicators of questions. There are 25 questions to measure these 14 indicators through a series of validity and reliability tests; the 25 questions are declared valid and reliable, so they are suitable for use as valid and consistent measuring instruments. Then, on the media expert questionnaire, there are three aspects: media, display, and usage. In these aspects, there are 17 indicators of questions; from 17 indicators, there are 22 questions. Like the media expert questionnaire, these 22 questions have also been tested for validity and reliability and declared valid and reliable. The researcher developed the instrument alone by considering learning objectives, student characteristics, learning media design principles, and relevant learning theories. Finally, in the documentation, the documents obtained were in the form of photos of the learning process, a list of names, the number of students, and the scores of fifth-grade students of Bunayya Integrated Islamic Elementary School.

Data Analysis

The data analysis techniques used include product data analysis, initial data analysis, and final data analysis. Analysis of product data obtained from the results of the feasibility test of learning media based on the Heyzine Flipbook Problem-Based Learning model based on the criteria of the validation questionnaire for media experts, material

experts, student response questionnaires, and teacher response questionnaires. Initial data analysis is an analysis of the needs of teachers and students for learning media based on the Heyzine Flipbook Problem-Based Learning model. Final data analysis is obtained from learning outcomes during the pretest and posttest; then, the data is analyzed using the normality test, t-test, Effect Size Cohen's d, and n-gain test.

Data analysis techniques with descriptive methods. The feasibility of learning media based on the Heyzine Flipbook Problem-Based Learning model is analyzed using validation tests from media and material experts. Then, the percentage of data is converted based on the criteria of very feasible, feasible, feasible enough, less feasible, and not feasible. Products with a percentage between 86% and 100% are categorized as "Very feasible," indicating that the product meets the quality standards. Percentages between 71% to 85% indicate "Feasible" products, meeting the standards but may require some improvement. The category "Fairly feasible" is given for 56% to 70%, indicating that the product meets some standards but needs significant improvement. 41% to 55% indicates a "Less viable" product with many flaws that need improvement. Finally, a 25% and 40% percentage indicates a "Not viable" product, which means the product does not meet the standards and requires complete repair or replacement.

Data analysis was carried out to determine the effect of using learning media based on the Heyzine Flipbook Problem-Based Learning model developed to improve student learning outcomes based on the pretest and posttest calculated using the T-test, Effect Size Cohen's d, and N-gain index (Afridapane, 2017). The t-test was chosen because this method is suitable for comparing the means of two groups. A t-test is used to see if there is a significant difference between the average student learning outcomes before and after using Heyzine Flipbook learning media and the problem-based learning model. The t-test will provide information about whether the increase in student learning outcomes is statistically significant (Handayani et al., 2024). Then, the Effect Size Cohen's d is used to measure the effectiveness of Heyzine Flipbook learning media; if using up to the t-test alone, only significant results will be obtained. Effect Size Cohen's d is needed to complement the information from the T-test by providing a more comprehensive picture of the effectiveness of learning media (Carrasc et al., 2023) . Therefore, it is necessary to arrive at the Effect of Cohen's d in order to know how much effectiveness the Heyzine flipbook media developed. The N-Gain test was chosen because this method provides information on how much students' learning outcomes improve after participating in learning (Handayani et al., 2024). N-Gain helps measure the effectiveness of learning interventions using Heyzine Flipbook media with Problem-Based Learning models in improving student learning outcomes. N-Gain complements information from the T-test and Cohen's Effect Size by providing a more comprehensive picture of the impact of learning.

The N-Gain score category is used to classify the improvement of student learning outcomes after using learning media. The "High" category is given for N-Gain (g) values greater than 0.7, which indicates significant improvement. The "Medium" category indicates a moderate improvement for N-Gain values between 0.3 and 0.7. Meanwhile, the "Low" category is given for N-Gain values of less than 0.3, which indicates a less significant improvement or no improvement.

This study uses two research variables: the independent variable and the dependent variable. The independent variable in this study is learning media based on the Heyzine Flipbook Problem-Based Learning model, while the dependent variable is the learning

outcomes of Natural and Social Sciences of grade V students of Bunayya Integrated Islamic Elementary School. For example, a p-value of 0.001 (less than 0.05) was obtained after conducting a T-test. This means a significant difference exists between the average pretest and posttest learning outcomes. Then Cohen's d result is 1.512, which indicates that the media has excellent effectiveness. Furthermore, the N-Gain value is 0.6 (including the medium category). Using learning media provides a reasonably good increase in learning outcomes. These results indicate that the Heyzine Flipbook learning media with the Problem-Based Learning model effectively improves student learning outcomes. Although the increase is not too high, it is statistically significant.

▪ RESULT AND DISSCUSSION

This research aims to develop learning media based on Heyzine Flipbook with Problem-Based Learning models to improve learning outcomes in Natural and Social Sciences. The subject matter in this study is the learning content of the material "Location and Geographical Conditions of Indonesia" for grade V students of Bunayya Integrated Islamic Elementary School. The results of identifying pre-research problems found by the author through the interview process with teachers and students, including first, still do not maximize the use of learning media in concrete and digital form in the learning process. Second, technology-based media is not used in the learning process. Third, learning resources and references are lacking. Fourth, teachers who apply direct instruction learning models with lecture methods, discussions, and assignments so that students do not understand the material presented by the teacher. Researchers conducted a problem identification process using several techniques, including interviews and documenting data as a reference to provide solutions to existing problems. The solution provided by the author to the problem is to develop Heyzine Flipbook-based learning media with the Problem-Based Learning model in the learning subjects of Natural and Social Sciences with the subject matter "Location and Geographical Conditions of Indonesia" for grade V students of Bunayya Integrated Islamic Elementary School. The process of developing Heyzine Flipbook-based learning media with the Problem-Based Learning model carried out by researchers are guided by the steps of research and development according to Borg and Gall, which consists of 8 of the 10 research stages used in it, including (1) potential and problems, (2) data collection, (3) product design, (4) product design validation, (5) design revision, (6) product trials, (7) product revision, (8) and trial use. (Azizah Bana Tussifa et al., 2021).

