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The Level Of Effectiveness Of Student Books Using The Problem Based Learning Model To Improve 21st Century Skill

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Abstract—The 21st century is said to be the century of the development of science and technology in order to survive, it is necessary to improve the quality of human resources who can keep up with these developments. Improving the quality of human resources plays an important role in 21st century education. Education in the 21st century is defined by various demands for skills known as the 4Cs (collaboration, communication, creative thinking, critical thinking). The learning process refers to problems that are closely related to the concept of Physics subjects. Physics is a branch of science that discusses phenomena and phenomena that occur in the universe. Physics also examines a field of science that plays an important role in the development of science and technology. In addition, learning Physics includes aspects of knowledge, attitudes, and skills. Learning physics is more demanded as an active learning resource. One source of learning is student books. The student books needed are very important in an effort to achieve the objectives of learning Physics carried out by students. This type of research is research and development. This study aims to see the effectiveness of student books with the Problem Based Learning (PBL) model to improve 21st century skills on temperature and heat materials for students of SMAN 3 Lengayang class XI.MIPA1. Effectiveness data obtained from students in the form of essay test questions. The research subjects were students of class XI.MIPA1 with a total of 35 people. The research instrument includes essay test questions. Effectiveness data analysis technique using descriptive percentage. The average N-Gain value obtained is 66% in the medium category.

Keywords — Effectiveness, Student's Book, Problem Based Learning (PBL) Model, 21st Century Skills.

I. INTRODUCTION

The 21st century is said to be the century of the development of science and technology in order to survive, it is necessary to improve the quality of human resources who can keep up with these developments. Improving the quality of human resources plays an important role in 21st century education. Education in the 21st century is defined by various demands for skills known as The 4C (communication, collaboration, critical thinking, and creativity). This is in line with the opinion of the expert (Anggraini 2016) who stated that "21st century learning can require students to have competencies in the form of problem solving, communication, collaboration, and critical thinking skills". This demand is very important through skills in the 21st century which is certainly a challenge for the government and society in Indonesia. Various efforts have been made by the government in order to improve the quality of education in accordance with the demands of the 21st century, namely implementing the 2013 curriculum. can see the reality of the problems in education today. In the 2013 curriculum, there was an improvement in the student center learning mindset which was previously a teacher center. Student center learning is learning that is initially one-way in nature, changed to become more interactive, and learning that was originally abstract is then encouraged to follow the context

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of the real world. In addition, the government also compiles, among others, what is realized through the regulation of the minister of education and culture on national education standards.

National education standards are minimum national criteria regarding the education system in all jurisdictions of the Unitary State of the Republic of Indonesia. These standards consist of 8 standards, namely: content standards, process standards, graduate competency standards, educators and education personnel standards, facilities and infrastructure standards, management standards, financing standards and education standards. One of the standards set forth in Permendikbud No. 8 of 2016 concerning the standard of facilities and infrastructure. The standard of facilities and infrastructure regulates the types of learning resources used in schools. One of them is a student book. A student book is a book that contains subject matter in the form of concepts and understanding that students will construct through the problems contained in the book, Nahel (2012). In connection with this understanding, the student book is a guide book containing Physics subject matter or basic concepts that are summarized. Student books can be used in the learning process, especially in mastering the concept of Physics. In addition, student books also have goals that can be achieved as learning demands for students.

Teaching materials are a source of information in the form of tools, texts needed by teachers as infrastructure to be used in planning, studying the implementation of Physics learning. Explanation of teaching materials according to expert opinion Maryani (2012) suggests that teaching materials are a set of materials that are systematically arranged both written and unwritten so that it is necessary to create an atmosphere that allows students to learn. One of the teaching materials in question is a student book.

The student book aims to support student learning activities in the classroom. Hobri (2010) stated that "student books needed are very important in an effort to achieve the expected learning objectives". Students are expected to be able to carry out the objectives and learning process in accordance with the demands of the standard properly. Student books can be used as a means of support for smooth learning activities in the classroom and at home. One of the advantages of student books is that they can be used as a source of information in learning Physics. The student book aims to improve student competence covering aspects of knowledge, attitudes and skills (Prastowo, 2013). Student books designed in accordance with the 2013 curriculum and national standards are listed in Permendikbud No 22 regarding process standards. The learning process in educational units is held interactively, inspiring, fun, challenging, motivating students to participate actively, innovatively, creatively, and independently. In general, the standard process requires learning according to the 2013 curriculum. The learning process refers to problems that are closely related to the concept of Physics subjects.

