

**DEVELOPING LEARNING TOOLS (LKPD) FCAPILLARITY MATERIAL
BASED ON THE CONTEXT OF BIOACTIVATOR IN PEANUT PLANTING
MEDIA TO IMPROVE STUDENTS' SCIENTIFIC LITERACY**

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Abstrak

This research aims to develop a Student Worksheet (LKPD) based on capillarity material by utilizing the context of bioactivators in peanut planting media, with a focus on increasing students' scientific literacy. Capillarity material is a relevant topic in science learning, and the use of bioactivators in the context of peanut farming provides real relevance to students' daily lives. The research method used is Research and Development (R&D) with stages of development, validation and limited trials. Data was collected through observation, interviews, and students' scientific literacy tests. The research results show that the LKPD developed has a high level of quality, complies with scientific literacy guidelines, and is able to increase students' understanding of the concept of capillarity. This research makes an important contribution to the development of science teaching materials that are more contextual and relevant to students' daily lives. In addition, increasing students' scientific literacy is also expected to help them develop critical and analytical thinking skills that are important in the world of modern science.

Keywords: Development of LKPD, Capillarity Material, Bioactivator Context, Peanut Planting Media, Increasing Scientific Literacy.

INTRODUCTION

The progress of science and technology is directly proportional to human progress. Humans who are literate in science and technology will be able to make the right scientific decisions or answers to a problem (Solomon, et al., 2020). The Indonesian government therefore carried out revisions in the education sector by changing the 2006 KTSP curriculum to 2013. The implementation of the 2013 curriculum is expected to improve the quality of human resources through a scientific approach, namely Basic Competencies (KD) divided into 4 groups including: 1) KD 1 spiritual attitude, 2) KD 2 social attitudes, 3) KD 3 knowledge, and 4) KD 4 skills. Basic competency knowledge and skills in each subject in the curriculum must be achieved by students through the learning process. One of these subjects is Physics..

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Based on PISA (Program for International Student Assessment) in 2018, which is a three-year international student assessment program by the OECD (Organization for Economic Co-operation and Development), Indonesian students' reading ability scored 371 from the OECD global average score of 487. or 72nd out of 78 countries participating in PISA 2018. In 2016, the Ministry of Education and Culture carried out the National Literacy Movement (GLN) together with related parties, trying to foster a culture of literacy in Indonesian society. At the 2015 World Economic Forum, six main types of literacy were determined that are important for students, parents and society. One of them is scientific literacy. Scientific literacy skills are scientific insights and abilities to identify questions, capture new insights, describe scientific events, give conclusions according to facts, understand the character of science, be aware that science and technology build the natural, intellectual and cultural environment, and are willing to care and participate in science insight issues.

A desire to understand student achievement in Indonesia compared to international standards and other countries facing similar challenges. This understanding will be utilized to recognize aspects related to student achievement and effectively improve it. PISA can help Indonesia describe population characteristics as a whole, which is useful for making policies that are more targeted and effective (Creswell & Poth, 2016). The 2018 PISA results provide data and evidence that can be used as a reference for policy makers in deciding how to improve the quality of the education system in Indonesia, and ultimately guarantee inclusive and equal education, and promote lifelong education for all. In this way, students can acquire the skills needed to achieve success in the future as stipulated in the fourth goal of the SDGs (United Nations, 2017b). The results of the 2018 PISA study released by the OECD show that Indonesian students' reading ability achieved an average score of 371, with the OECD average score being 487.

Then for mathematics the average score reached 379 with an OECD average score of 487. Furthermore, for science, the average score for Indonesian students reached 389 with an OECD average score of 489. In PISA 2018, the scientific literacy skills of students in Indonesia got a score of 396 and placed Indonesia in 70th place out of 78 participating countries. Based on the OECD, scientific literacy is divided into four aspects that are interconnected with each other, namely: (1) Context aspects (personal, national and global); (2) Aspects of scientific knowledge (knowledge of nature and technology, knowledge of how knowledge can be produced, and understanding the basics of using scientific procedures); (3) Competency aspect (explaining natural phenomena scientifically, evaluating and designing scientific investigations, and proving and interpreting data scientifically) and (4) attitude aspect (interest in science and technology, respecting the scientific approach to investigation, and caring about environmental issues). Physics is a branch of science. Physics is an important subject area because physics develops with advances in science and technology. Physics learning develops curiosity through discovery of direct experience through scientific work utilizing facts, building concepts, principles, theories and scientific methodology. Through learning

physics, students can develop thinking abilities to solve problems in everyday life (Aripin et al., 2021)

Physics is often considered difficult because the learning process is not linked to everyday life, so students do not understand the material presented. Ideally studying physics does not just involve learning combinations of various mathematical equations, but also understanding and appreciating natural phenomena. One related natural phenomenon is capillarity. Capillarity is a material that has many applications in everyday life. One of the physics lessons for class VIII semester 2 which is related to capillarity material is contained in Basic Competency (KD) 3.8 Explaining the pressure of substances and its application in everyday life, including blood pressure, osmosis and capillarity of transport tissue in plants, 4.8 Presenting experimental data for investigates liquid pressure at a certain depth, buoyancy force, and capillarity, for example in plant stems. In accordance with the two KD demands, the indicators of explaining and investigating which require scientific literacy skills, students are required to have scientific literacy skills to investigate a problem.