Potentials and Problems

In the first stage, namely potential and problems, researchers identified problems through teacher interviews and document studies in class student learning outcomes at Bunayya Integrated Islamic Elementary School, Candisari District, Semarang City. Interviews were conducted with teachers and grade V students at the school. The interview questions focused on the subjects in which students still scored below the Criteria for Achieving Learning Objectives, what subjects were the most difficult for students to understand, and then narrowed down to learning media. The results of interviews and document studies conducted by the author show that there are several problems in learning Natural and Social Sciences. The problems faced include (1) the learning content of Natural and Social Sciences, which is less interesting so that students

are less active in the learning process; (2) the learning methods used by teachers are still conventional by using the lecture method; discussion; assignment; and question and answer so that students tend to be passive when they only need to listen and listen to explanations and feel bored with learning that seems monotonous, (3) teachers have not fully developed and implemented learning media, especially in digital learning media, teachers refer more to teacher and student books that are already available, teachers only use concrete media in the form of pictures and makeshift props, and (4) there are still many students who get learning results below the Learning Objective Completeness Criteria because their material understanding skills tend to be low. Understanding of Natural and Social Science learning materials that are still lacking in students is in the material element of Indonesia's geographical location and conditions because the material contains much memorization and reading. This triggers low learning outcomes for students in Natural and Social Sciences learning subjects. Therefore, in this study, the authors focused on existing contextual problems related to developing learning media for Natural and Social Sciences regarding Indonesia's location and geographical conditions.

Data Collection

Researchers collected research data such as the results of teacher and learner interviews, the results of observations of the learning process in the classroom, the results of student learning documentation, and the results of teacher and learner needs questionnaires. The data that has been collected is then analyzed to compile materials and develop media that are tailored to the needs and characteristics of students and, of course, also adapted to the applicable learning curriculum. In the data collection stage, researchers collect various information related to product development so that the products produced can overcome the problems in Bunayya Integrated Islamic Elementary School and follow the needs of teachers and students. Product design is done according to the teacher and learner's needs, and the results are based on a questionnaire. In this step, researchers began to design product ideas that were interesting and not monotonous.

Product Design

Researchers created a product in the form of learning media based on the Heyzine Flipbook Problem-Based Learning model. The material used is about the location and geographical conditions of Indonesia. Heyzine Flipbook-based learning media Problem-Based Learning model is equipped with instructions for use, material, Student Worksheets, quizzes, and evaluation questions. The design used in learning materials is tailored to the needs of students, teachers, and elementary school Natural and Social Science materials. The language used is also communicative and easy for students to understand. The following link can be accessed to support learning: https://heyzine.com/flip-book/9f09d3c477.html. Product design is done according to the teacher and learner's needs, and the results are based on a questionnaire. In this step, researchers began to design product ideas that were interesting and not monotonous. To overcome this, researchers began to realize the media at the development stage by using the right color combination and adjusting to the background.

This learning media is designed as an exciting learning adventure, where learners act as young explorers who want to understand more about the country of Indonesia. Each chapter will present a problem or question that challenges learners to find answers through

exploration, analysis, and problem-solving activities. In addition, Heyzine Flipbook-based learning media for Problem-Based Learning models of Indonesia's geographical location and conditions are also equipped with instructions for use, book identity, learning outcomes, learning objectives, concept maps, materials, Learner Worksheets, quizzes, evaluation questions, and author profiles that can be easily accessed in flipbooks and become one of the main attractions for students. The media creation process is designed using Canva, Powtoon, CapCut, and HiPaint. After the design is complete, it is converted to the Heyzine Flipbook application.

The following figure shows the display of learning media based on the Heyzine Flipbook model Problem-Based Learning material on Indonesia's location and geographical conditions.

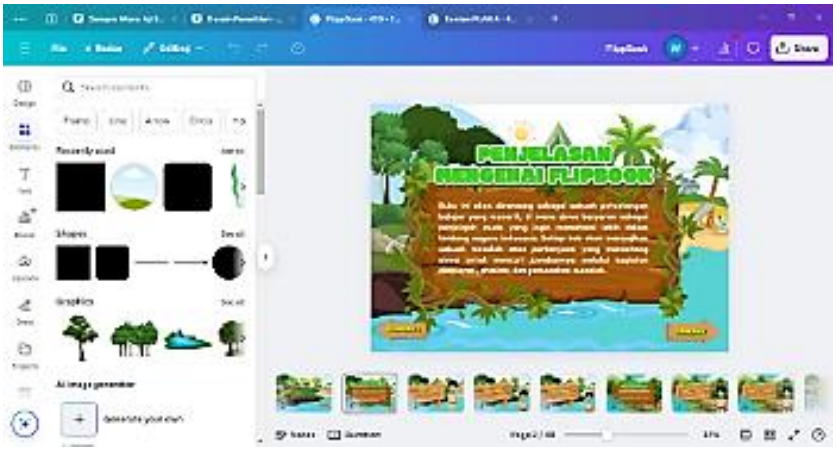

Figure 1. The process of making learning media is based on the Heyzine Flipbook model. Problem-based learning material is based on Indonesia's location and geographical conditions

Figure 2. The initial display of learning media based on the Heyzine Flipbook model Problem-Based Learning material on the location and geographical conditions of Indonesia

Figure 3. Display of the contents of learning media based on the Heyzine Flipbook model Problem-Based Learning material location and geographical conditions of Indonesia

Validation of Product Design

Media material experts carry out product design validation. Design validation is carried out by material and media experts by providing assessments, criticisms, and suggestions for media products developed through validation instrument sheets that researchers have prepared. Researchers also make instruments to measure product performance. Furthermore, in the material and media expert test, the experts validated the assessment according to the instrument that the author had made. The following are the results of the material and media validation tests.