Physics is a branch of science that discusses phenomena and phenomena that occur in the universe. Physics also examines a field of science that plays an important role in the development of science and technology. As students are able to have the ability to reason in solving physics problems. Students have the ability to think more actively in the field of Physics. Physics is also a basic science for engineering and other applied knowledge. Sujarwanto, 2014) suggests that students learn physics concepts, it is hoped that students will not only master these concepts but students can apply them and use the relationship between one concept and another in various situations and different problems. According to (Polya, 1973) also suggests that the ability to solve problems consists of four steps, namely understanding the problem, planning a solution, solving the problem, and checking again. In addition, learning is a complex aspect of human activity, which cannot be fully explained. In a complex sense, where learning has the essence of learning through the conscious effort of a teacher to teach students so that they can direct them to achieve the expected learning goals. Effective learning cannot be separated from the role of an effective teacher, effective learning conditions, student involvement and supportive learning resources. Effective learning conditions must include three main factors, namely: the existence of learning motivation, learning objectives, and learning suitability. The criteria for learning effectiveness are not only on the achievement of learning outcomes but also on the overall learning activities. namely the input and output that can be used as a benchmark in a learning. A learning activity can be said to be effective if it gives results in accordance with the criteria that have been planned. Physics learning includes aspects of knowledge, attitudes, and skills. Learning Physics is more demanded as an active learning resource. Therefore, students need to be expected to interpret Physics learning in accordance with the rules that have been set. However, learning Physics cannot be separated from mastering concepts, applying them in solving Physics problems, and working scientifically. According to expert opinion (Hoellwarth et al, 2005; Aji et al, 2016). argued that "Physics learning in today's classrooms tends to emphasize mastery of concepts and overrides students' physics problem solving abilities".

The fact found in the field of Physics learning is that the results of the first semester students' daily tests for the 2020/2021 Academic Year are still found to be complete below the Minimum Criteria (KKM) which is still low. This can be seen in Table 1.

Table 1. Daily Test Results of Semester I Students for the 2020/2021 Academic Year.

School name	The number of students		Test Results (Presentation)	
	Complete	Not Complete	Complete	Not Complete
SMAN 1 Lengayang	14	21	40	60
SMAN 2 Lengayang	7	28	20	80
SMAN 3 Lengayang	9	26	26	74
Average			**29**	**71**

Based on Table 1, it can be seen that the results of observations at the SMAN schools that have been carried out, problems can be found from the results of students' daily tests that are not complete. It is found that the average percentage of incomplete test results is 71%. These results have not reached the Minimum Completeness Criteria (KKM) of 80.

This is because in the three schools the use of student books is not in accordance with a more focused learning model and books are found to be conventional, not varying or applying the learning model. Permendikbud Number 22 of 2016 states that the core activities in the learning process must use a learning model. The learning model is a plan or pattern that is used as a guide in implementing learning in the classroom, (Trianto, 2015). The learning model that is suitable to be used to solve problems is the Problem Based Learning (PBL) model. Arends (2013) argues that PBL is a learning model that trains students to work on authentic, student-centered problems. The PBL model is also said to be a learning model that emphasizes problem solving through systematic steps. The purpose of the PBL model (Trianto, 2010) suggests that PBL is to help students develop thinking skills and problem solving skills, learn authentic adult roles and become independent learners. The syntax of the PBL learning model is orientation, organizing students to learn, helping independent and group investigations, developing and presenting work, as well as analyzing and evaluating problem solving processes (Arends, 2012). The learning model involves students actively in problem solving covering aspects of knowledge, attitudes, and skills.

Based on these problems, the author raises the title of carrying out the effectiveness of student books with the Problem Based Learning (PBL) model to improve 21st century skills. This study aims to see the level of effectiveness of student books with the model. problem based learning to improve 21st century skills on temperature and heat material for XI.MIPA1 class SMAN students.

II. METHODS

The type of research conducted is research and development. The results or products that will be produced are in the form of an effective student book. The development of research and development as a research activity that begins with research and continues with development. Research activities are carried out to obtain data or information needed for product trials and for starting materials, while development is carried out to produce student books.

The 4-D development model is one of the physics learning development models. This model was developed by Sivasailam Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel in 1974. The subject of the questionnaire observation was taken from 3 schools in Pesisir Selatan district, namely SMAN 1 Lengayang, SMAN 2 Lengayang and SMAN 3 Lengayang. The students who were taken for observation were students of SMAN 3 Lengayang class XI. MIPA. The subject of the product trial was SMAN 3 Lengayang with the selected class being class XI MIPA1 with a total of 35 students. The effectiveness instrument consists of a knowledge assessment sheet. This is also related to cognitive assessment, it can be seen from the students' cognitive test scores, namely cognitive learning outcomes, the product effectiveness sheet used an essay test sheet carried out through an initial test (pre-test) and a final test (post-test). Hal ini dapat dilihat pada Tabel 2.

Table 2. Criteria for N-Gain Value.