Facing the demands of the 21st century and the era of revolution 4.0, LKPD (Learner Worksheets) are needed. LKPD (Student Worksheet) Development according to Law of the Republic of Indonesia Number 18 of 2002, namely: Development is a science and technology activity which aims to utilize scientific principles and theories that have been proven to be true to improve the function, benefits and applications of science and existing technologies, or generating new technologies. Learning that stimulates students' scientific literacy abilities to explain and investigate complex physics learning. Based on the opinions above, the definition of development is the process of making a product or developing an existing product scientifically in regular stages, then conducting a feasibility test on the product through a series of validity tests by experts so that it becomes a product that is valuable in use, effective, real and can be used. fulfill the shortcomings of similar products that have existed before. With the existence of LKPD (Learner Worksheets), it is hoped that learning will be focused and create students with scientific literacy skills.

Physics learning on capillarity material can be done by connecting the concepts you have with the phenomena being studied. This relationship occurs because of the similarity of substance, this shows the logical meaning between the concept and its application. Information that is logical and has meaning for students is more meaningful than information learned by rote (Ulandari & Mitarlis, 2021). A learning process that optimizes application in everyday life will produce meaningfulness.

The meaningfulness of physics learning can be optimized if students have good literacy skills (Rakhmawan et al., 2015). Scientific literacy is the ability to use scientific knowledge and processes, identify questions, explain phenomena, and draw conclusions based on scientific data and facts (Mijaya et al., 2019). Scientific literacy has four domains, namely context, knowledge, competence and attitude domains. The competency domain contains three abilities, namely explaining scientific phenomena, evaluating,

designing scientific investigations, and interpreting data and evidence scientifically (OECD, 2016). Scientific literacy has several important aspects, namely the scientific process, understanding, knowledge of science, as well as the development of scientific behavior with existing science learning in Indonesia that still needs improvement.

The low level of scientific literacy is due to two factors, including: 1) conventional science learning and low scientific reading and writing skills, 2) students are not used to working on test questions and scientific literacy-oriented teaching materials (Macharia, 2018). One way to improve this is by developing teaching materials in the form of LKPD to increase scientific literacy. LKPD is a form of teaching material that functions as a guide that makes teaching and learning activities easier. LKPD is a teaching material that provides various assignments that are relevant to the material being taught, so that its use can help to achieve learning objectives (Mustofa et al., 2013).

LKPD contains a set of learning activities to maximize students' understanding by being given scientific problems and steps to solve these problems. Worksheets can increase students' interest and interest in learning (Depdiknas, 2008). Difficulty learning Physics can be reduced if students can carry out experiments directly through LKPD. LKPD is a student worksheet which will later be used as a guide for students to carry out experiments. The scientific approach is a learning model that uses scientific principles which includes a series of data collection activities through observation, questioning, experimentation, processing information or data, then communicating (Kemendikbud, 2014). The learning process using a scientific approach is directed so that students are able to formulate problems (by asking lots of questions), not just solving problems by answering only.

The learning process is expected to be directed at training analytical thinking (students are taught how to make decisions) rather than mechanistic thinking (routinely just listening and memorizing (s Chrysti, 2014). Scientific literacy-oriented worksheets are used to train students in solving problems and making sound decisions. can improve the quality of life based on scientific knowledge. The LKPD contains physics content combined with context in everyday life. By using the LKPD, tasks related to field activities, both experiments and observations, can be accommodated and synchronized with available learning resource. (ANGGARA, n.d.). Student Worksheets (LKPD) contain a practicum that must be carried out by students.

Practical activities in the laboratory cannot be separated from the use of natural ingredients using peanut growing media with the addition of bioactivators. The bioactivators used are EM4, yakult and pond water. Food plants that can be used as planting media are peanuts. Peanut plants are plants that have many functions. Peanuts are also very important to develop, because in terms of productivity, peanuts cultivated in Indonesia are still low (Apriliani, 2023).

Peanut production per hectare is still not optimal, so efforts need to be made to optimize peanut production. Efforts to optimize peanut production are influenced by the availability of quality seeds.

Developing Learning Tools (LKPD) fCapillarity Material Based on the Context of Bioactivator in Peanut Planting Media to Improve Students' Scientific Literacy

The high demand for peanut seeds cannot be balanced with the ability to produce peanut seeds, so the development of the peanut seed production business still has potential to be developed. The relatively stable price of peanut seeds is one of the advantages in the peanut seed production business. Several efforts that can be made in cultivation techniques for peanut production are the use of superior seeds and fertilization. Solid fertilizer for peanut plants can be provided through the use of various types of fertilizer including the use of organic and inorganic fertilizers.

Organic materials are materials derived from plant and animal remains, such as manure, compost, straw and other materials which can play a role in improving the physical, chemical and biological properties of soil. One of the important ways of farming management to increase soil fertility is through the use of organic fertilizer, namely bokashi fertilizer and goat manure. The benefits of bokashi fertilizer to increase and maintain the stability of agricultural production, especially food crops, require the application of technology that is cheap and easy for farmers. The use of EM4 fertilizer is an alternative that can be applied to agriculture today. The bokashi fertilizer used is rice husks, EM4, yakult and pond water.

