# DEVELOPMENT OF LKPD BASED ON SCIENCE LITERACY TO IMPROVE SCIENCE LITERACY OF JUNIOR HIGH SCHOOL STUDENTS ON ECOSYSTEM MATERIAL

**Aviva Tunasika Ginting[1], Khairuna[2]**
[1,2]Universitas Islam Negeri Sumatra Utara, Indonesia
E-mail:vivatunasikhag@gmail.com[1]; khairuna@uinsu.ac.id[2]

*Abstract*

This study aims to develop a Student Worksheet (LKPD) based on scientific literacy to improve junior high school students' scientific literacy in ecosystem material. The methodology adopted in this study is research and development (R&D), using a 4D development model that includes the stages of definition, design, development, and dissemination. The trial results showed that 80% of students were more interested and motivated when learning using LKPD and students' understanding of ecosystem material increased by 75%. The developed LKPD obtained a media validity of 85.80%, a language validity of 85.71%, and a material validity of 92.475%, indicating that the LKPD is suitable for use in learning. This LKPD is designed to encourage students to think critically through scientific literacy-based questions, which are in accordance with the needs of 21st century education. The ecosystem material taught through LKPD not only provides knowledge but also shapes students' attitudes. This study makes a positive contribution to biology education in Indonesia, preparing students for future scientific and technological challenges. It is hoped that the development of LKPD based on scientific literacy can be expanded to include various other scientific materials and utilize digital technology to create more interactive and interesting learning.

*Keywords: Development; LKPD; Science Literacy; Ecosystem.*

*Abstrak*

Penelitian ini bertujuan untuk mengembangkan Lembar Kerja Siswa (LKPD) berbasis literasi sains untuk meningkatkan literasi sains siswa SMP pada materi ekosistem. Metodologi yang diadopsi dalam penelitian ini adalah penelitian dan pengembangan (R&D), menggunakan model pengembangan 4D yang meliputi tahapan definisi, desain, pengembangan, dan diseminasi. Hasil uji coba menunjukkan bahwa 80% siswa lebih tertarik dan termotivasi saat pembelajaran menggunakan LKPD dan pemahaman siswa terhadap materi ekosistem meningkat sebesar 75%. LKPD yang dikembangkan memperoleh kevalidan media sebesar 85,80%, kevalidan bahasa sebesar 85,71%, dan kevalidan materi sebesar 92,475% yang menunjukkan bahwa LKPD tersebut layak digunakan dalam pembelajaran. LKPD ini dirancang untuk mendorong peserta didik berpikir kritis melalui pertanyaan berbasis literasi sains, yang sesuai dengan kebutuhan pendidikan abad ke-21. Materi ekosistem yang diajarkan melalui LKPD tidak hanya memberikan pengetahuan tetapi juga membentuk sikap siswa. Penelitian ini memberikan kontribusi positif terhadap pendidikan biologi di Indonesia, mempersiapkan siswa untuk tantangan ilmiah dan teknologi masa depan. Diharapkan pengembangan LKPD berbasis literasi sains dapat diperluas mencakup berbagai materi sains lainnya serta memanfaatkan teknologi digital sehingga menciptakan pembelajaran yang lebih interaktif dan menarik.

*Kata kunci: Pengembangan; LKPD; Literasi Sain; Ekosistem.*

## INTRODUCTION

As globalization and advanced technology continue to develop, adaptation to understanding and applying science becomes important. Scientific literacy includes not only understanding scientific concepts, but also the capacity for critical thinking, analysis of information, and decision-making based on evidence. Scientific literacy is an important aspiration for students who want to be actively involved in a society that continues to become more complex and highly dependent on knowledge. Quality education produces competitive human resources who are able to face challenges in a globalizing world. Therefore, education must equip students with the skills needed to face all challenges effectively (OECD, 2017). This requires rapid innovation and adaptation by the education system. Dynamic changes in various aspects of life encourage students to have not only knowledge but also 21st-century skills such as critical thinking, creativity, problem solving, collaboration, and communication. One of the urgent needs in realizing education that meets future needs is how to create a learning process that can be informative and transformative. The learning process must be able to develop students' literacy levels, especially scientific literacy which includes understanding scientific concepts, scientific thinking, and the use of science in everyday life. Scientific literacy is one of the most important foundations for students' understanding of natural phenomena and for students' participation in a society that makes decisions based on evidence and an increasingly scientific/technological society. This ability is expected to enable students to make better decisions in their daily lives.

Scientific competence is important, but the results of the PISA survey show that Indonesia has low scientific literacy. In 2015, the average score for Indonesian students was far below the OECD average. This indicates a gap in science training and the need to improve the way learning methods are implemented (OECD, 2023). This gap is a major challenge for educators and political decision makers. Low scientific literacy affects students' ability to understand scientific questions around them. This can lead to a lack of awareness of environmental, health and technological issues. For example, students who are not familiar with science are not sensitive to issues such as climate change and pollution (Nudiati &

Sudiapmana, 2020). This disease shows the need to improve scientific competence among students.

