

# Development of Student Worksheets (LKPD) based on Science Literacy on Ecosystem Materials

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**Abstract.** This study aims to (1) determine the validity of the student worksheets (LKPD) based on student's scientific literacy in class X high school ecosystem materials based on material experts, learning design experts, teacher responses and student responses. This research was conducted at SMA N Salapian in April-July 2022, with descriptive data analysis techniques, LKPD development was carried out using the Thiagarajan Four-D (4-D) development model consisting of four stages, namely defining, designing, developing and distributing. The results of the material expert assessment show that they are in the very good category with an average percentage of 89.61% (very good), design experts 92.57% (very good), teacher respondents are 92.36% (very good), student respondents are 90.71% (very good).

**Keywords:** LKPD, Science Literacy, Ecosystem

## 1 Introduction

Education is very important in the life of the nation and homeland. Through education, each individual is expected to have a set of knowledge, thinking skills, life skills, and values needed in order to develop into a complete human being and be able to contribute to the country, society or at least for himself [7]. This can be achieved through the learning process. One of them is the process of learning biology subjects. Based on the 2013 curriculum development, the objectives of biology subjects are that students active in protecting and loving the environment, forming a schema of biological knowledge of students in the form of factual, conceptual, and procedural knowledge, increasing awareness about the application of science and technology that is beneficial to individuals, society, and the environment, providing experience to students through the stages of observation and experimentation, testing hypotheses, processing data, investigating and solving problems in life both individually and in society as well as communicating experimental results orally and in writing to foster a scientific mindset as a provision in real-world competition [4].

This learning can be obtained if students have literacy skills and use them well. Scientific literacy is a person's ability to use scientific knowledge and skills based on empirical evidence creatively, especially those relevant to careers and everyday life, in order to solve problems and make socio-scientific decisions [5]. There are four aspects of scientific literacy, namely

science as a body of knowledge, science as a way of investigating, science as a way of thinking and the interaction between science, technology, and society [2].

Thus, an appropriate media is needed to support students' scientific literacy, one of which is the student worksheet (LKPD). LKPD is a collection of sheets containing student activities that allow students to carry out real activities [3]. Development of LKPD that is adapted to the conditions and needs of students needs to be done [8]. Material selection also needs to be taken into account in practicing scientific literacy and is relevant to everyday life [1]. Based on these characteristics, the appropriate material is an ecosystem. Ecosystems study the interactions between living things and between living things and their environment, studying facts, concepts, problems, and problem solving.

The results of a preliminary study of observations and interviews conducted at SMA Negeri 1 Salapian and SMA Swakarya Kabupaten Langkat with a biology teacher at the SMA said that the worksheets that had been used previously only contained a summary of the material and questions about the material without relating it to scientific literacy, does not lead students to present facts, concepts, hypotheses, conduct observations, experiments, demonstrations, investigations, solve a problem scientifically, and does not present the interaction of science, technology with society. Thus the LKPD is not in accordance with the demands to achieve the objectives of learning biology. However, teachers are reluctant to create and develop their own LKPD according to learning needs, adjusting to the needs of the times and the character of students.

Based on observations and interviews at the two schools, ecosystem learning in schools tends to be taught only in the form of theories not related to natural problems, investigations and solving problems of daily life so that students have difficulty understanding ecosystem materials that can be sustainable for real life with problems complex. Based on the facts, an innovation is needed to improve the quality of student worksheets that contain student scientific literacy to be used by teachers and students so that educational goals through the biology learning process can be achieved.

## 2 Method

This research is a research on developing student worksheets (LKPD) based on scientific literacy on ecosystem material which contains four aspects of scientific literacy according to Chiappetta. This study uses a 4-D development model developed by Thiagarajan which includes 4 stages, namely: 1) *define* (defining); 2) *design* (planning); 3) *develop* (development); 4) *disseminate* (spread). Disseminate stage was not implemented in this study. This development research activity was carried out from April to July 2022. The research instruments used were validation sheets, questionnaires for biology teacher responses at SMA N 1 Salapian and student response questionnaires. Data were analyzed using a *Likert* scale. LKPD category to be very good if it is in the range of 83% - 100%.

## 3 Results and Discussion

The implementation of research on developing student worksheets (LKPD) based on scientific literacy on ecosystem material by following the steps of the Thiagarajan model. Here's how each step is implemented: *Define*: This initial investigation stage aims to determine and define needs by analyzing the objectives and limitations of the material in the development of LKPD based on scientific literacy on ecosystem material. From the

observations, it is necessary to develop an Ecosystem LKPD with the aim of: 1) Realizing a LKPD based on scientific literacy on ecosystem material that can be used properly; 2) Helping students learn independently and in groups, especially during class learning. After mapping the main tasks of students according to KI and KD, it can be identified the main material that will be taught in ecosystem material, namely ecosystem components, interactions in ecosystems, types of ecosystems, energy flows, biogeochemical cycles, changes and ecosystem maintenance

*Design:* The activities of this stage are the preparation of ecosystem materials, the preparation of the LKPD writing format, and the initial design. The preparation of ecosystem materials is adjusted to the conditions of the ecosystem in the environment around students.

