



Reinforcement on Students' Scientific Literacy: Development of Worksheet Based Lynk

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Abstract. This study aims to develop a valid, practical, and effective worksheet based Lynk to habituate students' scientific literacy. Thiagarajan 4-D model (Define, Design, Development, and Disseminate) in Research and Development (R & D), were used as research method. This article reported the results of the development in the define stage. 10 teachers and 112 students in the Metro city, Indonesia were involved as research subjects. The questionnaire sheet was used to obtain data on the needs analysis of science worksheet based Lynk for elementary school. Based on the results of the research, it can be concluded that students need a worksheet based Lynk which are able to stimulate students learning, enhance students' involvement in learning, and create a pleasant learning atmosphere. Based on the data, 82.73% of students agree for the necessity of a worksheet based Lynk development, with a validity value of 3.15 in the valid category and the reliability value of Cronbach's alpha 0.928.

Keywords: Worksheet based Lynk · learning material · science literacy

1 Introduction

Learning in the 21st century has undergone significant changes and progress, which is certainly part of the advancing education. One of the educational progress was focused on the changes of the learning atmosphere. Learning as a process of creating an environment that allows the learning process to occur [1], strengthen the paradigm into the student-centered. Student-centered learning process is believed could facilitates students to provides opportunities in obtaining information, construct knowledge and new skills optimally. The learning process in Regulation Minister of National Education number 19 of 2005 article 19 paragraph 1 concerning standard processes that the learning process in educational units is carried out interactively, inspiring, fun, challenging, motivating students to participate actively, and providing sufficient space for initiative, creativity and independence build upon the talents and interests of students. Moreover, scientific literacy skills are also mandatory for elementary school students in the 21st century as

mentioned in the goals of learning science in elementary schools, namely to develop an understanding of science concepts that can be applied in everyday life [2]. In science learning, it must be obtained the accomplishment of meaning to the stage of the real essence of learning.

In terms of improving the quality of the educational process, there are a number of components that need to be considered, namely the input, process, output, and feedback components [3]. The input component is students. The components of the process are teachers, teaching materials, and supporting facilities. The output component is the state of the students after learning. And the feedback component is what steps to take after seeing the output. Related to this, educators must be able to create an active and effective learning atmosphere to achieve learning objectives. The teaching and learning process is the core of the overall educational process with the teacher as the main role. In the learning process there are several problems that teachers often encounter. One of the important issues is choosing the right teaching materials. A learning atmosphere that is in accordance with process standards can be carried out by using teaching materials that support learning. The competence to develop teaching materials is ideally controlled by the teacher well so that the conventional learning process can be reduced, where the teacher is more dominant and the students are less active tend to be listeners. The Student Worksheet is a printed teaching material in the form of sheets of paper containing material, summaries, and instructions for implementing learning tasks that must be done by students, which refers to the basic competencies that must be achieved. Prastowo, 2016 revealed that one of the teaching materials that can be developed by teachers is as a facilitator in learning activities [4]. Daryanto (2014) emphasized that the Student Worksheet is a set of learning as a complement or a means of supporting the implementation of learning [5].

Implementation of learning activities using student worksheets can increase student activity in reading, writing and encourage students to think critically about the subject matter being taught, so that students become more active and make it easier for students to absorb and understand the material being taught. Presented in the worksheets Arini (2020) revealed some characteristics of student worksheets as follows: 1) worksheet only consists of a few pages, not up to a hundred pages, 2) worksheet is printed as specific teaching materials to be used by a hundred certain levels of education, 3) It consists of a brief description of the subject matter in general, a summary of the subject matter, dozens of multiple-choice questions and fill-in questions, 4) worksheet as one of the teaching media used by students in learning [6]. It is complemented by Surani's opinion (2018) that the worksheet must contain requirements for its preparation activities, namely, didactic requirements, construction requirements, and technical requirements [7]. Learning in this era, whether we realize it or not, must utilize technology in the process of achieving educational goals. The use of technology in learning is believed to be able to help improve the quality of learning, because it makes it easier for lecturers and teachers to explain learning material that is abstract, theoretical, and far from the reasoning of students and students.

The development of learning tools is carried out from time to time to support each learning and renewal of the learning process. The development of the device is carried out because the development of the device will be able to motivate students in learning.

