Analysis of contextual-based physics textbook development on static fluid materials for 21st century skills learning

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Abstract: The curriculum education 2013 requires all subjects that contribute to the assessment of attitudes, knowledge and skills. One the subjects in the high school that contributes to this is learning physics, as the concept expected in 21st century skills learning. 21st century skills learning is learning that integrates literacy skills, knowledge skills, skills and attitudes as well as mastery of technology. The preliminary study is to analyze the development of physics textbooks with the theme of static fluids using a contextual-based model on 21st century skills learning, which is used to spur students to find and apply various learning concepts, especially learning 21st century skills based on contextual on static fluid material for 21st century skills learning. So that we can see the learning outcomes from the analysis of the contextual-based physics textbook development. The method used is development (Research and Development R & D). Research and Development is a research method used to produce products and test the effectiveness of these products. The product produced and tested is a contextual-based student textbook with static fluid material to improve 21st century skills learning. Analysis of teaching materials can be in the form of textbooks used by students so that learning has increased considerably.

1. Introduction

The virtue of learning the development of 21st century skills provides changes in human life. The 21st century requires everyone to have various skills to be able compete in the face of the changing times that are increasingly fast. The 21st century demands that learning can produce students who have various skills to become successful students in life. The main goal of the 21st century is to develop students' abilities and support their development to become more independent in facing the times. So that students must be creative, think critically, be able to solve problems, make decisions, communicate, collaborate and work in teams. The demands for these skills can be fulfilled if the implementation of education prepares students to master the various skills needed. This indicates that education has an important role in preparing for the progress of the nation in the present and future.

Education is a process of learning activities where there are various elements of education to achieve the goals of national education. The aim of national education is one of the main factors in determining the quality of a nation. So it is necessary to do a renewal in improving the quality of national education.

The national education system is of high quality, one of the determining factors in the success of educating the nation's life. Formal education is one of the organizers of achieving success in educating the nation's life in the provision of education. In formal education such as Senior High School (SMA),...
the implementation of this education cannot be separated from the educational goals to be achieved [1]. These educational goals will certainly be achieved if there is success in the world of education. This is because the goals of education are a benchmark for success in facing the challenges of 21st century skills.

Learning physics in the 21st century is a learning that integrates several abilities such as literacy, knowledge, skills and attitudes as well as mastery of technology. To face learning in the 21st century, everyone must have critical thinking skills, literacy skills, information literacy, media literacy and master information and communication technology. This is in accordance with the existing demands of the 2013 Curriculum, where the 2013 Curriculum requires all subjects to contribute to the formation of attitudes, knowledge, skills for students. The current curriculum is the 2013 revised 2017 curriculum which aims to shape the character, competence and literacy of students. In the era of the industrial revolution 4.0, it was not enough with old literacy, namely the ability to read, write and count. This, the teaching material is one of the supports in helping the learning process in class.

The teaching material is used in schools as a tool for educators to create an atmosphere for learning physics to be more effective and efficient. This is because teaching materials are a place for educators to deliver teaching materials. Teaching materials can also arouse desire and motivation and increase interest in learning so as to spur students in the learning process. According to defines a textbook as a written work in the form of a book in a particular field, is a standard book used by teachers and students in the learning process for instructional purposes and purposes. State that textbooks are printed learning media that can be used to make it easier for educators and students to improve their competency [2].

Static fluid matter is a science that studies substances flowing in stationary conditions, especially liquids and gases, which is one of the materials in the subject of physics in which each indicator has a relationship in everyday life [3]. The application of the application of this static fluid material is very suitable in contextual learning, so that the material is very important to be taught optimally so that students can find out the application of everyday life from the theory [5].

CTL is a learning concept where the teacher presents the real world into the classroom and encourages students to make connections between their knowledge and its application in their daily lives [6]. Defines CTL as a comprehensive system. CTL consists of interconnected parts, if these parts are interwoven with each other, it will produce an effect that exceeds the results given the parts separately. [7]. Based on the description above, the CTL approach makes students learn more meaningful, interesting, fun, and can apply what they learn in everyday life. So this CTL needs to be applied in schools [9]. States that the Contextual Teaching and Learning (CTL) system is an educational process that aims to help students see meaning in the work material they are learning by connecting with the context of their daily lives [10].

The reason for the need to apply contextual learning based on the definition of Physics is the study of natural phenomena so that contextual learning is very suitable in Physics subjects because contextual learning is a learning concept that helps teachers relate the material being taught to real-world situations and can encourage students to make connections between The knowledge that is owned and its application in real situations, namely in everyday life, the understanding of physics concepts that involve active student involvement both physically and mentally will get student learning outcomes.