One of the materials that needs to be applied in science education is the ecosystem. The ecosystem education system teaches the relationship between flora and fauna with the environment. Along with environmental issues such as illegal logging, pollution, and others, understanding of the ecosystem needs to be guaranteed (Regar et al., 2022). This material not only increases insight, but also provides the formation of students' caring attitudes towards the environment. Ecosystem material is nothing more than an effort to accumulate knowledge for students and hopes to foster awareness and concern for the environment. With a good, easy and fun education system, a student is expected to be more critical of the impact of human behavior (Fitriyana et al., 2020). With this hope, it is extraordinary in a world situation full of challenges. Science teaching that is interwoven into a pattern of class settings, repetition and numbers like in middle school, is one of the many reasons for the high level of scientific illiteracy. This non-varied teaching process tends to reduce student attraction (Fadillah, 2017).

Learning methods in class and outside the classroom need to be more interactive and more related to the existing context. One of the causes of low scientific literacy skills is the learning method which is still traditional, where there is more study and memory from imagination without really understanding the structure. Monotonous, without type and varied learning tends to reduce students' motivation to learn actively. In junior high schools that are part of the Medan Islamic Center Foundation, teachers never use Student Worksheets (LKPD) in science learning. Most of the learning process is carried out by relying on stagnant textbooks, there tends to be no activity learning, and students do not get active experiences (active learning). Without LKPD that is designed appropriately for science education learning, students do not get the opportunity to actively participate in learning activities.

LKPD using a science literacy approach is expected to help students understand and carry out scientific applications, encourage critical thinking, and apply them in reality. Therefore, the development of this material is very relevant

to help students in ecosystem learning and provide them with skills for future challenges. One effort to improve student understanding is through the use of Student Worksheets (LKPD) based on science literacy. LKPD is a learning tool designed so that learners can facilitate the learning process and actively participate in learning activities. Prastowo (2014) stated that with LKPD, students can interact directly in teaching that is more applicable. Students can be directly involved in the learning process, which encourages them to think and act in various creative ways. Various activities prepared in LKPD require students to apply the knowledge they have learned in real life. All of these efforts are expected to be able to increase student motivation and involvement (Hidayati, 2023).

This activity has a major influence on developing students' self-confidence. Science literacy-based LKPD needs to meet the needs and characteristics of students. The ideal LKPD must provide complete information and activities that stimulate exploration and analysis. That way, the information presented can improve students' science literacy intelligence (Budiarti, 2021). An effective design will have a positive impact on students' interest and interaction in learning activities. In learning about ecosystems, students can be provided with material in the form of facts and real issues that are closer to the surrounding environment. Students can be invited to analyze real cases of environmental damage and find the right solutions. Thus, students not only understand the ecosystem theoretically, but are also trained to think critically and analytically about the problems that occur around them (Nugraha et al., 2020).

This will result in more valuable learning. The use of LKPD that focuses on scientific literacy also provides an opportunity for students to make exclusive observations around their environment. Through experiments and observations, students can understand scientific concepts better. This is a very powerful method for increasing scientific literacy (Regar et al., 2022). Exclusive experiences will strengthen students' understanding of the concepts being taught. Assessment of the use of LKPD in learning is crucial to determine its effectiveness. Responses from students and teachers can be used to improve and refine LKPD in the future. Through this approach, LKPD can continue to be updated in line with student needs

and curriculum development (Kristyowati & Purwanto, 2019). The ongoing evaluation process will ensure the quality of LKPD.

Based on this background, this study aims to share LKPD based on scientific literacy that can increase the scientific literacy of Junior High School students in ecosystem material. necessary, with the development of effective LKPD, students can better understand the material and can apply the knowledge that has been learned in the context of everyday life. This development is needed to answer the needs of education at this time.

The development of effective and contextual LKPD will be a strategic step in improving students' scientific literacy. Through this research, it is necessary to be able to provide a positive contribution to biology education in Indonesia and help students face the challenges of science and technology in the future. This will be a valuable educational investment for future generations. The role of teachers is very crucial in the implementation of LKPD based on scientific literacy. Teachers must have a good understanding of scientific literacy and be able to design interesting and interactive learning. With the active involvement of teachers, the learning process will be more effective and interesting for students (Hidayati, 2023). Competent teachers will be able to inspire students to study harder.

A good curriculum must support the development of science literacy in schools. Therefore, there needs to be synergy between the curriculum applied and the learning methods used. This will ensure that students get a holistic and meaningful learning experience (Nudiati & Sudiapermana, 2020). This synergy is crucial to creating a safe learning environment. In the future, the development of LKPD based on science literacy can be expanded to include various other materials in science. By utilizing digital technology, LKPD can be designed to be more interactive and interesting. This will further increase student involvement in the learning process (Kristyowati & Purwanto, 2019). Technology can be an effective aid in education. Thus, the development of LKPD based on science literacy is highly expected to improve the quality of science education in Indonesia. Through this research, it is hoped that it can provide an effective solution to increasing students' science literacy, as a result they can contribute positively to an

increasingly complex and science-based society. This effort will help create a generation that is better prepared to face global challenges.