The results of fermentation using EM-4 technology can be used to fertilize the soil and suppress the growth of pathogens in the soil, so that the effect can increase plant growth and production. For farmers who demand practical fertilizer use, bokashi is an organic fertilizer that can be made in a few days and is ready to use in a short time. The benefits of goat manure are to 1) reduce the amount of livestock waste stored. 2) the smell caused by piles of goat droppings can be reduced. 3) eliminate potential pathogens contained in livestock manure 4) grains that can become weeds die or will not grow. 5) makes it easier to transport and compost can improve the soil. 6) composting livestock manure can release nutrient elements that can be directly utilized by plants. 7) reduces sources of pollution and has economic value. External supporting factors can come from the planting media used and the addition of growth regulators. The planting medium commonly used for planting media is soil (Hidayat et al., 2018).

However, nowadays the use of soil as a planting medium has begun to be replaced by other planting media that are easily obtained. Sand media is an inorganic media that is often used as an alternative planting medium to replace the function of soil. Other media such as savanna have begun to be widely used because they are considered more practical and able to maintain the humidity of the media. The use of growth regulators is also needed to support the success of cuttings. There are 2 types of growth regulators, namely natural and synthetic.

The natural growth regulator that can be used is coconut water and the synthetic growth regulator that can be used is Rootone-F. Market demand for peanut plants is also increasing. According to Seprita and Surtinah (2012), factors that can stimulate farmers to develop food crop businesses are increasing demand and high prices. To meet market needs, farmers tend to still use inorganic fertilizers. Organic farming is attracting a lot of

attention to change the old lifestyle of using non-natural chemicals in agricultural cultivation into a healthy, environmentally friendly lifestyle.

One step for this is to consume healthy and highly nutritious organic products that can be produced using organic farming methods (Syarifuddin, 2021). Organic vegetables are no exception. The impact of organic products on health is the main motivation for consumers in choosing organic products (Huber et al, 2011). Organic plant cultivation is not only limited to eliminating the use of synthetic materials, but also requires that the land used is not polluted and has good and sustainable accessibility. Providing organic fertilizer into the soil can improve the soil's physical, chemical and biological properties (Juarsah, 2016).

Organic fertilizer functions to minimize the residual effects caused by inorganic fertilizers and is able to add macro and micro nutrients and improve the chemical, biological and physical properties of the soil. Organic fertilizer can come from weathering of plant, animal and human remains (Lingga et al, 2006). One source of organic fertilizer comes from goat manure. Goat manure is relatively easy to obtain as the main source of nutrients in organic cultivation. The need for manure is very large because of its low nutrient content. Goat manure contains nutrients of 0.70% N, 0.40% P₂₀₅, 0.25% K₂₀, C/N 20-25 and organic materials (Sinuraya & Melati, 2019).

The application of the bioactivator context can be realized by developing LKPD based on the bioactivator context with a scientific approach. Research related to the development of capillary material LKPD based on the context of bioactivator for peanut planting media as a suitable science teaching material for student learning activities and is expected to be able to increase students' scientific literacy. LKPD acts as a scaffold which is used to assist learning activities in the environment outside the classroom (non-formal environment), by determining assignments on specific objects so that students can focus on the material at hand. being studied and learning objectives can be achieved. Prastowo (2011) describes the function of LKPD in learning, into four points, namely: (1) Teaching materials that make it easier to interact with the material provided, (2) Presenting tasks that improve mastery of the material, (3) Train independent learning, (4) Make it easier for educators to give assignments. Nyamupangedengu & Lelliot (2012) stated that the purpose of using LKPD is to support learning activities, especially in environmental observation activities.

Based on observations, it was found at SMP Negeri 4 Bengkulu City, which is one of the schools that is quite safe, comfortable and conducive, far from busy centers, thus allowing students to study in peace. SMP Negeri 4 Kota Bengkulu is a National Standard School (SSN) and is one of the favorite schools and is the choice of the community to entrust the guidance of their sons and daughters to SMP Negeri 4 Kota Bengkulu. The students come from various different backgrounds, both in terms of socio-economics, academic achievement and living far apart, which will shape the students' individual character. In terms of academic achievement, in 2008 it was ranked 1st in Bengkulu City and Bengkulu Province. The highest NEM was achieved by students of SMP Negeri 4 Bengkulu.

Developing Learning Tools (LKPD) fCapillarity Material Based on the Context of Bioactivator in Peanut Planting Media to Improve Students' Scientific Literacy

Various achievements in academic and non-academic fields have been achieved by Bengkulu City State Junior High School 4, which was founded in April 1979. Until its development, this school was one of the favorite schools in Bengkulu City and has become an Adiwiyata school at both city and national levels in 2013. This kind of situation can be seen in students' attitudes when they take part in teaching and learning activities, students who have a high individualistic nature will socialize less with other students. Physics learning at SMP Negeri 4 Bengkulu has been maximized by utilizing the laboratory. Physics learning at SMP Negeri 4 Bengkulu has been maximized by utilizing the laboratory.