The development of worksheet using Lynk is to develop learning device products that are used to help make it easier for students to access learning resources in the form of teaching materials, worksheet and direct evaluations easily online without burdening students to reduce the internal memory space of the telephone. In addition, compiling a validation sheet for learning tools and validating responses that are similar to research that has been done by previous researchers in the form of developing lesson plans and teaching materials through flipped classrooms. The difference in this study, researchers focus on the development of LKPD as a source of learning. Worksheet will help students to learn independently and learn to understand written assignments [8].

Based on the results of observations of worksheet documents used by teachers and in-depth interviews with elementary school teachers in the Metro City area, it shows that 44% of students use LKPD in science learning. 56% stated that learning using worksheet facilitates students in learning. However, based on the LKPD that has been used only 12% of science learning has grown students' scientific literacy, 15% are able to create stimulus for students to be ready to learn, 45% involve students in learning, 35% create a pleasant learning atmosphere and 88% of students want learning resources another is worksheet based lynk to habituate students' scientific literacy. In line with the research results of Amila, et al., 2018; Ariningtyas, et al., 2017; Sudarmin and Sumarni, 2018 that the development of worksheet can improve achievement, scientific literacy, character values, conservation behavior, and understanding of students' concepts [9–11].

The Student Worksheet is a worksheet as a learning resource in supporting student learning activities which contains work steps, information and concepts given to students [12]. Worksheet is a collection of sheets containing student activities that allow students to carry out real activities with the objects and problems studied. Worksheet serves as a learning guide for students and also makes it easier for students and teachers to carry out teaching and learning activities. Worksheet can also be defined as printed teaching materials in the form of sheets of paper containing material, summaries, and instructions for carrying out tasks that must be done by students, which refers to the basic competencies achieved [13]. The tasks given to students can be in the form of theory and or practice.

Based on the problems and facts in the field as well as relevant research, this research will develop a worksheet based lynk with the help of technology that has never been applied by schools. The resulting worksheet is expected to be able to habituate students' scientific literacy on elementary science material. The specific purpose of this research is to generate and analyze the influence of Lynk-based elementary science worksheet development on students' scientific literacy. The urgency of the research is that product development can be used as an interactive learning media for students, both with internet available and not available internet. The target of the research is to find new findings in the form of ready-to-use learning media to support the application of the learning model in higher education with the Project Based Method. The contribution of research, can strengthen the implementation of the Ministry of Education and Culture's MBKM, namely students study off campus with partner school institutions, develop teaching materials in the form of worksheet as a Lynk-based interactive learning media that can be accessed without an internet network.

2 Methods

This research were conducted from July 2022 to October 2022 at 5 public elementary schools in the Metro city, Indonesia. The population of this study was 450 4th–6th grades students in total. Samples were taken as many as 112 students, using purposive sampling technique. The data collection technique used in this needs analysis research consists of three parts, namely the document review method, the observation method, the questionnaire method and the literature study method. Document review is used to obtain an overview of the K-13 curriculum and worksheet components used in schools. Observations were made to observe the implementation of learning in the classroom, both observing the role of the teacher as a facilitator who taught students and the activities of students in gaining knowledge and observing the obstacles they faced. Questionnaires were used to reveal the characteristics of students, students' responses to science learning and the specifications of the desired learning resources. Research Instruments used in this needs analysis research are document review sheets, observation sheets, student needs questionnaires and literature related to worksheets based Lynk and students' science skills. The relation between data target, data resource, instrument, and data analysis type presented in Table 1.

Table 1. RELATION BETWEEN DATA TARGET AND RESEARCH INSTRUMENTS

Research Stage	Data Targets	Data Resource	Instrument	Data analysis type
Define	Define subject and object	Curriculum document	Document review sheet	Deskriptive
	Collect and analyze data and information obtained	Students and teachers	Observation sheet	Deskriptive
	Determining learning materials and tools, as well as product design	Worksheet documents	Document review sheet	Deskriptive
	Map out the products according to predetermined designs	Worksheet documents	Document review sheet	Deskriptive
	Lynk-based worksheet development needs	Students	Questionnaire sheet	Deskriptive, quantitative, and qualitative

3 Data Analysis Technique

The data analysis technique used in this research as mentioned in Table 1, were descriptive analysis, qualitative analysis, and quantitative analysis. Descriptive analysis were used to analyze data by describing the data that has been collected as it is without intending to make conclusions or generalizations. In this study, the descriptive analysis technique was in the form of a qualitative description, namely the presentation of data from the document review results in the form of curriculum components and worksheet components. The observation sheet conducted in this study aims to describe the implementation of worksheet during practicum at school and to determine the achievement of students' basic process skills based on activities in the worksheet. Analysis of the results of observations was carried out using descriptive analysis techniques, namely by interpreting the data from observations in the form of activities in the worksheet such as predicting, observing or conducting practicum, answering questions, and explaining the results of the thinking.