*Gap research*derived from previous research is, that science literacy learning using the environment, brings students to do activities outside the classroom through exclusive observation. Through direct observation using the environment, students can identify questions, conduct experiments and conclude experiments according to what they observe. The environment helps students to learn concretely (contextually) and realize the things learned in textbooks or texts. Science literacy learning using the environment can be applied in all science materials, be it material about living things, heat, force and so on. using the environment as a source of learning science, students will have a better understanding of science literacy.

Lealitas shows that the level of scientific literacy among Indonesian students has not yet reached the required level. Referring to the upcoming PISA assessment in 2022, Indonesia is ranked 67th out of 81 participating countries in the science aspect, with an average score of 383 (OECD, 2023a). Analysis of the trends that will occur in PISA from time to time says that the progress of Indonesian students' scientific literacy tends to be stagnant, and does not even provide significant improvement. In fact, science achievements in 2022 actually decreased compared to the scores achieved in 2006. Relevant research studied by (Andeswari et al., 2021), entitled "Development of Student Worksheets (LKPD) Based on Problem Based Learning in Learning IX of the Medan Islamic Center Foundation Junior High School". Although there are similarities in the development of LKPD Based on Problem Based Learning, the focus of disparity in this study lies in the learning materials, research locations, and students.

Based on previous research by Wulandari & Wardani (2017) also supports the importance of developing LKPD based on scientific literacy. The results of their study show that the use of LKPD with this approach can increase students' awareness of environmental problems as well as their ability to solve science-based problems. With this approach, students not only learn about ecology as a science, but also understand its role in maintaining environmental sustainability. This is in

line with the goals of modern education that integrate learning with character development and 21st century skills. In addition, research by Nugraha et al. (2020) shows that the integration of scientific literacy in ecology learning through LKPD improves students' ability to understand the relationships between ecosystem components and the impact of human activities on the environment.

These results support the importance of developing science literacy-based teaching materials to improve students' environmental literacy. Another study by Rahmawati et al. (2022) also stated that science literacy-based LKPD designed contextually and oriented towards real problems can increase student involvement in learning and build a deeper understanding of environmental issues. The results of previous research also conducted by Hermawan et al. (2017) revealed that the achievement of environmental literacy of high school students in Denpasar City was in the moderate category, but there was a gap in the achievement of components in environmental literacy. The components of knowledge and cognitive skills were in the high category, while the components of responsible attitudes and behavior were in the moderate category.

This shows that the achievement of environmental literacy of students in Denpasar is not optimal in all components of environmental literacy. Improvements need to be made in biology learning, especially environmental material in the classroom to improve students' environmental literacy. Students as the next generation of the nation not only need to be trained in environmental literacy, but also need to be trained in problem-solving skills. Problem-solving skills are one of the skills that students must have in the 21st century. Problem-solving skills are the ability of individuals to effectively solve a problem through knowledge, skills and actions to achieve a solution (OECD, 2017). Problem-solving skills are not only used in solving environmental problems, but these skills are useful to help students solve problems that they will face in real life and the local social environment. In that case, students who have scientific literacy skills have the ability to solve problems with scientific concepts, creatively create simplified technological results, and can make decisions based on community values and culture (Pratiwi et al., 2019).

Based on the results of the author's observations at SMP Yayasan Islamic Center Medan, it shows that there is a lack of student literacy in science literacy-based learning and there is no learning that uses LKPD and only uses monochrome textbooks, and the results of interviews with grade IX science teachers at SMP Yayasan Islamic Center Medan show several problems in the learning process. One of the main problems is the low learning outcomes of students, especially in biology material. This is caused by the lack of innovative teaching materials and learning approaches that are still monotonous, so that students are less motivated to learn actively.

The teacher also said that the LKPD currently used has not been able to meet the criteria of teaching materials that can actively involve students in the learning process. In addition, teachers have not been able to develop science LKPD that meets the general LKPD requirements that can involve students in active learning. To achieve optimal learning, appropriate teaching materials and approaches are needed. The teaching materials needed can be teaching materials that contain how to use, pictures, and practice questions that can be done in a fun way, such as teaching materials in the form of LKPD.

Based on the problems in the background, it is necessary to follow up so that it is necessary to develop Student Worksheets (LKPD) based on Science Literacy. Therefore, the author is motivated to conduct a study entitled "Development of LKPD Based on Science Literacy to Improve Science Literacy of Grade IX Students of SMP Yayasan Islamic Center on Ecosystem Material". This study was conducted to determine the feasibility of LKPD Based on Science Literacy on Ecosystem Material on the topic of Environmental Change in the form of effectiveness, practicality, and validity that have been developed.