Table 1. Results of product validation of Heyzine Flipbook learning media integrated with Problem-based learning

Validator	Percentage	Criteria
Material	96%	Very Decent
Media	91%	Very Decent
Average	93.5%	Very Decent

Based on the table above, a percentage of 96% was obtained by the material expert and categorized as very decent. Meanwhile, media experts get a percentage of 91%, which is a very decent category. From this assessment, it can be concluded that the media and material for learning media products based on the Heyzine Flipbook model Problem-Based Learning material on Indonesia's location and geographical conditions are suitable for testing.

Design Revision

Design revisions based on notes related to input, criticism, and suggestions given by material and media experts as a form of improvement for researchers on the Heyzine Flipbook-based learning media Problem-Based Learning model produced. The results of the revision notes include: 1) adjustment of learning objectives in the learning media with

those in the learning tool, and 2) the writing style/font is changed according to font standards for children. From the input provided by the material expert lecturer, the researcher improved the media developed so that it was feasible to be tested.

Small-Scale and Large-Scale Product Trials

At the implementation stage, small-scale and large-scale trials are conducted. A small-scale trial involving 18 students of class VA of Bunayya Integrated Islamic Primary School to prove the effectiveness of the product to be developed. The product effectiveness test is carried out using an assessment instrument so that the data obtained is complete and meets the effectiveness standards. The following are the results of the small-scale and large-scale effectiveness tests.

Table 2. Results of the pretest and posttest of the small-scale trial

Score	High	Low	Average
Pretest	76	17	42
Posttest	93	76	74

The average pretest score on the small group trial was 42, with 3 learners completing the Learning Objective Achievement Criteria (70) and 15 not completing the Learning Objective Achievement Criteria (70). The average posttest score on the small group trial was 80, with all students completing the Learning Objective Achievement Criteria (70). The results of this calculation prove that students' learning completeness increases from pretest to posttest scores.

Table 3. Results of the pretest and posttest of the large-scale trial

Score	High	Low	Average
Pretest	73	37	47
Posttest	93	70	78

The average pretest score on the large group trial was 47, with 2 learners completing the Learning Objective Achievement Criteria (70) and 29 not completing the Learning Objective Achievement Criteria (70). The average post-test score on the large group trial was 78, with all students completing the Learning Objective Achievement Criteria (70). The results of this calculation prove that students' learning completeness increases from pretest to post-test scores.

Table 4. Small-scale normality test results

	Normality Test					
	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistik	Df	Sig.	Statistik	Df	Sig.
Pre_Test	.080	18	. 200*	.981	18	.964
Post_Test	.137	18	.200*	.947	18	.378

Table 4 shows the normality test results for determining the pretest and posttest scores on a small scale using the Kolmogorov Smirnova and Shapiro-Wilk tests assisted by the SPSS 30 application. The normality test criteria are expected if the significance

value is > 0.05 so that the data is usually distributed. The normality test results above show a significance > 0.05 in the Kolmogorov-Smirnova pretest; the significance reaches 0.200, and the normality test of the posttest value shows a significance of 0.200. Then, using Shapiro-Wilk, the pretest significance result is 0.964, and the posttest significance is 0.378, so it can be concluded that the data is usually distributed because the significance value is > 0.05.

Small-scale trials were conducted by VC class students of Bunayya Integrated Islamic Elementary School, as many as 18 students, to test the feasibility and effectiveness of learning media products based on the Heyzine Flipbook model Problem-Based Learning material on the location and geographical conditions of Indonesia that have been made. The results obtained show that 100% are declared very good and interesting.

Table 5. Large-scale normality test results

	Tes Normalitas					
	Kolmogorov-Smirnova			**Shapiro-Wilk**		
	Statistik	**Df**	**Sig.**	**Statistik**	**Df**	**Sig.**
Pre_Test	.094	31	.200*	.981	31	.838
Post_Test	.138	31	.139	.956	31	.228

Table 5 shows the normality test results for determining the pretest and posttest scores on a small scale using the Kolmogorov Smirnova and Shapiro-Wilk tests assisted by the SPSS 30 application. The normality test criteria are said to be expected if the significance value is > 0.05 so that the data is usually distributed. The normality test results above show a significance > 0.05 in the Kolmogorov-Smirnova pretest; the significance reaches 0.200, and the normality test of the posttest value shows a significance of 0.139. Then, using Shapiro-Wilk, the pretest significance result is 0.838, and the posttest significance is 0.228, so it can be concluded that the data is usually distributed because the significance value is > 0.05.

Large-scale trials were conducted by VC class students of Bunayya Integrated Islamic Elementary School, as many as 31 students, to test the feasibility and effectiveness of learning media products based on the Heyzine Flipbook model Problem-Based Learning material on the location and geographical conditions of Indonesia that have been made. The results obtained show that 100% are declared very good and interesting.

Effectiveness of Heyzine Flipbook Media Integrated with Problem-Based Learning

The test criteria for the paired sample t-test is if the sig value. (2-tailed) <0.05, then there is a significant difference in learning outcomes on pretest and posttest data. Conversely, if the sig value. (2-tailed) >0.05, so no significant difference exists between learning outcomes in pretest and posttest data. With the help of the SPSS 30 application, the t-test results were obtained as follows.

Based on Table 6, the results obtained are the sig value. (2-tailed) 0.000, which means smaller than 0.005, so it can be concluded that there is a significant difference between the results of the pretest and post-test on a small scale and a large scale. From this test, it is concluded that there is an average difference in the results before and after

Table 6. Small-scale and large-scale test results

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretest-postest	-33.556	18.674	4.402	-42.842	-24.269	-7.624	17	.000
Pair 1	Pretest-postest	-30.129	14.266	2.562	-35.362	-24.896	-11.759	30	.000

treatment. The significant difference between the pretest and post-test confirmed that the learning intervention using Heyzine Flipbook media with the Problem-Based Learning model effectively improved student learning outcomes. So, the distribution is normal, and the t-test requirements are met. Furthermore, to prove that the zine flipbook media with the problem-based learning model is effective, researchers use Cohen's d effect size based on the T-test because the T-test only knows significance. When determining its effectiveness using the effect size Cohen's d. Through the effect size of Cohen's d, the results are 1.797 on a small scale and 2.112 on a large scale. The tremendous value of Cohen's d indicates that the learning intervention strongly impacts learning outcomes. This means that using Heyzine Flipbook learning media with the Problem-Based Learning model is very effective in helping students understand learning material. Cohen's d effect size results provide strong evidence of the effectiveness of Heyzine Flipbook learning media with the Problem-Based Learning model in improving student learning outcomes.