For second semester class VIII physics material includes: pressure of substances, sub-chapters regarding capillarity, vibrations, waves and sound and light. One subject is limited to 40 minutes, so in one day students study 240 minutes. One hour of study because science, including physics, has quite extensive material and must be supported by quite a lot of practical material. As for the minimum learning completeness for science, physics in class VIII, second semester, the minimum criteria (KKM) is 75. Most of the students of SMP Negeri 4 class VIII are as many as 75% use textbooks from the government and the remaining 25% use LKPD as study material for doing assignments and exercises.

RESEARCH METHODS

The type of research used is Research and Development (R & D) research and development. The Research and Development research used refers to the Thiagarajan, Semmel and Semmel (1974) model, namely the 4-D Research and Development model (four D model) which consists of 4 stages, including: defining, designing, development (develop) and disseminate. The research design used in this research is a 4-D model development research design (Four D Models) according to Thiagarajani, Semmel and Semmel (1974). This research was carried out in 4 stages, namely defining, designing and developing and disseminating.

This research was carried out at SMP Negeri 4 Bengkulu City on 4 April - 23 April 2022 even semester 2022 and the soil pH test was carried out at the FKIP Soil Laboratory of Bengkulu University and the SMP Negeri 4 Bengkulu Laboratory. Implementation of the developed learning LKPD and its instruments was implemented at SMP Negeri 4 Bengkulu City class VIII Semester II (two).

This study used a research design in the form of images consisting of 6 treatments for each planting medium in the control class and experimental class. Each treatment consisted of 36 polybags for 1 plant. In this way, there are peanut seeds planted in polybags.

The data in this research is primary data collected using scientific literacy test questions. This test uses adoption questions that have been developed by previous researchers with a total of 15 questions with validity and reliability values.

The presentation of quantitative data in the form of knowledge learning results from students' scientific literacy abilities is in the form of students' knowledge tests which are analyzed by determining the mean and mean. The t-test statistical technique requires prerequisites to be met, namely normality and homogeneity.

RESULTS AND DISCUSSION

A. Stage *Define*

Stage First *define* done with method descriptive Which useful for analyzing needs in the learning process as well as collecting various information related to the product to be developed. This stage is carried out through pre-research activities and looking for reference sources. This stage contains several steps, namely time triangulation of data about students' initial knowledge, triangulation of data sources about the use of teaching materials, data about harvest area, production, productivity of peanut plants based on the context of bioactivators for peanut planting media. For increase literacy science student And Data about linkages KD with the development of LKPD in learning material capillarity. Stage analysis knowledge beginning with triangulation time documentation of values (list of values) for data from three repetition periods. Time triangulation aims For see how much big knowledge beginning Which owned learners.

From results triangulation time obtained average completeness Study it's quite good even in some ways times experienced improvement, 90% of students Which get mark on KKM For pretest And 50 % not enough More students get scores above the KKM, from the results of students' learning completeness it can be seen that the learning results are not in accordance with the competency demands of 21st century education and the 4.0 era where students have scientific literacy abilities. So it is very necessary to provide stimulating teaching materials ability literacy science participant educate Which later expected to have an impact on ability results Study knowledge, skills And attitudes towards literacy indicators science. The analysis stage of the use of teaching materials is carried out by triangulating data sources, namely interviews with school principals, teachers and students to find out whether the teaching materials used by teachers are in accordance with the demands. century 21st And era 4.0. Analysis Which obtained from results interview material teach Which used Teacher on material capillarity, only using only packaged teaching materials and LKPD (student worksheet) from the publisher, some of the teaching materials used are not yet integrated with scientific facts related to students' scientific literacy, the teaching materials used a number of Not yet stimulating ability literacy science participant educate for finish question ability literacy science, Because limitations time and lack of motivation that students have in carrying out the learning process. Teacher Already use LKPD learning Which effective and efficient, the evaluation used has aimed at students' scientific literacy abilities.

With these conditions, it meets the learning criteria for the demands of the 21st century and the 4.0 era which demands students' scientific literacy abilities. Based on this information, it indicates the importance of developing learning LKPD based

on a scientific approach with scientific literacy indicators, it is hoped that students will have an impact on their own ability in science literacy. After the material analysis, the researcher conducted data analysis about wide harvest, production and productivity of peanut plants based on the context of bioactivators in planting media in peanut land. For the increase in science literacy for students, this study aims to develop learning material for teachers, namely LKPD learning chapter on pressure in substances liquid which is integrated on everyday scientific events or phenomena, namely capillarity that will be made as material for IPA especially Physics that is material on capillarity.

Data on harvested area, production, productivity of peanut plants based on source body statistical center for 2011-2022. So by collecting data on harvest area, production, and productivity of peanut plants, literature studies can be found. Data collection stage regarding the relationship between KD and the context of bioactivators for peanut planting media, development of LKPD in learning capillarity material by analyzing syllabus documentation, basic competencies and chapters on pressure in liquids with the scientific phenomenon of capillarity which occurs in plant stems through the manure composting process. The results of the analysis showed that the context of bioactivators in the planting media in peanut land on chapter pressure on substance liquid relate with capillarity material. After analyzing the relationship between KD, syllabus, which is related to the phenomenon of capillarity science, the researcher carried out indicator analysis learning which is done for setting objective learning. Based on the *definition* needs analysis with the collection of data obtained, this was done above to face the demands of scientific literacy in the 21st century and era 4.0. It is very important that learning LKPD is needed which is expected to have an impact on the scientific literacy abilities of students.