## RESEARCH METHODS

### Research Design

The method used in this study is R&D. In this method there are several types of models. The model used is the development of the 4D model. The 4D development model is a development model for various types of general learning

media, which can be used to develop various types of learning media. This model was developed by Sivasailam Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel. The 4D development model consists of 4 main stages, namely Define or Definition, Design or Design stage, Develop or Development stage, and Disseminate or stages for Distribution.

## Participants and Instruments

This research was conducted on IX at SMP Yayasan Islamic Center in the even semester of the 2024/2025 academic year, focusing on the sub-Components and Forms of Interaction in the Ecosystem. There was 1 class IX as a small-scale subject in this study, then there were all classes IX MTs Islamic Center Medan. The main objective of this study is the development of LKPD based on scientific literacy on Ecosystem material with the topic of Ecosystem Components and forms of interaction in the Ecosystem.

## Procedure

This study uses the Research and Development (R&D) development model to develop Student Worksheets (LKPD) based on scientific literacy on ecosystem material for junior high school students. The researcher began by conducting a needs analysis to collect data from students and teachers. In this stage, the researcher distributed a questionnaire that aimed to evaluate students' understanding and science literacy skills. In addition, the researcher also conducted interviews with teachers to understand the challenges faced in teaching science. After analyzing the needs, the researcher then compiled a scientific literacy-based LKPD. In this process, the researcher designed the LKPD content to be in accordance with the curriculum and relevant to the ecosystem material. The researcher also determined the format and structure of the LKPD in such a way that it was interesting and easy for students to understand.

Next, the researcher invited experts to validate the developed LKPD. The experts evaluated the feasibility of the material, suitability to educational standards, and LKPD design to ensure that the LKPD supports active learning. After receiving input from experts, the researcher conducted a trial of the LKPD

in class. The trial was conducted in two stages: first, the researcher involved a small group of students in a limited trial to identify the strengths and weaknesses of the LKPD. Second, the researcher conducted a field trial in one full class to test the effectiveness of the LKPD in improving science literacy. After the trial, the researcher collected feedback from students and teachers through a questionnaire to obtain their views on the LKPD. The researcher also conducted observations of the learning process to assess student engagement and understanding of the material. Based on the results of the evaluation, the researcher revised the LKPD if necessary.

## *Data Analysis Techniques*

The data collected during the study will be analyzed using descriptive statistical methods. The researcher analyzed the results of the questionnaire and observations to obtain a picture of the increase in students' scientific literacy after using LKPD. The subjects of this study consisted of grade IX junior high school students who would use LKPD based on scientific literacy. The researcher also involved science teachers in the validation and evaluation process of LKPD. In this study, the researcher used several instruments, including questionnaires to measure students' scientific literacy understanding and skills, observation sheets to observe student activities during learning, and interviews to obtain qualitative data from teachers and students regarding the effectiveness of LKPD. With these structured steps, the study is expected to provide a clear picture of the development of LKPD based on scientific literacy on ecosystem material and its impact on increasing junior high school students' scientific literacy, with measurements using a Likert scale.

The Likert scale is one of the favorite scales or often used in measuring attitudes. The Likert scale uses answer categories ranging from strongly agree to strongly disagree. Researchers can use 5 categories of agreement levels (strongly agree, agree, undecided, disagree, and strongly disagree). In addition, researchers can use 7 categories but there are also researchers who use four or six answer categories for reasons of avoiding the middle category. Because in the attitude

variable it must be determined whether the respondent is positive or negative, therefore a scale with an even answer category is usually used.

It doesn't matter how many answer categories the researcher chooses. However, it should be remembered that the fewer answer categories given, the less the spread of scores (reduced variance) will be, which will also reduce the reliability of the answers. The Likert scale is used to measure attitudes, opinions, and perceptions of individuals or groups. Each instrument item that uses a Likert scale has a gradation value from very positive to very negative.

**Table.1 Likert Scale.**

| Criteria | Score |
|---|---|
| Strongly agree | 5 |
| Agree | 4 |
| Doubtful | 3 |
| Don't agree | 2 |
| Strongly disagree | 1 |

(Riduwan, 2015)

**Table 2 Validity Criteria**

| Validity Level | Validity Predicate |
|---|---|
| 85-100% | Very valid |
| 71-85% | Valid |
| 52-70% | Less valid |
| < 50% | Invalid |

**RESULTS AND DISCUSSION**

This study aims to develop Student Worksheets (LKPD) based on scientific literacy on ecosystem material for junior high school students. The LKPD development process follows the 4D model consisting of four stages: Define, Design, Develop, and Disseminate.