Then, the evaluation stage tests the increase in the average value of N-gain by comparing the increase in pretest and posttest scores, which are calculated using the N-gain index analysis. The N-gain test was conducted to determine the increase in pretest and posttest. The average increase was calculated using the N-Gain analysis method to compare the difference between the pretest and posttest scores. The N-gain test was conducted to determine the average increase in pretest and posttest. The average increase is calculated using the N-Gain analysis method to compare the difference between the pretest and posttest scores. The following are the results of the N-gain score.

Based on the picture above shows the frequency distribution of gain score values in the form of a bar chart on the small-scale pretest-posttest. It is known that the Valid N value is 18, meaning that the number of respondents entered into SPSS is 18 students. Then, in the output of "Small Scale" in the frequency and percent section, it is known that there are 3 or 16.7% of students who get a gain score <40%. Furthermore, 3 or 16.7% of students get a 40-55% gain score. Then, 8 or 50% of students get a gain score of 56-75%. Finally, 3 or 16.7% of students get a gain score >75%.

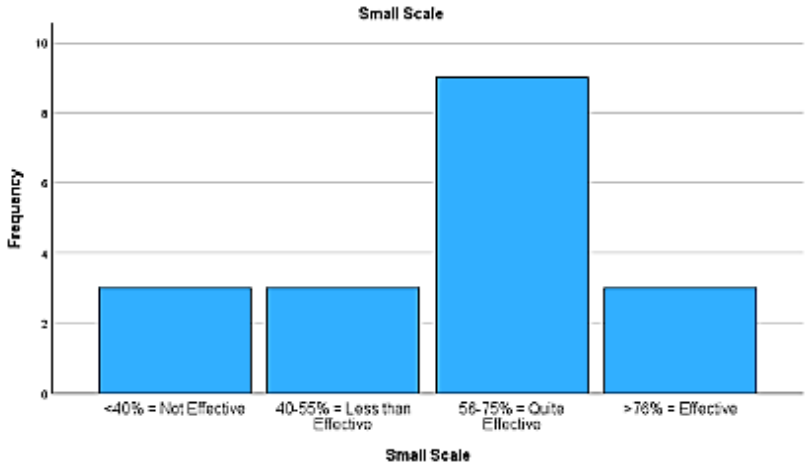

Figure 4. Diagram of small scale n-gain

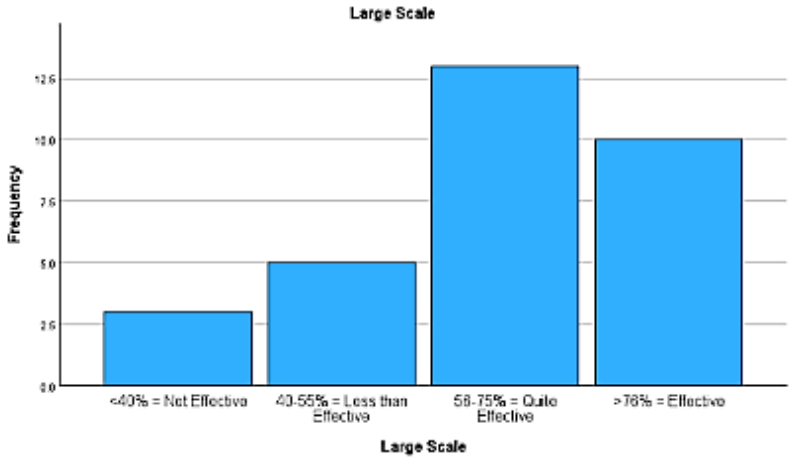

Figure 5. Diagram of large scale n-gain score

The figure above shows the frequency distribution of gain score values as a bar chart on the large-scale pretest-posttest. It is known that the Valid N value is 31, meaning that the number of respondents entered into SPSS is 31 students. Then, in the "Large Scale" output in the frequency and percent section, it is known that there are 3 or 9.7% of students who get a gain score <40%. Furthermore, 35 or 16.1% of students get a gain score of 40-55%. Then there are 13, or 41.9% of students who get a gain score of 56-75%. Finally, 10 or 32.3% of students score> 75%.

Based on the results of the test calculation (N-Gain) on a small-scale trial, it is known that there is an average increase of 0.5537, which is included in the medium criteria. In the large-scale trial, it is known that there was an average increase of 0.5503, which is included in the medium criteria. This shows that using Heyzine Flipbook learning media with the Problem-Based Learning model reasonably increases student learning outcomes. Heyzine Flipbook learning media with the Problem-Based Learning model proved effective in improving student learning outcomes; this shows that this media can potentially improve student understanding of learning materials. This also

proves that the Heyzine Flipbook media with the Problem-Based Learning model has succeeded in helping students understand the material on Indonesia's location and geographical conditions. These results also underscore the need for teacher professional development related to using technology in learning and implementing innovative learning models such as Problem-Based Learning.