4 Results and Discussion

The development research conducted by the researcher is reported in this article until the needs analysis process. The needs analysis aims to collect information about the problems contained in science learning and their causes, the implementation of learning and the obstacles that occur, the use of teaching materials and their shortcomings [14]. The results of the needs analysis are used as the basis for determining alternative solutions and recommendations for specifications for student worksheets to be developed. The scope of the needs analysis referred to in the study includes: (1) that students need a worksheet based *Lynk* that is able to create a stimulus for students to be ready to learn, (2) involve students in learning and (3) create a pleasant learning atmosphere.

A. *Worksheet based Lynk needs analysis that is able to create a stimulus for students to be ready to learn?*

The review of curriculum documents and worksheet shows that the worksheet used in schools does not meet the qualifications of the K-13 curriculum because there are only learning objectives, tools and materials, experimental steps and several questions. So that in the implementation of learning, students still do not understand the relationship with the concept of the material to be taught. So it takes worksheet that can direct students to answer learning objectives by providing predictions or hypotheses on problems related to the experiment. In addition, the questions contained in the worksheet used are also not suitable for linking predictions with experiments so that questions are needed that can direct students to understand the concepts being taught. In carrying out the experiment, students also experienced problems in understanding the experiment because of the lack of students' knowledge of the tools and materials used and each experimental step listed in the worksheet had not been able to direct students to carry out experiments so students needed learning videos to help carry out the experiment. So that researchers provide an alternative, namely using a link that will be included in the worksheet.

So, based on document review and student observations, students need worksheet which includes the following stages: (1) studying scientific issues; (2) describe scientific phenomena; and (3) using scientific evidence. In the analysis of student needs questionnaires are used to strengthen the results of document reviews and observations of researchers on solutions in the implementation of learning, namely stimulus students to be ready to learn; (2) involve students in learning; and (3) creating a fun learning atmosphere as outlined in worksheet based Lynk to habituate students' scientific literacy. The description of students' responses to science learning uses 4 questions, as described below: In general, students stated that they liked science learning, this was indicated by the response students by 67.27%. However, even though almost half of the students agree that they like science learning, when the learning process takes place, students still feel unmotivated (71.82%) and bored (69.55%). This resulted in 60.91% of students find it difficult to understand science lessons. So overall, students agree that learning science is quite boring and less fun. Whereas science learning should: (1) involve students actively to interact with concrete objects [15]; (2) should emphasize aspects of scientific products, scientific processes, and scientific attitudes in learning management [16]; and (3) directed to inquiry and do so that it can help students to gain a deeper understanding of the natural surroundings [17]. Related to this, to realize science learning, teachers should carry out teaching and learning activities with innovative learning such as inquiry approaches, community science technology, problem solving, and others. This is in line with the results of Uno's research (2011) that how to teach students "and not on "what students learn" [18].

The questionnaire data is supported by the results of in-depth interviews which are described below: several elementary schools in the northern metro city area have used LKPD in several learning materials. As in grade 4, which has used LKPD in theme 2. Grade 4 students have varied responses regarding the worksheet that has been given by educators. Dominant students admit that the use of worksheet can facilitate them in learning activities and habituate students' scientific literacy. In line with expert opinion that the components of the learning process and learning resources in schools to achieve balanced competence between attitudes, knowledge and skills still require content improvement [19]. However, grade 4 students stated that the worksheets given were not interesting. Then, students are also not very familiar with lynk, only some students have heard the term lynk. In grade 5 students, they have used LKPD at the previous grade level, They consider that the provision of worksheet by educators is very helpful for them in learning activities as well as literacy. The design used is also attractive. Grade 5 students are familiar with Lynk, but the intended link is not a website/link site but a link in the form of the address of an internet page. Then, grade 6 students have also used worksheet for some materials. The worksheet design is attractive and can habituate literacy activities, it can also facilitate the learning process. However, grade 6 students are not familiar with lynk and have never used a lynk-based worksheet. Overall, students want lynk-based IPA worksheet to be developed and with a more attractive design. According to educators who teach in grades 4A, 5A, and 6A, the worksheets used are not homemade. The worksheet used is also still textual with a simple design. Elementary school educators in the North Metro area are also very interested in the worksheet development that will be carried out. Educators need worksheet that

can habituate students in an activity to collect information in various ways, be able to convey the results of observations, and find, understand, and apply a concept, and can be a learning guide so that students become more active and skilled. Educators also need worksheet that can help students record information and materials obtained through learning.