*Define Stage*

The purpose of the Define stage is to select and do various things that are needed in the learning process and collect as much information as possible related to the product being developed. The definition stage consists of four stages: First, Curriculum Analysis used at MTs Islamic Center is Curriculum 13 which has several materials including family planning materials that are adjusted to KI and KD in its curriculum. Teachers stated that the learning process often involves the use of teaching materials in the form of teacher guidebooks. In face-to-face meetings, teachers use lecture and discussion methods to explain, and teachers are generally familiar with the development of electronic learning that can be manipulated via computers. However, teachers have never developed learning media in the form of electronic materials, including LKPD, which are used are printed books.

**Second**, Student Analysis: Overall, MTs Islamic Center students, especially class IX, are between 13 and 14 years old. Students at this age prefer an interesting learning process. Based on the results of distributing questionnaires to 36 students during learning, the results obtained were 97.14% of students LKPD had never used electronic class formats, especially family planning materials, which caused boredom.

Based on the results of a similar survey, 82.85% of students agreed with the development of LKPD, especially in biology classes, ecosystem material, making the learning process more interesting and efficient both in and outside the classroom. Students also suggested that in addition to text, LKPD should also include audio, video, and animated images as support to help students better understand the material and questions discussed.

**Third**, Concept Analysis: This stage is the stage of planning concepts and materials related to ecosystem material. Fourth, Task analysis: Task analysis consists of KI and KD analysis in the context of ecosystem material developed through LKPD. In LKPD, the questions are in the form of essays based on scientific literacy. On the other hand, the assignments given by teachers at school are still assignments contained in printed books, and students need to record these

assignments because the printed books they have are from the school library and books.

### Design Stage

After defining the needs, LKPD is designed by considering the characteristics of students and the applicable curriculum. This LKPD includes: 1). Environmental exploration activities. 2). Science literacy-based questions that encourage students to think critically.

At the design stage, it is done by designing a draft of LKPD based on scientific literacy by designing an assessment instrument in the form of a validation sheet and a questionnaire for the practicality test of teachers and students. The LKPD draft consists of LKPD cover, LKPD title, scientific literacy indicators. Competency achievement indicators, learning instructions, discourse related to ecosystem components, activities/tasks that must be done by participants. The scientific literacy indicator used is one of the chemical literacy indicators by using scientific understanding in solving problems. The design of the validation sheet consists of six aspects of feasibility assessment, namely the feasibility of content, characteristics of scientific literacy, presentation, language, graphics. The validation sheet is equipped with an assessment rubric. The design of the practicality questionnaire consists of users of positive statement points.

### Develop Stage

The designed LKPD is then validated by experts. The validation process is carried out to ensure the feasibility of the material, compliance with educational standards, and the design of the LKPD. The development stage is carried out by validating the LKPD product to 3 expert validators, the validators provide an assessment based on the aspects listed on the validation sheet. During the validation process, revisions are made according to the suggestions of the validators and then re-validated until a valid LKPD is achieved.

**Table 3**
**Validator Assessment Results**

| Expert | Percentage % |
|--------|--------------|
| Media | 85.80% |
| Language | 85.71% |
| Material | 92.475% |

Problem solving in LKPD is expected to hone students' abilities in scientific literacy. This is in accordance with the statement of Uus Toharudin, dikk year, if students are able to solve a science problem using the scientific understanding they have learned, then the students have used their scientific literacy skills. Validation carried out by media experts aims to evaluate the products developed as LKPD based on scientific literacy and to obtain information on the acceptance of good electronic media LKPD. This evaluation aims to see the feasibility of the media. Learning in the form of LKPD so that it can be applied to students.

Based on the calculation results with a classification network that includes font size, cover design, color composition, layout, relevance and use of images with a total of 7 questions, the average validation results of media experts reached an average score percentage of 85.80%, this indicates that LKPD based on scientific literacy is feasible to use without revision. Validation carried out by language experts aims to evaluate LKPD products in terms of language. The elements assessed are compliance with good and correct Indonesian language rules, good language readability and interactive dialogue. Based on the calculation results with a ranking network consisting of compliance with good and correct Indonesian language rules, readability and language used in interactive dialogue with a total of 7 questions, the validation results of language experts got an average score of 85.71% indicating that LKPD based on scientific literacy is feasible to use without revision and the average value is included in the very valid criteria.

The assessment was carried out by material experts to assess the LKPD product from the material, the components of the aspects assessed were the

suitability of the material with KI and KD, the truth of the material, presentation material, teaching support, teaching presentation techniques, completeness of presentation. Based on the results of calculations with an evaluation network that includes the suitability of the material with KI and KD, the accuracy of the material, supporting material for teaching presentation, presentation techniques, learning, learning completeness with a total of 14 questions, the results of the validation of material experts obtained an average percentage score of 92.475% which indicates that E-LKPD based on scientific literacy is feasible to use and this average value is included in the criteria very valid without revision.

During the work on the LKPD, students looked relaxed and happy. The length of time for students to work on the LKPD was no more than the time allocation provided in the learning instructions. The next trial was a trial with 2 teachers and a trial with 28 students (small groups) to see the practicality of the LKPD through a user practicality test questionnaire. In the trial, revisions were carried out 4 times based on the validator expert to perfect the LKPD. The results of the trial with teachers obtained a practicality value with an average score of 87.29%, while the trial with small-scale group students obtained a practicality value with an average score of 89.60%, both trial results were included in the very good criteria. The results of the limited trial were that the LKPD was declared practical for use by teachers and students in the learning process.