*Development:* this stage is to produce the final product of LKPD Based on Science Literacy in Ecosystems that are suitable for use. The results of validation by material experts regarding the feasibility of content, Material Feasibility, Support Material, presentation equipment, and components of scientific literacy, can be seen in the following figure 1.

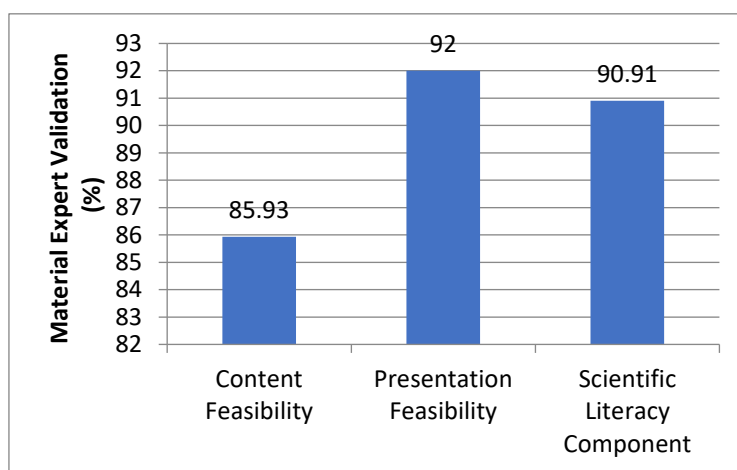


Fig. 1. Average Material Expert Validation Results

Based on the results of the validation of the feasibility of the content of the material, the LKPD which shows that the content feasibility component in the very good category. Overall, it can be concluded that the material expert's assessment of the feasibility of the content is in the very good category, namely 85.93%. Based on the validation results of the material presentation feasibility, the LKPD shows that the presentation feasibility component is in the good category with a score of 92%. Based on the validation results of scientific literacy component, the LKPD show that very good category with a score of 90.91%. Overall, it can be concluded that the material expert's assessment of the scientific literacy component is in the very good category

From the results of material expert validation on LKPD, it appears that the average score is very good. This is because the LKPD compiled has complied with the rules of writing appropriate and appropriate LKPD material. In this material validation, each component is analyzed according to the student's condition so that it is very good for use in the classroom. And it can be concluded that the material for LKPD Ecosystems based on scientific literacy is "Very Good" as a whole, it can be seen from the average percentage of 89.61%. The

validation results by design experts about graph feasibility design, presentation feasibility design, and scientific literacy design can be seen in the following figure 2.

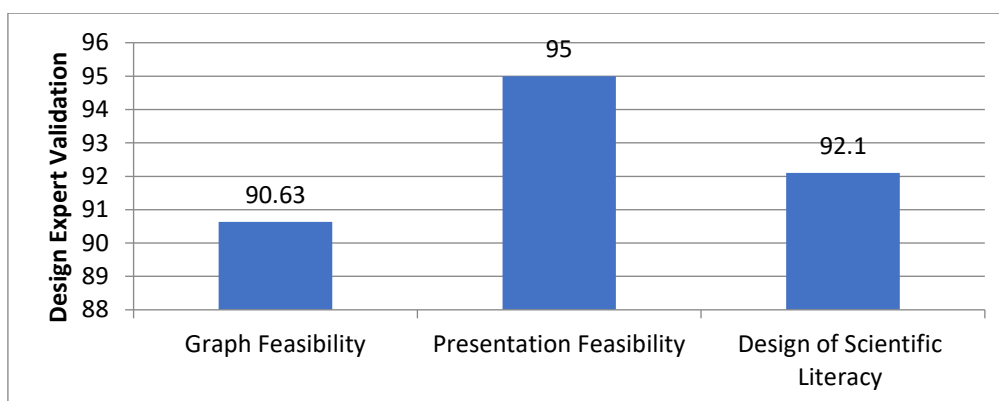


Fig. 2. Average Design Expert Validation Results

The validation results in the form of an assessment score of LKPD Ecosystems based on scientific literacy are in the Good criteria, with an average percentage of 92.57%, which means that the LKPD is very feasible to be developed. The results of the LKPD assessment based on scientific literacy on ecosystem material by biology teacher with the components assessed are components of scientific literacy according to Chiappetta is in the "Very Good" criteria with an average of 92.36%.

The results of LKPD assessment based on Science Literacy by Students are in the "Very Good" criteria with an average of 90,71%. Data was taken using a student response questionnaire which included the readability of the LKPD, clarity of the language used, understanding, writing and display of the LKPD, and student interest in the LKPD. The results of student respondents, all respondents agreed about the attractive appearance of the LKPD, the ease of understanding the language used in the LKPD, and the ease of understanding the material using the scientific literacy-based LKPD. LKPD as an interesting teaching material for students and using language appropriate to the level of child development will motivate them to study hard and study smart[6]. In addition, all respondents agreed about the writing, fonts, sentence structure, pictures and presentation of writings and pictures in the LKPD in accordance with the LKPD's graphic criteria.

#### 4 Summary

Based on the results of the research and discussion that have been described, it can be concluded that LKPD is very good. The results of the material expert assessment show that they are in the very good category with an average percentage of 89.61% (very good), design experts 92.57% (very good), teacher respondents are 93.63% (very good), student respondents are 90.71% (very good).

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