B. *Analysis Of The Needs For Lynk-Based Worksheet Development Products Involving Students In Learning*

Furthermore, the results of the questionnaire related to the use of Classroom Learning Media are presented: (1) Teachers use learning media when learning science 78.18% Strongly Agree; (2) The learning media used are Powerpoint and the like 69.55% Agree; (3) Learning media such as PPT and the like used by teachers have not helped you in understanding the material; (4) 9.55% Agree So, based on the analysis of the student needs questionnaire, it was found that 71.43% of students answered Agree the need Development of Student Worksheets based Lynk for practicing scientific literacy, with a validity value of 2.754 in the fairly valid category and the reliability value of Cronbach's alpha count 0.928 so that $r \text{ count} > r \text{ table}$ ($dk \ 112 = 0.2725$) so that the questionnaire needs of students is reliable.

Based on observations made by researchers located at elementary school, researchers obtained observations that according to educators in high grades (Grades 4, 5, and 6) in elementary school, the use of worksheet, especially in elementary science learning content, had not Well done. The reason is that educators feel they do not have more free time to compose or develop worksheet in learning, especially elementary science. Then in terms of students, especially in high grades (Grades 4, 5, and 6) in elementary school, from the results of interviews that researchers did, there were still many students who did not understand what worksheet was. The term worksheet still sounds foreign to students at elementary school because in the learning they do daily it can be said that they rarely or even never use worksheet. The learning carried out is usually only guided by thematic books available at school. During the observations that the researchers conducted at elementary school the researchers only got 1 worksheet, but only limited to simple and not varied worksheet. The use of existing worksheet is also not based on lynk.id. In addition, at elementary school Metro Pusat there are still many students and educators who do not know the term lynk.id, they think that the link in question is a link that is usually shared such as a Youtube link or G-form, in learning also students are usually not allowed to use smartphones. The existence of research carried out in the form of developing lynk.id-based worksheet is very necessary to support learning in schools to be better and develop again. The development of link.id-based worksheet will certainly facilitate learning and can be accessed wherever and whenever according to the will of the wearer but still needs supervision from adults because this worksheet based lynk is accessed using a smartphone/laptop, and indeed at elementary school Metro The student center is not allowed to bring smartphones except during certain circumstances. From what we have obtained during field observations, we have determined that we will design a project in grade 5 with our chosen KD, namely: 3.3 Explaining the digestive organs and their functions in animals and humans and how to maintain the health of human digestive organs; 4.3 Presenting work (eg posters, models, or role plays) on the concept

of digestive organs and functions in animals or humans. With the development of lynk.id-based worksheet in terms of KD, it is hoped that it will make it easier for students to understand the material, because by using lynk.id the material can be accessed again and there is no time limit. Students can review at home what they have learned at school so that learning can seem more practical and of course very easy for students.

In terms of the students themselves, there are still many who don't know what a lynk is, and what a lynk-based worksheet is. The Lynk they know is a YouTube link or an official link to an online learning site from the Ministry of Education and Culture. Meanwhile, lynk itself through the lynk.id website is a mobile webpage creation platform that we can use to share content, not only social media, content creators, media liaisons for people who have business ownership of products, services, to webinars, but can also be used for other platforms, namely as learning guidance tailored to existing needs. One example of a teacher at elementary school Metro Barat asked: "Is the use of lynk-based worksheet effective if you exclude the use of notebooks when learning is no longer online because it is digital-based while students are prohibited from bringing gadgets?".

C. Worksheet Based Lynk Needs Analysis That Can Create A Pleasant Learning Atmosphere

The description of student responses regarding the worksheet applied in the classroom was explored using 3 questions in the questionnaire, as described below: It is seen that the teacher has used teaching materials in the form of worksheet during the learning process. This is indicated by the response of students of 79.09%. However, 61.36% of students agree that the use of worksheet provided by the teacher still does not help students understand the material both in terms of concepts and process skills of students. Because the worksheet used in class is only in the form of steps and questions that must be answered by students without making students think about the problems in the concept of the material to be taught so that students only glance at getting the material without going further. This is in line with Sulistyorini's opinion that the worksheet used in schools generally only contains a list of questions in essay form and students are assigned to answer them [19]. There is no literacy and problem-solving process so that it has not encouraged the growth of critical thinking in students. One of the factors that affect students' scientific literacy skills is critical thinking skills [20]. The main goal is the result and teachers have an important role in growing students' scientific literacy skills [21].