**Table.4**
**Group Test**

| Group | Percentage % |
|-------|--------------|
| Small | 87.29% |
| Big | 89.60% |

The small group test aims to analyze the percentage of the feasibility of this LKPD product by filling out a questionnaire to check one of the alternative answers proposed. The small group test was conducted in class IX-4 with 28 students. The collection of small group student response questionnaires on the LKPD learning media based on scientific literacy in biology subjects, especially the Ecosystem

Component material with a total of 16 questions with a feasibility percentage of 87.29%. The results of this percentage can be said that the LKPD learning media is very suitable for use as a student learning resource that supports the learning process as a media or online learning resource. The large group test aims to analyze the percentage of the feasibility of the LKPD learning media development product by filling out a questionnaire by checking one of the alternative answers proposed. The large group test was conducted on all classes IX of MTs Islamic Center. The large group test response questionnaire on the LKPD learning media based on scientific literacy in biology subjects, especially the Ecosystem Component material with a total of 16 questions with a feasibility percentage of 85.80%. This learning media is very suitable to be used as a learning support or learning resource for students to support the learning process as an online learning resource. Then this can increase the interest and learning outcomes of students at school.

**Diagram 1 Percentage Results (%) of LKPD Assessment**
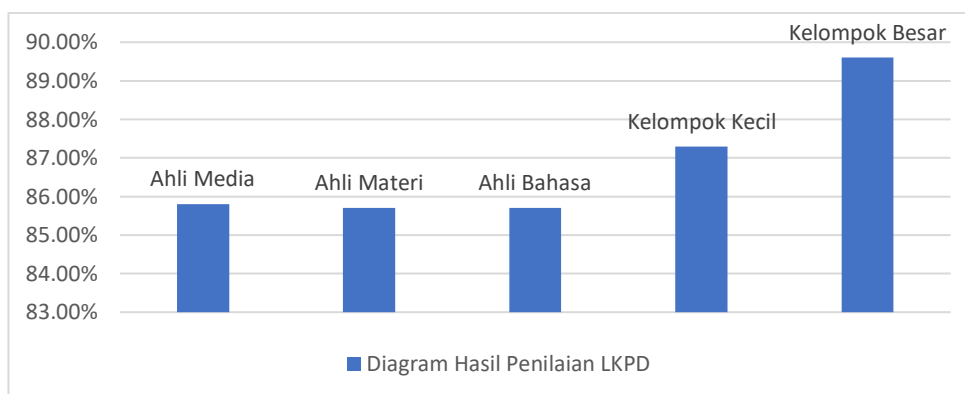


*Disseminate Stage (Spread)*

After getting feedback from the validator, LKPD was tested in class. The trial was conducted in two stages: limited trial and field trial. The results of the trial showed that: 1). 80% of students felt more interested and active in learning using LKPD. 2). The increase in students' understanding of ecosystem material reached 75%. After a limited trial and implementation revision. The purpose of the LKPD stage, In this study, only the distribution and promotion of the final product in the form of LKPD was carried out on a limited basis to biology teachers and grade IX students at MTs Islamic Center Medan.

The development of LKPD based on scientific literacy aims to improve the scientific literacy of junior high school students, especially in ecosystem material. The results of the study showed that the use of LKPD can increase student involvement in the learning process. This is in line with research by Nugraha et al. (2020) which states that the integration of scientific literacy in learning can improve students' understanding of environmental issues.

The development of Student Worksheets (LKPD) based on scientific literacy is a strategic step in improving the quality of science education in Indonesia, especially in ecosystem material. In this study, the trial results showed that 80% of students felt more interested and active in learning using LKPD. This shows that an interactive and contextual approach can significantly encourage student engagement. Research by Nugraha et al. (2020) supports this finding, emphasizing the importance of integrating scientific literacy in learning to increase student participation. The increase in students' understanding of ecosystem material was also recorded at 75%. This shows that the use of well-designed LKPD can help students understand scientific concepts better. Hidayati (2023) stated that interactive and applicable LKPD can increase students' motivation and understanding of the subject matter.

Thus, LKPD not only functions as a learning aid, but also as a means to improve students' critical thinking skills. The validity of the LKPD developed also showed encouraging results. The validity percentage reached 85.80% for media, 85.71% for language, and 92.475% for material. These results indicate that the LKPD developed meets the eligibility criteria required for use in the learning process. Research by Budiarti (2021) emphasizes the importance of LKPD design that pays attention to the appropriateness of content, language, and presentation to increase learning effectiveness. Students' critical thinking skills are also trained through scientific literacy-based questions contained in the LKPD. Research by Pratiwi et al. (2019) shows that students who are trained to think critically in the context of science can be better at solving problems and making decisions based on scientific evidence. This is very important to equip students with the 21st century skills needed in an increasingly complex modern world.