B. Level Design

1. Design Level

design stage, the researcher creates a design for the science worksheet on the physics of capillarity in stems of peanut plants through process composting fertilizer pen andam and husks without bioactivator treatment (control class) and yakult bioactivator treatment, EM4, pond water (experimental class) and measuring capillarity in peanut plants. How capillarity works in peanut plants. In peanut plants, the water in the stem part will be higher than the water in the soil. In liquids, the molecules can experience adhesion and cohesion forces. The cohesive force is the attraction between molecules in a liquid of the same type, while the adhesion force is the attraction between molecules in a liquid of different types, namely natural materials that have undergone a composting and fermentation process over time. 3 weeks in the form of liquid (liquid) in the container where the liquid is located.

If adhesion is greater than cohesion, such as in water with the surface of the measuring cup, the water will interact strongly with the surface of the measuring cup so that the water wets the glass in the measuring cup and also the top surface of the liquid will be curved (concave). This situation can cause the fluid to curve (concave).

This situation can cause the liquid to rise upwards due to surface tension in an upward direction until the equilibrium limit of the upward force with the gravity of the liquid resulting from composting manure and husks during fermentation and after fermentation is reached. So, water can rise upwards in a small pipe (drop pipette) which is usually called a capillary pipe. So, capillarity is very dependent on cohesion and adhesion.

Water rises in capillary tubes due to adhesion while mercury falls in capillary tubes due to cohesion. This is what happens during the transportation process in peanut plants. This peanut plant uses capillary action to carry water to the roots and up to the stem in the form of a (solid) plant stalk. This attraction is used to help force water from the soil and spread throughout the peanut plant. There are three forces involved with the capillarity process. 1) Adhesion is the process of attaching one thing to another thing. For peanut plants, adhesion allows water to stick to the organic tissue of peanut plants.

Cohesion keeps molecules of the same substance together. For peanut plants, cohesion holds water molecules together. 3) Surface tension is the tensile effect between molecules that causes the liquid resulting from the composting of manure and husks that have been given pond water bioactivator, Em4 and yakult (experimental class) and without bioactivator (control class) to form a top or outer layer that behaves like some kind of thin film. Surface tension is responsible for the shape of water drops and for holding the structure together when peanut plants absorb water. Wood vessels (xylem) as a result of the adhesion force between the walls of the wood vessels and water molecules resulting from composting andam and husks during and after fermentation, while the *design* stage consists of two stages. The first stage done measurement plant use analysis data _percentage of plant growth.

The results of this data are used to measure plant growth starting from root length, number of root branches, plant height, stem base diameter and number of leaves. Data Analysis of Plant Growth Percentage This used For measure growth plant start from root length, quantity branch root, tall plant, diameter base stem, amount leaves .

2. LKPD Design

Stage *design* (design) LKPD that is researcher make design LKPD capillarity physics based on context bioactivator media plant peanut land indicators of scientific literacy with a scientific and *research approach*. LKPD design includes test preparation, format selection, and initial design. Test compiler in the form of a rubric question with indicator literacy science And *research*, Compiler test form question rubric with a scientific and *research approach* so that later students will have scientific literacy skills related to the scientific phenomenon of capillarity based on the context of bioactivators in peanut planting media. Once done compiler test researcher do activity election format Which in accordance with the material learning capillarity, And researcher designing fill LKPD such as suitability material with KI, KD And indicators, design *layouts* , Picture And that writing there is in in LKPD physics capillarity based on context bioactivator for peanut planting media. Then, an

initial design was carried out in the form of a capillarity physics worksheet based on the context of bioactivators for peanut planting media Which arranged researcher Then given sraan by Lecturer mentor before the activity production.

In the capillarity physics LKPD based on the context of bioactivators in bean growing media land Which developed load title LKPD indicator literacy science with a scientific approach. The image on the cover represents the data obtained to explain capillarity material, which stimulates the ability to analyze a problem in the scientific phenomenon of capillarity through the process of composting manure and husks. Fertilizer image pen And incident capillarity in University Bengkulu stimulates 1) Getting to know various types of fertilizer and the properties of fertilizer, testing fermentation of manure composting and measuring the capillarity of manure composting and husk

a. Instructions for use LKPD

Instructions for using LKPD which contains procedures for using LKPD correct, so that when using the LKPD it is hoped that it will be able to complete test questions included in the scientific literacy indicators with a scientific approach

- Base Theory

LKPD physics capillarity based on context bioactivator media plant The peanuts developed contain knowledge concepts to stimulate students' scientific literacy with a scientific approach. In the chapter description of pressure of substances and its application in everyday life to materials capillarity.

- Literacy Line-up Question Practice science

Capillarity physics worksheet based on the context of bioactivators in bean growing media land Which developed load exercise question Which based scientific literacy. Question Which in the LKPD arranged customized with steps from scientific literacy indicators with approaches scientific.

- Evaluation

Evaluation in LKPD can measure the extent of scientific literacy abilities participant educate Which nature literacy science with approach scientific students have in the form of results and discussion of the experiments carried out.