Implications of Heyzine Flipbook Media integrated with Problem Based Learning

The results of data analysis showed that the Heyzine Flipbook learning media developed received excellent qualifications from teachers, students, and experts. In addition, the results also showed a significant difference between before and after the application of Heyzine Flipbook learning media for students on student learning outcomes. This is due to the following factors. First, heyzine flipbook learning media with problem-based learning models can improve the learning outcomes of elementary school students. Flipbook learning media can provide new experiences for students related to contextual learning (Haryanto et al., 2023). Combining Heyzine Flipbook digital media and the Problem-Based Learning model creates synergy in improving student learning outcomes (Fauzy et al., 2024). Heyzine Flipbook, as a digital platform, provides flexibility and interactivity that is impossible to find in conventional media (Patonah, Januar Saputra, & Listyarini, 2024). Multimedia features such as images, audio, and video can be integrated into flipbooks, making learning materials more enjoyable and easy to understand. Previous findings also reinforce this, stating that flipbook media integrated with the Problem-Based Learning model can improve student understanding (Ilham et al., 2021)

Second, heyzine flipbook learning media with problem-based models can increase learning motivation. Media development is carried out in the Natural and Social Sciences learning process through more fun activities, namely playing while learning. This learning media is designed as an enjoyable learning adventure, where students act as young explorers who want to understand more about the country of Indonesia. Each chapter will present a problem or question that challenges learners to find answers through exploration, analysis, and problem-solving activities. The combination with the problem-based learning model encourages students to participate actively in the learning process through problem-solving games. This is supported by research from Utari, Gunada, Makhrus, & Kosim (2023) that shows that students receive information passively and are challenged to find solutions to the problems given. This process trains students' critical, analytical, and collaborative thinking skills. When students are motivated, they tend to be more focused and engaged in the learning process (Arifin et al., 2023). Students are also more active in seeking information and discussing with their friends. Combining the Heyzine Flipbook and the Problem-Based Learning model creates a more meaningful learning experience for students (Patonah et al., 2024). Learning materials presented in an attractive digital format and problem-solving challenges motivate students to learn more deeply.

Third, heyzine flipbook learning media with problem-based models can create a pleasant learning environment. Media is used in the learning process to encourage students' interest and motivation to learn (Arifin et al., 2023; Meilinda et al., 2024). Innovation in the development of learning media that is more educative, innovative, and interesting can provide a sense of pleasure and increase students' learning motivation in the classroom. heyzine flipbook learning media with problem-based learning models for

Natural and Social Sciences learning materials "Location and Geographical Conditions of Indonesia," as a practical and fun media. This is evidenced by the media produced that can attract attention and foster a sense of pleasure in students (Ilham Setiadi et al., 2021; Riski et al., 2024). In the heyzine flipbook, learning media with the problem-based learning model are produced, and animated videos, images, audio, and user manuals are developed. Flipbook technology was developed with the help of the Heyzine Flipbook and Canva websites. This flipbook technology feature can provide new experiences to students in accessing technology that collaborates with learning materials (Fauzy et al., 2024.; Patonah et al., 2024). The application of heyzine flipbook technology in developing the developed media can be done by clicking the link provided. Then, students can access various features of the heyzine flipbook freely. Technology-based learning activities like this will undoubtedly create a pleasant learning environment.

Heyzine flipbook media with a problem-based learning model, namely the content being taught, is effectively used as a learning media in the classroom and can improve student learning outcomes. This research is supported by previous research examining the use of flipbook media in learning, which found that flipbook media is feasible and effective in supporting student understanding in the learning process of natural and social sciences in the classroom Pigai & Yulianto (2024). Flipbook media has also been proven to increase students' enthusiasm for learning because of the combination of problem-based learning models that make students active in learning (Rasmawan, Muharini, & Lestari, 2022). Research on problem-based learning models is used as a model or series of learning activities to stimulate student thinking to think more critically in the learning process (Utari et al., 2023). Other studies have also found that using Heyzine Flipbook integrated with the Problem-Based Learning model can significantly increase student learning motivation (Fauzy et al., 2024)

This research implies that heyzine flipbook media with problem-based learning models can be used by teachers in learning natural and social sciences, especially for grade V elementary school students. This media involves students to be passive and active in learning so that learning is meaningful and students can remember and understand the material presented. This research shows that technology-based learning media, such as Heyzine Flipbook, have great potential in improving student learning outcomes. This encourages learning media developers to continue to innovate and utilize the latest technology in creating learning media that are more interactive, interesting, and effective. Technology-based media, coupled with the collaboration of the Problem-Based Learning model, has proven effective because it is relevant to the needs of 21st-century students requiring higher-level thinking skills, problem-solving, and collaboration. Therefore, the development of learning media in the future needs to pay attention to the characteristics and needs of students and adjust to the demands of the times.

▪ CONCLUSION

Learning media is very important for students in the teaching and learning process, so learning Natural and Social Sciences is more varied. The results of research and discussion related to learning media based on the Heyzine Flipbook Problem-Based Learning model to improve the learning outcomes of fifth-grade students of Bunayya Integrated Islamic Elementary School are valid, practical, and effective. The results of the validity of the learning media obtained an average value score of 93.5. Furthermore, based

on the effectiveness test, the number reached 0.000 <0.05. There is a significant difference between the pretest and posttest results. Then, for the level of effectiveness through Effect, Cohen's d obtained 1.767 on a small scale and 2.112 on a large scale. This indicates that the learning intervention has a powerful impact on improving learning outcomes. In the average improvement test, the N-gain value was 0.5537 on a small scale in the medium category and 0.5503 on a large scale in the medium category. This shows that this media can improve students' understanding of learning materials. This also proves that the Heyzine Flipbook media Problem-Based Learning model has succeeded in helping students understand the material of Indonesia's geographical location and conditions. These results also underscore the need for teacher professional development related to using technology in learning and implementing innovative learning models such as Problem-Based Learning.

▪ REFERENCES

Affandy, H., Sunarno, W., Suryana, R., & Harjana. (2024). Integrating creative pedagogy into problem-based learning: The effects on higher order thinking skills in science education. Thinking Skills and Creativity, 53, 101575. https://doi.org/10.1016/J.TSC.2024.101575

Agus Kurniawan, D., & anggraini Di Kabupaten Muaro Jambi, L. (2018). *Evaluasi sikap siswa smp terhadap ipa evaluasi sikap siswa smp terhadap ipa di kabupaten muaro jambi.* In Jurnal Ilmiah DIDAKTIKA (Vol. 19).