The ecosystem material taught through LKPD not only provides knowledge, but also shapes students' attitudes towards the environment. Research by Fitriyana et al. (2020) shows that a deep understanding of ecosystems can increase students' awareness of environmental issues, such as climate change and pollution. Thus, LKPD based on scientific literacy can contribute to the formation of a generation that cares more about the environment.

The use of LKPD based on scientific literacy also allows students to make direct observations in their surroundings. By conducting experiments and observations, students can understand scientific concepts better. Regar et al. (2022) stated that direct experience in science learning is very effective in improving students' scientific literacy. This shows that LKPD can be an effective tool in improving students' understanding of the subject matter. Evaluation of the use of LKPD in learning is very important to determine its effectiveness. Feedback from students and teachers can be used to improve and develop LKPD further. Kristyowati & Purwanto (2019) emphasized that the continuous evaluation process will ensure the quality of LKPD. In this way, LKPD can continue to be adjusted to student needs and curriculum developments.

Based on this background, this study aims to develop a scientific literacy-based LKPD that can improve the scientific literacy of junior high school students in ecosystem material. It is hoped that with the development of effective LKPD, students can better understand the material and be able to apply the knowledge they have learned in the context of everyday life. This development is expected to answer current educational needs. The role of teachers is very important in the implementation of scientific literacy-based LKPD. Teachers must have a good understanding of scientific literacy and be able to design interesting and interactive learning. Hidayati (2023) stated that active teacher involvement will make the learning process more effective and interesting for students. Competent teachers will be able to inspire students to study harder.

A good curriculum must support the development of science literacy in schools. Therefore, there needs to be synergy between the curriculum applied and the learning methods used. Nudiati & Sudiapermana (2020) emphasized that this

synergy is important to create a conducive learning environment. With the support of the curriculum, LKPD based on science literacy can be implemented better. In the future, the development of LKPD based on science literacy can be expanded to cover various other materials in science. By utilizing digital technology, LKPD can be designed to be more interactive and interesting. Kristyowati & Purwanto (2019) stated that technology can be an effective tool in education. Thus, the development of LKPD based on science literacy is very much needed to improve the quality of science education in Indonesia.

Through this research, it is expected to provide an effective solution in improving students' scientific literacy, so that they can contribute positively in an increasingly complex and science-based society. This effort will help create a generation that is better prepared to face global challenges. Thus, LKPD based on scientific literacy not only functions as a learning tool, but also as a means to shape the character of students who care about the environment and are able to think critically. Overall, the development of LKPD based on scientific literacy shows great potential in improving the quality of science education in Indonesia. With the right approach, it is hoped that students will not only gain knowledge, but also the skills needed to face future challenges. This research makes a positive contribution to biology education in Indonesia and helps students face the challenges of science and technology in the future.

**CONCLUSION**

This study shows that the development of LKPD based on scientific literacy has the potential to be expanded to other materials in science, by utilizing digital technology to create more interactive and interesting learning. Overall, the development of LKPD based on scientific literacy is a strategic step in improving the quality of science education in Indonesia, helping students understand scientific concepts, and equipping them with the skills needed to face future challenges.

# REFERENCE

Agung, A. A. G. 2016. *Statistik Dasar untuk Pendidikan.* Deepublish.

Aini, S. N. et.al. 2021. Pengaruh Kualitas Pelayanan, Harga dan Promosi terhadap Kepuasan Pelanggan Transportasi Online Grab di Kota Malang. *Journal Riset Mahasiswa Manajemen (JRMM)*. Vol. 7, No. 1. Hal: 1-5.

Andi Prastowo. 2012. *Metode Penelitian Kualitatif Dalam Perspektif Rancangan dan Penelitian.* Jogjakarta: Ar-Ruzz Media.

Andi Prastowo. 2011. *Panduan Kreatif Membuat Bahan Ajar Inovatif*. Yogyakarta: Diva Press.

Andi Prastowo. 2014. *Panduan Kreatif Membuat Bahan Ajar Inovatif.* Yogyakarta:Diva Press

Anggraeni, Alvina Rahma & Euis Soliha, 2020. *Kualitas produk, citra merek dan persepsi harga terhadap keputusan pembelian* (Studi pada konsumen Kopi Lain Hati Lamper Kota Semarang), Al Tijarah: Vol. 6 No. 3 (Special Issue), 96-107.

Arfiliyah Nur Pratiwi. 2019. Faktor Yang Mempengaruhi Keteraturan Membayar Iuran Pada Peserta Jaminan Kesehatan Nasional (Jkn) Kategori Peserta Mandiri (Studi Kasus Pasien Rawat Inap Rumah Sakit dr. Soebandi Kabupaten Jember). *In Journal of Chemical Information and Modeling* (Vol. 53).