- Glossary

The capillarity physics LKPD is based on the context of bioactivator for peanut planting media based on scientific literacy with a scientific approach developed containing a glossary which aims to explain foreign terms contained in the LKPD.

- List References

This LKPD contains a bibliography containing references used in its preparation LKPD physics capillarity based on context bioactivator growing media peanut land based literacy science with approach scientific .

2. Instrument Design

The instrument created is a test of scientific literacy skills in the form of an essay totaling 15 questions, each question has 5 indicators of scientific literacy. 2 indicators of scientific literacy in the context aspect include (1) understanding nature (2) interpreting experiences in context personal, social And global And 3 indicator

literacy science competency/process aspects include 1) Identifying scientific questions 2) Explaining phenomena scientifically 3) Using scientific evidence and teacher and participant response questionnaires educate.

c. Stage Develop

Stage develop is stage development, on stage This, design beginning LKPD and instruments done by validation by Lecturer expert material And expert media towards LKPD learning.

1. Validation Product

a. Validator assessment results Material

Validation material used For give evaluation to Developed LKPD. Data collection for material validation is collecting data and information from material experts, after assessing and drawing conclusions. The instrument used to validate the material is in the form of questionnaire using a Likert scale.

2. Test Reliability

Reliability shows an understanding that something is an instrument can trusted For used as tool data collector Because instrument That Already considered Good. (Winarni, 2019). The reliability test for these statement items is measured through coefficients (Cronbach alpha). The calculation results are then compared with the r table . An item will be said to be reliable if the coefficient value is greater than the r table value with a significance level of 5% and the r table calculation criteria is $df=n-32$, then it is obtained mark r table = 0.349.

a. Difficulty Level Question

Difficulty level analysis is intended to find out what the question is classified easy, medium And hard. Level difficulty is A number that indicates how difficult or easy a problem is. In the Pretest Question difficulty test And Posttest on study can We Look on table 4.14 And table 4.15

b. Differentiating Power Question

Power differentiator question is ability something question For differentiate between students with high abilities and students with abilities low. Matter This can shared with Test Differentiator Question Pretest and Posttest in this study with results in table 4.30 and table 4.31

d. Dessiminate Stage

The Dessiminate stage is the dissemination stage . at this stage, LKPD products and research instruments, manure fermentation products andam and husk has in spread to teachers IPA And student JUNIOR HIGH SCHOOL Country 4 Bengkulu City at the moment study.

1. Scale Product Trials limited

Test try product scale limited done after test try expert And test Try students for the test question instrument. The limited scale trial aims to describe students' scientific literacy abilities educate And describe practicality LKPD Which developed based on response Teacher And participant educate. Test try scale limited done in Laboratory JUNIOR HIGH SCHOOL Country 4 City Bengkulu, as much 32 person learners.

2. Description of participants' scientific literacy abilities educate

Test try scale limited done For describe students' scientific literacy abilities. Before implementing the physics LKPD, a pretest is carried out first. This pretest was carried out to determine the increase in the application of the Capillarity Physics LKPD based on the context of bioactivators in peanut planting media by comparing it with the results of the posttest given at the end of the lesson. Test this out done during research. Learning activities were carried out in the laboratory of SMP Negeri 4 Bengkulu City.

Students carry out practical work directly in groups. The practicum group is divided into six groups. Each group consists of five to six students. The practicum began by testing andam and husk using natural ingredients using the bioactivator Yakult, EM4 and water pool. After That in a way gradually, each group present the results of their respective work. Group presentations were carried out in stages, due to time constraints and lack of student motivation product LKPD Physics capillarity based on context developed peanut growing media bioactivator.

Students present the results of their group work in groups and several groups present the results of their group work through their respective group representatives. Students study the LKPD in a way gradually start from before practice started until the end of the research is complete. The results of the fermentation of manure and husks were stored for 3 weeks in the laboratory. Then students are guided through the process of planting bean seeds land. The planted peanuts are grown for 3 weeks.

Every week done process fertilization with use fertilizer bokashi. This bokashi fertilizer is obtained directly online. At the end of plant research peanut land the given fertilizer pen andam And husk fermentation results during 3 Sunday. Process fertilization on plant peanut Soil treatment was carried out by comparing the treatment of giving Andam manure and fermented husks and 9 grams of bokashi fertilizer/plant. Capillarity Physics LKPD product based on the context of bioactivator for peanut planting media which was developed with the aim of develop students' scientific literacy skills . Product development is measured based on pretest and posttest assessments by counting And analyze results Study participant educate through literacy skills science participant educate use question ability literacy science.

The scientific literacy ability measured is fifteen questions and each question consists of two indicators, namely (1) Understanding nature and (2) Interpreting experiences in personal, social and global contexts.

Based on the results of the pre-test and post-test, the following is an example of research results that show that when giving the pre-test, students' scores were with a total of 90 and 85. The students' pre-test scores increased. After learning using the Capillarity Physics LKPD based on context bioactivator media plant peanut land, mark posttest students experienced a decline whole.

Matter This because on moment knowledge posttest at the end learning learners Enough low Because learning during This Not yet apply LKPD related to the context of bioactivators for peanut planting media and the lack of student motivation in improving learning outcomes. As in the following LKPD, learning activities are presented about science events in pictures 4.36 incident capillarity on plant through process composting your manure and husk.