Ainur Rohmah, A., & Rachmawati, R. (2019). Utilization and quality of information system for administration services based on ICT in Patehan, Kraton, Yogyakarta. Indonesian Journal of Science and Technology, 4(1), 55–63. https://doi.org/10.17509/ijost.v4i1.12680

Andini, S., & Fitriana, L. (2018). Developing flipbook multimedia: the achievement of informal deductive thinking level. Journal on Mathematics Education, 9(2), 227–238.

Angga, A., Suryana, C., Nurwahidah, I., Hernawan, A. H., & Prihantini, P. (2022). *Komparasi implementasi kurikulum 2013 dan kurikulum merdeka di sekolah dasar kabupaten garut.* Jurnal Basicedu, 6(4), 5877–5889. https://doi.org/10.31004/basicedu.v6i4.3149

Anggraeni, D. F. P., Widodo, W., & Supardi, Z. A. I. (2023). Development of the android-based educational game media "perjalanan si maya" as a formative assessment to improve critical thinking skills and interest in learning science for elementary school students. IJORER : International Journal of Recent Educational Research, 4(4), 514–533. https://doi.org/10.46245/ijorer.v4i4.386

Apriliyani, S. W., Mulyatna, D. F., & Artikel, S. (2021). Sita Wahyu Apriliyani & Fauzi Mulyatna/Flipbook E-LKPD dengan Pendekatan SINASIS 2 (1) (2021) *Prosiding Seminar Nasional Sains Flipbook E-LKPD dengan Pendekatan Etnomatematika pada Materi Teorema Phytagoras Info Artikel Abstrak.*

Arciosa, R. M. (2022). Information communication technology (ICT)-Based instructional software and its effectiveness in teaching high school geometry. Indonesian Journal of Teaching in Science, 2(1), 51–60. https://doi.org/10.17509/ijotis.v2i1.45271

Arifin, I. N., Mardian Arif, R., Arifin, V. M., Juniarti, Y., & Sutisna, I. (2023). *Desain pengembangan e-modul ipa materi kalor berbasis flipbook maker dalam meningkatkan motivasi belajar siswa kelas v di sekolah dasar.*

Azizah Bana Tussifa, N., Nurhabibah, P., & Guru Sekolah Dasar, P. (2021). *Pengembangan media pembelajaran wayang kartun pada materi cerita fabel kelas ii sdn 1 grogol kabupaten cirebon.* Jurnal Education and Development, 9(3), 152–158. https://doi.org/10.37081/ed.v9i3.2787

Buck, C., Clarke, J., Torres de Oliveira, R., Desouza, K. C., & Maroufkhani, P. (2023). Digital transformation in asset-intensive organisations: The light and the dark side. Journal of Innovation & Knowledge, 8(2), 100335. https://doi.org/10.1016/J.JIK.2023.100335

Calvin, Y., Mali, G., & Timotius, A. I. (2023). IJE International Journal of Education mapping current trends of efl teaching and learning research practices in indonesia. International Journal of Education, 16(1), 9–18. https://doi.org/10.17509/ije.v16i1.4419

Carrasco, C. D., Bahle, B., Simmons, A. M., & Luck, S. J. (2023). Using multivariate pattern analysis to increase effect sizes for event-related potential analyses. https://doi.org/10.1101/2023.11.07.566051

Castaño-Calle, R., Jiménez-Vivas, A., Poy Castro, R., Calvo Álvarez, M. I., & Jenaro, C. (2022). Perceived benefits of future teachers on the usefulness of virtual and augmented reality in the teaching-learning process. Education Sciences, 12(12). https://doi.org/10.3390/educsci12120855

Daga, A. T. (2021). *Makna merdeka belajar dan penguatan peran guru di sekolah dasar.* Jurnal Educatio FKIP UNMA, 7(3), 1075–1090. https://doi.org/10.31949/educatio.v7i3.1279

Defantari, E. L., & Yulianto, S. (2024). Development of interactive learning media capinus air science lessons water cycle topics. Jurnal Penelitian Pendidikan IPA, 10(10), 7220–7227. https://doi.org/10.29303/jppipa.v10i10.7483

Diani, R., & Hartati, N. S. (2018). *Flipbook berbasis literasi Islam: Pengembangan media pembelajaran fisika dengan 3D pageflip professional.* Jurnal Inovasi Pendidikan IPA, 4(2), 234–244. https://doi.org/10.21831/jipi.v4i2.20819

Dinahastuti, A., Ali Kisai, A., Hendriani, M., Pgsd, U., Pg-paud, U., & Author, C. (2023). *Jurnal Pemikiran dan Penelitian Pendidikan Dasar ISSN.* 7(2). https://doi.org/10.52266/Journal

Djarwo, C. F., & Handasah, R. R. (2019). JUPE: *Jurnal pendidikan mandala pengembangan media pembelajaran digital flipbook berbasis problem solving pada materi struktur atom di tingkat sekolah menengah atas.* Retrieved from http://ejournal.mandalanursa.org/index.php/JUPE/index

Fauzy, F., Jesmin, M., Sahruddin, A., & Arya Makarim, M. (2024). *Implentasi media interaktif berbasis heyzine flibook terhadap motivasi belajar siswa smp negeri 12 barru.*

Handayani, T., Sami, S., Prodi, A., Guru, P., Dasar, S., Pendidikan, I., … Korespondensi, P. (2024). *Kajian teori dan praktik pendidikan volume.* 33(2), 129–146.