Astari, N. M. S. N. 2017. Pengaruh Pemberian Teh Hijau Terhadap Penurunan Kadar Kolesterol Pada Lansia Awal (46-55) Tahun. Repository

Banila, L., Lestari, H., & Siskandar, R. 2021. Penerapan Blended Learning Dengan Pendekatan STEM Untuk Meningkatkan Kemampuan Literasi Sains Siswa Pada Pembelajaran Biologi Di Masa Pandemi Covid-19. *Journal of Biology Learning*, 3(1), 25.

Bruscia, K. 2006. Defining Music Therapy. Barcelona Publishers.Hidayati, 2023. Pendidikan Lingkungan dan Kesadaran Siswa. *Jurnal Pendidikan* Vol.2 (3)*.*

Budiarti, 2021. Literasi Sains dan Pengambilan Keputusan. *Jurnal Ilmu Pendidikan.* 3(1)

Chaeruman, U. A. 2010. Merancang Model Blended Learning. *Jurnal Teknodik,* 17(4).

Cigdemoglu, C and Geban, O. 2015. Improving students' chemical literacy levels on thermochemical and thermodynamics concepts through a context-based approach. *Chemistry Education Research and Practice*. 16. hlm. 302-317.

Delima N. et al. 2020. Faktor Yang Berhubungan Dengan Kepatuhan Diet Diabetes Mellitus Pada Pasien Diabetes Mellitus Di RSUD Kota Kendari Tahun 2018. *Jurnal Gizi dan Kesehatan Indonesia*, 1(1), 21.

Depdiknas. 2006. *Kurikulum Tingkat satuan Pendidikan (KTSP) untuk Sekolah Dasar/ MI*. Jakarta: Terbitan Depdiknas.

Fitri, A. S. dan Y. A. N. Fitriana. 2020. Analisis Senyawa Kimia pada Karbohidrat. *SAINTEKS*, 17 (1) : 45–52.

Hermawan, P. 2017. Perancangan Tata Letak Jalur di Stasiun Lahat Untuk Mendukung Operasional Jalur Kereta Api Ganda Lintas Layanan Muara Enim – Lahat. Tugas Akhir. Yogyakarta: Universitas Muhammadiyah Yogyakarta.

Hidayati, 2023. Pendidikan Lingkungan dan Kesadaran Siswa. Jurnal Pendidikan.

Hoolbrook, J., dan Rannikmae, M. 2009.The Meaning of Scientific Literacy. *International Journal of Environmental & Science Educational*, Vol. 4, hal 144 – 150.

Kelana, J.B., Wulandari, M.A., dan Wardani, D.S., 2021, Penggunaan Aplikasi Zoom Meeting Di Masa Pandemi COVID-19 Pada Pembelajaran Sains, *Jurnal Elementary*, 4(1), ISSN : 2614-5596.

Kristyowati, Reny, dan Agung Purwanto. (2019). Pembelajaran Literasi Sains Melalui Pemanfaatan Lingkungan. Scholaria*: Jurnal Pendidikan Dan Kebudayaan*. 9.2. 183–91.

National Research Council. 2012. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*. The National Academies Press.

Nugraha, Mohammad Fahmi. Budi Hendrawan Dkk. 2020. *Pengantar Pendidikan dan Pembelajaran di Sekolah Dasar.* Tasikmalaya : Edu Publisher.

OECD. 2021. PISA 2021 Results (Volume I): What Students Know and Can Do. OECD Publishing.

OECD. 2017. PISA 2015. *Assessment and Analytical Framework*: Reading, Science, Mathematics, Financial Literacy, and Collaborative Problem Solving, revised edition. Paris: OECD Publishing.

Rahmawati (2022). *Apa Saja Variabel Penelitian Dalam Bidang Marketing*??? (Panduan Bagi Peneliti Pemula). Samarinda: Mulawarman University PRESS.

Shadily, Echols, 2007. *Kamus Inggris Indonesia*. Jakarta: PT Gramedia.

Sudaryono, Febriani, R., & Rohmah, S. (2019). Terhadap Motivasi Belajar Mahasiswa (Studi pada Prodi Pendidikan Akuntansi Fakultas Keguruan Dan Ilmu Pendidikan Universitas Banten Jaya). *Jurnal Pendidikan*, 2(1), 43.

Sutrisna, N. (2021). Analisis Kemampuan Literasi Sains Peserta Didik SMA di Kota Sungai Penuh. *Jurnal Inovasi Penelitian*, 1(12), 2683-2694.

Trianto. (2010). *Model Pembelajaran Inovatif-Progresif Konsep, Landasan, dan Implementasi Pada Kurikulum Tingkat Satuan Pendidikan (KTSP)*. Jakarta: Kencana

Trianto . 2013 . *Model Pembelajaran Terpadu* . Jakarta : PT Bumi Aksara

Widjajanti, Endang. 2008. *Kualitas Lembar Kerja Siswa*.