Mari Memahami Masalah (Mengidentifikasi pertanyaan ilmiah)

Jika demikian, bagaimana dengan pergerakan air di dalam tubuh pohon yang tinggi? Sebagaimana kita ketahui, pohon-pohon yang tinggi pun mampu menyerap air dan mendistribusikannya hingga ke daun pucuk. Dengan melihat fenomena tersebut, maka kapilaritas saja dipandang tidak cukup untuk menaikkan air hingga puncak pohon yang tinggi sehingga kapilaritas hanya memiliki kontribusi yang kecil dalam proses pergerakan air dalam sistem tumbuhan. Ada faktor lain selain kapilaritas yang dapat mendukung pergerakan air di dalam tubuh tumbuhan.

With the above stimulus, students can analyze events capillarity on process composting fertilizer pen andam and husks. However For identify question scientific Still Not yet appropriate. So, we can see the capillarity event, after learning with the capillarity physics worksheet based on context bioactivator media plant peanut land participant educate part Already can complete LKPD with scientific literacy indicators for competency/process aspects according to the approach scientific.

Table 4.42 Recapitulation of Pretest and Posttest Score Results

Scientific literacy indicators	<i>P</i> <i>retest</i>	<i>P</i> <i>osttest</i>	N <i>gain</i>	Inter <i>pretation</i>
Understanding nature	0	4	1	Very high
Making sense of experiences in personal, social and global contexts.	1 00	5 8.5	1	Very high
Average	8 5.77	7 8.35	1	Very high

From table 4.42 presented above, it can be seen that there has been an increase in ability literacy science participant educate with approach scientific after learning is carried out with LKPD physics capillarity based on context bioactivator peanut planting medium. An illustration of the increase in students' scientific literacy skills can be seen in the picture 4.43

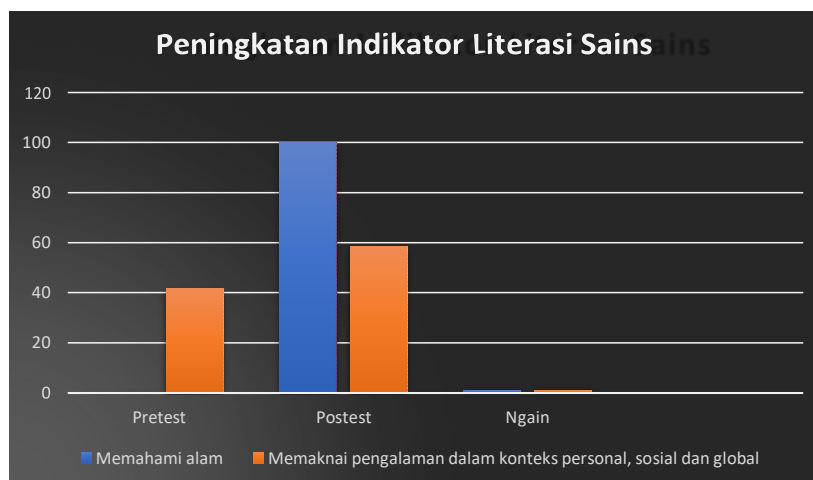


Figure 4.43 Increase in Scientific Literacy Indicators

Based on from data Which served Picture 4.43 show that there is an increase in each indicator of students' scientific literacy abilities. As a result, students' scientific literacy abilities before implementing the capillarity physics LKPD were based on context bioactivator media plant peanut land seen from two gaining indicators average as big as 85.77 including in category tall whereas The average posttest score is 78.35 which is in the quite good category. From data the obtained results analysis enhancement literacy science with average equal to 1 in the very high category. Increasing students' scientific literacy abilities understand natural And interpret experience in context personal, social and global Wrong One factor Which caused ol e h phenomenon Which familiar known students, which makes them interested in learning. If learning is oriented with wisdom local increasingly convey impression contextual so that students are simpler in interpreting the lessons they are studying (Azizahwati et al, 2015).

The posttest was carried out after implementing the LKPD in learning. Previously the LKPD had been validated for its intended use obtain information consisting of criticism and suggestions regarding the LKPD created. Based on the validation of the LKPD carried out by experts, it was found that the capillarity physics LKPD based on the context of the peanut growing media bioactivator that was developed was very worthy used. Results *posttest* after use LKPD learning capillarity physics based on the context of bioactivators in peanut planting media, the results obtained on ability literacy science experience enhancement (N gain) with the average of 1 criterion is very high. Indicators of scientific literacy using a scientific approach enhancement with category very tall on indicator understand nature and interpreting experiences in personal, social and contexts global.

3. Practicality LKPD

The practicality of the LKPD can be seen from the responses given by teachers and students after using the Physics of Capillarity LKPD based on the context of media bioactivators. plant peanut land.

The teacher's response is useful for providing assessments and suggestions for the Capillarity Physics LKPD based on peanut planting medium bioactivators in order to improve the product being developed and determine the practicality of the LKPD. Teacher give response positive to interest LKPD And material Which There is in LKPD, LKPD interest in teacher responses received a positive response with a percentage of 100% and 100% material with very practical criteria. LKPD Physics of capillarity based on the context of the bioactivator for peanut growing media being developed including in criteria very practical with average 100%. From The results of the teacher's response show that the Capillarity Physics LKPD is based on context bioactivator media plant peanut land very practical used. The students' responses were given in all aspects positive response with an average percentage of 99% with very practical criteria without any suggestions for improvement, the participants gave positive responses educate.