Hapsari, G. P. P., & Zulherman, Z. (2021). *Pengembangan media video animasi berbasis aplikasi canva untuk meningkatkan motivasi dan prestasi belajar siswa.* Jurnal Basicedu, 5(4), 2384–2394. https://doi.org/10.31004/basicedu.v5i4.1237

Hariyani, S., & Artikel, H. (2023). *Buletin pengabdian multidisiplin penerapan model problem-based learning untuk meningkatkan kemampuan berpikir kritis*. Retrieved from https://jurnal.piramidaakademi.com/index.php/budimul

Haryanto, H., Widarti, H. R., Mashfufah, A., Dewi, R. S. I., & Kusumaningrum, S. R. (2023). Flipbook-Based Project-Based Learning: An opportunity to improve science literacy. Jurnal Penelitian Pendidikan IPA, 10(7), 4004–4009. https://doi.org/10.29303/jppipa.v10i7.7916

Ilham Setiadi, M., Muksar, M., Suprianti, D., Malang, N., Bandungrejosari, S., & Aktivitas Hasil Belajar, F. (2021). *Penggunaan media pembelajaran flipbook untuk meningkatkan aktivitas dan hasil belajar siswa*. Jurnal Ilmu Sosial Dan Pendidikan (JISIP), 5(4). https://doi.org/10.36312/jisip.v5i4.2542/http

Indah, D. N., Aris, S., Budiarso, S., Wahyuni, S., & Basicedu, J. (2019). *Pengembangan e-lkpd berbasis problem based learning (pbl) untuk meningkatkan kemampuan higher order tingking skill (hots) pada pembelajaran ipa oleh*.

Indarta, Y., Jalinus, N., Waskito, W., Samala, A. D., Riyanda, A. R., & Adi, N. H. (2022). *Relevansi kurikulum merdeka belajar dengan model pembelajaran abad 21 dalam perkembangan era society* 5.0. EDUKATIF : JURNAL ILMU PENDIDIKAN, 4(2), 3011–3024. https://doi.org/10.31004/edukatif.v4i2.2589

Isrokatun, I., Hanifah, N., Abdul, R. Y., Rosmiati, R., & Khoerunnisah, R. (2023). The Development of android-based learning mobile app to practice critical thinking skills for elementary school students. Pegem Egitim ve Ogretim Dergisi, 13(2), 161–172. https://doi.org/10.47750/pegegog.13.02.20

Jadhav, P., Gaikwad, H., & Patil, K. S. (2022). Teaching and learning with technology: effectiveness of ict integration in schools. Retrieved from https://ejournal.bumipublikasinusantara.id/index.php/ajsed

Ketut Erawati, N., Kadek, N., Purwati, R., Dewa, I., Putrı, A., & Saraswatı, D. (2022). *Pengembangan e-modul logika matematika dengan heyzine untuk menunjang pembelajaran di smk.*

Khakim, N., Santi, N. M., Bahrul, A., Assalami, U., Putri, E., & Fauzi, A. (2022). *Penerapan model pembelajaran problem based learning dalam meningkatkan motivasi belajar PPKn di SMP YAKPI 1 DKI Jaya*. Jurnal Citizenship Virtues, 2022(2), 347–358.

Li, S., Gao, L., Han, C., Gupta, B., Alhalabi, W., & Almakdi, S. (2023). Exploring the effect of digital transformation on Firms' innovation performance. Journal of Innovation & Knowledge, 8(1), 100317. https://doi.org/10.1016/J.JIK.2023.100317

Li, X., Wang, X., & Xu, W. (2022). The information technology revolution and structural labor change: Evidence from China. Economic Modelling, 115, 105956. https://doi.org/10.1016/J.ECONMOD.2022.105956

Logayah, D. S., Maryani, E., Ruimat, M., & Wiyanarti, E. (2023). Integration of disaster education through learning of social studies in junior high school in effort to prepare disaster resilient students. Jurnal Pendidikan Ilmu Sosial, 31(2), 201–212. https://doi.org/10.17509/jpis.v31i2.52486

Mahesti, T., Saputra, A., & Fatmawati, U. (2023). E-module development through Kvisoft Flipbook Maker as a teaching material supplement in biotechnology sub chapter of health to enhance student's analytical thinking. THE 3RD International

Conference On Science, Mathematics, Environment, And Education: Flexibility in Research and Innovation on Science, Mathematics, Environment, and Education for Sustainable Development, 2540, 020027. AIP Publishing. https://doi.org/10.1063/5.0106262

Mahya, B. H., & Setiawan, D. (2024). Development of carabisatulus chatbot learning media based on environment to improve science learning outcomes. Jurnal Penelitian Pendidikan IPA, 10(6), 3132–3140. https://doi.org/10.29303/jppipa.v10i6.7185

Malihah, E., Nurbayani, S., Komariah, S., Utami, L., Munggaran, R. A., Rizkia, A. A. K., … Pratama, R. P. (2023). Community-Based social capital: the key to inclusive political initiatives from gender equality, disability, and social inclusion (GEDSI) Perspective. Jurnal Pendidikan Ilmu Sosial, 32(2), 165–182. https://doi.org/10.17509/jpis.v32i2.63273

Mayasari, A., Arifudin, O., Juliawati, E., & Sabili Bandung, S. (2022). *Implementasi model problem based learning (pbl) dalam meningkatkan keaktifan pembelajaran* (Vol. 3).

Meilinda, G., Sunaengsih, C., & Sujana, A. (2024). *Penggunaan media flipbook digital untuk meningkatkan motivasi belajar siswa kelas v sekolah dasar materi cahaya dan sifatnya.* In Academy of Education Journal (Vol. 15).

Milasari, D., & Setyasto, N. (2023). Effectiveness of the microsoft sway assisted problem-based learning model on science learning outcomes. Jurnal Penelitian Pendidikan IPA, 9(9), 7028–7035. https://doi.org/10.29303/jppipa.v9i9.4563

Mulyanto, S., & Mustadi, A. (2023). *Media pembelajaran powerpoint interaktif pada mata pelajaran ips kelas v sekolah dasar.* Jurnal Penelitian Dan Pengembangan Pendidikan, 7(1), 110–116. https://doi.org/10.23887/jppp.v7i1.54552

Novianti, A., Bentri, A., & Zikri, A. (2020). *Pengaruh penerapan model problem based learning (pbl) terhadap aktivitas dan hasil belajar siswa pada pembelajaran tematik terpadu di kelas v sekolah dasar* (Vol. 4). Retrieved from https://jbasic.org/index.php/basicedu

Nurfadhillah, S., Ningsih, D. A., Ramadhania, P. R., & Sifa, U. N. (2021). *Peranan media pembelajaran dalam meningkatkan minat belajar siswa sd negeri kohod* III. In PENSA : Jurnal Pendidikan dan Ilmu Sosial (Vol. 3). Retrieved from https://ejournal.stitpn.ac.id/index.php/pensa

Nursafitri, D., & Ansori, I. (2024). *Pengembangan media pembelajaran majalah digital flipbook berbasis model pembelajaran project based learning untuk meningkatkan hasil belajar IPA.* Jurnal Penelitian Pendidikan IPA, 10(12), 10877–10885. https://doi.org/10.29303/jppipa.v10i12.9326

Padangsidimpuan Afridapane, I. (2017). *Belajar dan pembelajaran aprida pane muhammad darwis dasopang.* Jurnal Kajian Ilmu-Ilmu Keislaman, 03(2).