The questionnaire data is supported by observations in elementary schools in the East Metro area that in the current era of the industrial revolution 4.0 where there are demands for us as the next generation, especially prospective educators, to be able to utilize and develop learning components by integrating certain technology-based disciplines. Updates and technological sophistication that continue to develop encourage us as educators to continue to learn and innovate in creating media and teaching materials in learning. Mastery of teachers in understanding the teaching materials that will be used is very influential for the achievement of learning objectives. The existence of interesting teaching materials for students if not coupled with mastery of their use, will reduce the quality and effectiveness of the media and teaching materials in the learning process. The existence of mastery in applying teaching materials can support the process of

implementing the transfer of knowledge by teachers to students optimally. However, it is quite unfortunate that not all educators can maximize the use of technology as supporting teaching materials so that there are still schools that are left behind. Based on research data regarding the understanding of worksheet for teachers and students in elementary school in the East Metro city area, it is known that the understanding of digital-based media and teaching materials is quite good, but the understanding of teachers and students regarding digital-based worksheet in schools is quite lacking, some of the students at the school already know the worksheet but, in its application, it has not been implemented.

Learning the interaction of teachers with students, namely the development and mastery of scientific attitudes and science process skills. It can be said that the learning process focuses on providing direct experience and the application of the nature of science. The following describes the responses of students to the use of worksheet in class with details: in the science learning process the teacher always provides teaching materials to students 85.45%; Strongly Agree The teaching materials provided are in the form of student worksheets 79.09% Strongly Agree The student worksheets provided by the teacher have not helped students to understand the material 61.36% Agree this data is in line with the results of Gandasari's research (2019) that worksheet are teaching materials prepared by educators to support and assist the implementation of learning either individually or in groups in constructing students' own knowledge [22, 23]. With the creation of the worksheet, students are expected to be able to carry out learning activities and express creative ideas either individually or in groups, can think critically and establish good cooperation with group members [24]. LKPD will provide visualization in the material being studied (Sari & Susilowibowo, 2022) not only that, but worksheet can also be used to assist teachers in facilitating students to detect student concepts through their own activities [25, 26].

The application of scientific literacy in schools is not easy but teachers need to habituate the application of scientific literacy by stimulating students to think critically, applying learning methods/models that are suitable for science learning and teaching science not only as concepts. Related to this, based on the questionnaire distributed, the following data were obtained: (1) 78.18% and 69.55% agreed with the response. However, even though it has shown variations in the use of learning media in science learning, it turns out that 59.55% of students think that the media has not helped students understand the material or display students' process skills. The description of students' responses to the needs of the lynk-based worksheet is 75.91%. In addition, students also need the latest learning media that can support this worksheet based Lynk to show its usefulness by using augmented reality media which is highly approved by students (81.36%). This data is reinforced by the results of in-depth interviews with the following results: science learning with the 2013 curriculum has been carried out smoothly but there are still obstacles in it related to the existence of student worksheets based on the 2013 curriculum. Emerging today, with the background of the educators in this school being many senior teachers, they have difficulty adapting to science and technology, especially to develop the worksheet itself to make it look attractive and can habituate students in finding and developing process skills. In fact, not infrequently there are educators who do not make worksheet at all, they only use thematic printed book guides

from the Ministry of Education and Culture, or they directly download the ones that are already on Google.

Based on the results of observations and interviews that we conducted at elementary schools in the Metro city area, it is necessary to develop a better worksheet, worksheet that can habituate students to be more active and enthusiastic in learning, while the expected worksheet is worksheet that is able to become a learning guide. Students, practicum instructions and become reinforcement in understanding learning materials and worksheet which can practice information gathering activities through experiments, reading, or direct interviews with resource persons. Where, the above is in accordance with the basic competencies in science learning. In line with the results of Prastowo's research (2011) that the objectives of the worksheet are (1) to help students find a concept; (2) help students apply and integrate various concepts that have been found; (3) as a learning guide; (4) as reinforcement; (5) as a practical guide [4].

5 Conclusion

Based on the results of the research, it reveals fact that: (1) students feel bored and unmotivated in the learning process which implies to the lack of students' scientific literacy skills (2) the previous worksheets, learning models, and learning media have no potential in maximized students' scientific literacy skills. Based on the research finding, it is necessary to develop a worksheet based Lynk to habituate students' scientific literacy skills. The worksheet based Lynk that was developed makes students easier to understand the material, can be accessed without time limits, can repeat learning at home, learning is more practical, and makes it easier for students.

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