LKPD physics capillarity based on context bioactivator media plant peanuts from response Teacher And participant educate Which found, can concluded practical to use. Indicators of interest in the module and material, teachers and students get positive responses with practical criteria because the LKPD is based on capillarity physics context bioactivator media plant peanut land its use easy to understand. The physics of capillarity worksheet is based on the context of the bioactivator for peanut planting media which was developed and is easy to use in learning. Serve fact scientific about capillarity on composting manure andam And husk Which interesting For read, practice And adding insight participant educate about knowledge incident science capillarity on plants through composting fertilizer pen andam And husk, process planting peanuts And support participant educate For own ability literacy science with approach scientific. Material Which served in LKPD delivery Also in accordance with the learning objectives and indicators, delivery of Capillarity Physics LKPD material based on the context of related peanut planting medium bioactivators with fact phenomenon science in life daily can encourage students to have scientific literacy skills with a scientific approach and there is an evaluation which aims to test how far students understand about material capillarity based on context bioactivator media plant peanuts.

4. Advantages and disadvantages Product

Excess LKPD physics capillarity based on context bioactivator peanut planting media that has been developed with the results of an assessment by material expert validators, namely 100% with very feasible criteria and media experts 100% with very feasible criteria, the average feasibility of the capillarity physics LKPD based on the context of bioactivators for peanut planting media is 100% with very suitable criteria for use. The results of the teacher and student responses were positive. The capillarity physics LKPD was based on the context of the bioactivator as a peanut planting medium which was very practical to use. This was seen by the teacher's response with a percentage of 100% and the

students' positive response was that students received very practical criteria because the capillarity physics LKPD was based on context. bioactivator for peanut planting media because its use is easy to understand by studying it first. Capillarity physics worksheet based on context bioactivator media plant peanut land Which developed easy to be used in learning according to the steps contained in the LKPD. Presents scientific facts about capillarity in composting manure and husks which are interesting to read, practice and increase students' insight into knowledge of capillarity science events in plants through composting manure and husks, the process of planting peanuts and supporting students to have scientific literacy skills with a scientific approach

The delivery of the material presented in the LKPD is also in accordance with the objectives And indicator learning, delivery material LKPD Physics capillarity based on the bioactivator context of peanut planting media which is related to the facts of scientific phenomena in everyday life can encourage participants educate own ability literacy science with approach scientific and there are evaluation Which aim For test how much Far understanding students about capillarity material based on the context of bioactivators in peanut planting media land. Besides That LKPD physics capillarity based on context media bioactivator plant peanut land Which stimulating For practice participant educate have the ability literacy science with approach scientific material capillarity. However , the capillarity physics worksheet is based on the context of media bioactivators plant peanut land have weakness from facet its implementation which is less effective when learning because of the lack of motivation of students towards the LKPD product being developed. Independence and lack of time discipline cause students to be undisciplined and delay carrying out evaluations. It is best to carry out implementation in stages And group so that participant educate more motivated And No delaying time. Apart from the busy study hours of students outside of the research hours being carried out.

Apart from that, giving scores to scientific literacy indicators using a scientific approach refers to the literature and the scoring is different, because the indicators or stages of scientific literacy abilities using a scientific approach are at the level of analysis. vary.

CONCLUSION

The conclusion from this research and development is that the effect of bioactivators on the quality of fermented manure, husks and andam, husks + andam as a growing medium for peanuts is:

a). C/N ratio	30 – 40
b). Particle Size	20

c). Aeration (Posirity) and material water content (moisture)	2.5-7.5 cm and 50 – 60 %
d). Porosity	Easy to absorb water
e). Humidity (<i>Moisturecontent</i>)	50 – 60 %
f). Temperature	70 ⁰ C
g). Degree of Acidity (pH)	Manure composting undergoes a PH increasing process using natural ingredients. To measure the degree of acidity (PH) a PH meter is used.
h) Nutrient Content	N, P , K, although the percentage is small and contains other compounds that are beneficial for plants.

Characteristics LKPD physics capillarity based on context media bioactivator plant peanut land Which developed with indicator scientific literacy, scientific approach and *research* , including mission, theoretical competence base, activity base, source material, And character assessment.

The LKPD developed is very suitable for use, this is proven based on validator assessments, material validators have an average of 100% very feasible criteria, media validation is 100% very suitable for use. used.

Scientific literacy skills with a scientific approach increased after do learning use LKPD physics capillarity based on the bioactivator context, this is related to the very high N gain = 1 . Enhancement highest There is on indicator literacy science understand nature and interpret experiences in personal, social and global contexts with N gain = 1 very tall.

The practicality of the capillarity physics worksheet based on the context of bioactivators for peanut planting media can be seen from the teacher's response and the student's response with a percentage of 100%, very good criteria and the positive response of students with a percentage of 98.5%, very good criteria. Motivation of students towards science subjects with percentage 90 % And material IPA with percentage 88.78 % with criteria Very good.

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