N-Gain	Criteria
	Tall
<g>> 70 %	
30 % ≤ <g> ≤ 70 %	Currently
<g>< 30 %	
	Law

(Source: Hake, 1999:1)

Based on Table 2. above, it is explained that the criteria for a good N-gain value have moderate to high criteria, while for low criteria it means that the level of effectiveness is low or not effective for use. The effectiveness of student books can meet several effective criteria, namely student books are in the medium to high category.

III. Result And Discussion

The analysis of 21st century skills is carried out by looking at students' ability in problem solving, analyzing temperature and heat material so that the level of students' critical thinking, creative, collaborative and communication skills will be seen in learning. Students' critical and creative thinking skills can be seen by giving pretest and posttest questions to students. Meanwhile, students' ability to collaborate and communicate can be seen when they participate in the Physics learning process, such as when studying independently and studying in groups. The average results of the analysis of 21st century skills, such as: critical thinking skills, creative thinking, collaboration and student communication can be seen in Table 3.

Table 3. Average 21st Century Skills.

No	Meeting	Creative Thinking	Critical thinking	Collaboration	Communication
1.	Meeting I	64,85	62	69	64, 66
2.	Meeting II	79,14	82,12	84, 75	81, 33
3.	Meeting III	92	90, 37	87, 5	91, 16
	Total average	79	78	80	79

Based on Table 3. The average 21st century skills can be seen that the results of the average value of aspects of critical thinking skills assessment are 78, the results of the average value aspects of creative thinking skills assessment are 79, the results of the average value aspects of collaboration skills assessment are 80 , the result of the average value aspect of communication skills assessment is 79. In conclusion, to see it more clearly, the average 21st century skills can be seen from Figure 1.

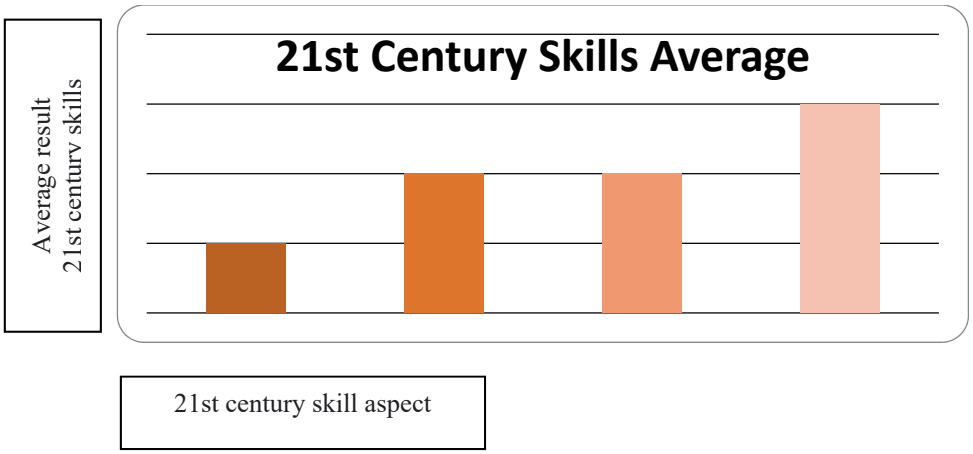

Figure 1. Average of each 21st century skill set.

In Figure 1. The average 21st century skills can be seen that the results of the average value of aspects of critical thinking skills assessment are 78, the results of the average value aspects of creative thinking skills assessment are 79, the results of the average value aspects of collaboration skills assessment are 80 , the result of the average value aspect of communication skills assessment is 79. Even though the KKM at school is 80, it means that it is still below the KKM limit.

Students' ability to collaborate and communicate can be seen in terms of student learning activities, both individual learning, group learning, and question and answer sessions. From interviews obtained with teachers, there are still many students who find it difficult to collaborate and communicate well in learning, in general, only students who are active have high abilities, others are still low. The effectiveness of this product can be seen from the results of the students' pretest and posttest in accordance with using valid questions. The results of the final test scores can be seen in Table 4.

Table 4. Final Test Results.

Class	Complete	Not complete	N-Gain Score	Description
XI MIPA 1	89, 2%	87,17 %	66 %	Currently

Based on Table 4. It can be seen in the final test results of 89.2%. Students who take the test will take this final test. Therefore, the N-Gain value obtained from the final test is 66%.

IV. CONCLUSION

The results of the research on the effectiveness of students' books using the Problem Based Learning (PBL) model to improve the 21st century skills of SMAN 3 lengayang class XI students are categorized as effective. The assessment of the effectiveness of the student's book was carried out by respondents with effective results. This proves and it can be concluded that the level of effectiveness of students' books using problem based learning models to improve 21st century skills on temperature and heat materials for students of SMAN 3 Lengayang class XI.MIPA1 can be declared effective.

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