Patonah, S., Januar Saputra, H., & Listyarini, I. (2024). *Pengembangan bahan ajar melalui heyzine flip book software untuk siswa kelas 1 sekolah dasar.* In Elementary School (Vol. 11).

Pattipawaej, O., Setiawan, D., Desiani, A., Tallar, R., & . A. R. (2023). The implementation of merdeka belajar kampus merdeka through adaptive learning program and curriculum development. KnE Social Sciences. https://doi.org/10.18502/kss.v8i9.13330

Pigai, F. Y. P., & Yulianto, S. (2024). Development of flipbook learning media to improve learning outcomes IPAS. Jurnal Penelitian Pendidikan IPA, 10(8), 5775–5781. https://doi.org/10.29303/jppipa.v10i8.7937

Prabowo, E., & Wakhudin, W. (2024). *Pengembangan media augmenteded reality (AR) untuk meningkatkan motivasi belajar siswa pada mata pelajaran IPAS kelas 4 SD Negeri 3 Linggasari.* Jurnal Pendidikan Dan Pembelajaran Indonesia (JPPI), 4(2), 591–604. https://doi.org/10.53299/jppi.v4i2.552

Qorimah, E. N., Laksono, W. C., Hidayati, Y. M., & Desstya, A. (2022). *Kebutuhan pengembangan media pembelajaran berbasis augmented reality (ar) pada materi rantai makanan.* Jurnal Pedagogi Dan Pembelajaran, 5(1), 57–63. https://doi.org/10.23887/jp2.v5i1.46290

Ramdani, A., & Wahab Jufri, A. (2021). *Peningkatan kompetensi guru melalui pelatihan penggunaan media pembelajaran berbasis android.* In Seminar Nasional Pengabdian kepada Masyarakat Tahun (Vol. 3).

Rasmawan, R., Muharini, R., & Lestari, I. (2022*). Pengembangan e-modul flipbook ipa berbasis problem based learning pada materi pencemaran lingkungan.* 6. https://doi.org/10.31004/basicedu.v6i5.3558

Riski, N., Utami, A., Iskandar, S., & Nuraeni, F. (2024). *Pengaruh pendekatan saintifik berbantuan media flipbook terhadap peningkatan kemampuan literasi sains siswa sekolah dasar.*

Ristanti, S., & Isdaryanti, B. (2024). Development of canva-based science infographic learning media to improve students' learning outcomes. Jurnal Penelitian Pendidikan IPA, 10(10), 7984–7992. https://doi.org/10.29303/jppipa.v10i10.9506

Sa'diyah, K. (2021). *Pengembagan e-modul berbasis digital flipbook untuk mempermudah pembelajaran jarak jauh Di SMA.* EDUKATIF : JURNAL ILMU PENDIDIKAN, 3(4), 1298–1308. https://doi.org/10.31004/edukatif.v3i4.561

Setiawan, D., Ansor, I., Witanto, Y., Supriyanto, T., & Kadek Aris Rahmadan, N. (2024). *Abdimas umtas: jurnal pengabdian kepada masyarakat lppm-universitas muhammadiyah tasikmalaya powtoon-based learning videos for quality elementary school learning outcomes.*

Setiawan, D., Putri, E. R., & Hidayat, A. (2023). Learning methods and scientific approaches on integrated thematic learning. Jurnal Penelitian Pendidikan IPA, 9(4), 1679–1686. https://doi.org/10.29303/jppipa.v9i4.3029

Shah, S. S. (2022). Teaching and learning with technology: effectiveness of ict integration in schools. Indonesian Journal of Educational Research and Technology, 2(2), 133–140. https://doi.org/10.17509/ijert.v2i2.43554

Simanjuntak, H., & Pardede, D. L. (2023). *Media pembelajaran powerpoint interaktif pada mata pelajaran ipa kelas v sekolah dasar.* JIMPS: Jurnal Ilmiah Mahasiswa Pendidikan Sejarah, 8(4), 3950–3957. https://doi.org/10.24815/jimps.v8i4.26248

Utari, W. M., Gunada, I. W., Makhrus, Muh., & Kosim, K. (2023). *Pengembangan e-modul pembelajaran fisika model problem based learning berbasis flipbook untuk meningkatkan keterampilan berpikir kreatif peserta didik.* Jurnal Ilmiah Profesi Pendidikan, 8(4), 2724–2734. https://doi.org/10.29303/jipp.v8i4.1822

Wibowo, E., & Pratiwi, D. D. (2018). *Desimal: jurnal matematika pengembangan bahan ajar menggunakan aplikasi kvisoft flipbook maker materi himpunan.* 1(2), 147–156. Retrieved from http://ejournal.radenintan.ac.id/index.php/desimal/index

Yuliani, E., & Setiawan, D. (2024). Development of flipbook-based digital comics to improve learn-ing outcomes on simple comic material. https://doi.org/10.22219/raden.v4i1

Yunitasari, I., & Hardini, A. T. A. (2021). *Penerapan model PBL untuk meningkatkan keaktifan peserta didik dalam pembelajaran daring di sekolah dasar*. Jurnal Basicedu, 5(4), 1700–1708. https://doi.org/10.31004/basicedu.v5i4.983