In fact, based on an interview with a physics teacher at SMA Negeri 1 Lengayang, that during the learning process in class, the teacher uses an old revised textbook, namely: the 2016 revision of Kanginan margins. The textbooks used by the teacher are still simple, so the textbooks that are applied do not meet the character of 21st century education. Where education in the 21st century students are able to apply 21st century skills, namely 4C skills. 4C skills include critical skills, creative skills, collaboration skills and communication skills. Textbooks that are used by teachers during the learning process have not been able to help teachers in achieving learning objectives. But in reality, textbooks were found to be unable to encourage students to learn as expected, namely student-centered learning so that it can improve student learning outcomes by learning independently, in groups and being able
to conduct class discussions. Students have difficulty solving the physics problems contained in the
textbook. Because the formulas and examples of questions in the textbook are too difficult for students
to understand, so they affect student learning outcomes. Physics learning that is carried out is
generally less related to the real nature of students, so it is less interesting and boring, because teachers
are generally less able to analyze the application of student physics concepts in real life students [11].
But in reality, teachers still use textbooks during the learning process to implement more effective
learning so that learning objectives can be implemented properly [12].

Another thing, the teacher conducts LKPD during the learning process. The LKPD used by the
teacher in the classroom is the LKPD that is made by the teacher. The LKPD used by the teacher
contains the material title, KD, indicators, learning objectives, material summaries and questions that
students must do. But in reality the LKPD used by teachers in the classroom cannot improve student
learning outcomes so that learning objectives are not achieved. The purpose of learning is to determine
the analysis of the development of contextual-based Physics textbooks on static fluid material for 21st
century skills learning. [13]. To be able to see learning outcomes from the analysis of contextual-based
Physics textbook development for 21st century skills learning. [14]

Based on the background described above, it appears how important it is to apply contextual-based
teaching materials that are developed in solving student learning problems. The hope is that with this
contextual-based textbook, the student's physics learning outcomes will increase, so that the solution
can be applied, namely the analysis of contextual-based physics textbook development on static fluid
material for 21st century skills learning.

2. Research Methods
This research is a descriptive research. Descriptive research is a form of research aimed at describing
existing phenomena, both natural phenomena and man-made phenomena. Descriptive research can
produce a description of the phenomenon under study, describe the processes that occur and present
various important information about these variables. The population of this study were all students of
SMA Negeri 1 Lengayang. This type of research is development (Research and Development R & D).
Research and Development is a research method used to produce certain products and test the
effectiveness of these products. The product that is produced and tested is a contextual-based student
textbook to improve 21st century skills. Sampling was carried out using a non-probability sampling
technique, namely accidental sampling, where subjects are those encountered and in accordance with
the criteria for the research objectives. The research sample was students of class XI SMA Negeri 1
Lengayang. The data used in this study are primary data, namely data obtained through a
questionnaire. Then the questionnaire was used to analyze the teacher's assessment. The data analysis
technique used a Likert scale. Where the measured variables will be broken down into sub-variables
and finally in the form of several positive statements and negative questions starting from very good,
good, sufficient and less. So that the results of the questionnaire obtained can be calculated by
calculating the score given by the respondent and using the Likert scale criteria. The object of this
research is a contextual-based textbook to improve critical thinking skills on static fluid material in
class XI semester I. The basic competencies used consisted of 1 KD, namely KD 3.3 Applying the law
of static fluids in everyday life. The textbooks used in this research were designed and validated by
experts consisting of two physics lecturers.

3. Results and Discussion
The research aims to determine the effectiveness of contextual-based physics textbooks on static fluid
material. The dependent variable in this study consisted of students' abilities in the cognitive realm as
seen from the assessment based on the learning outcomes of class XI students and affective, attitude
and psychomotor assessments. After being applied, the contextual-based Physics textbook students
easily understand between theory and its application in the daily life of students. Contextual-based
Physics textbook results can change the child's mindset that Physics is not only a formula that is
learned but Physics also has a lot to do with the real life of students and Physics will not be separated
from everyday life that it is very clear from the definition of Physics is a science that studies about phenomena of nature.

The results obtained from the instruments that have been developed are:

3.1. Analysis of Graduate Competency Standards

Competency Standards for graduates of physics learning are qualifications of graduate abilities that include assessment of attitudes, knowledge, and skills which students must fulfill. [15] Competency standards of graduates can state that every learning must have competence in 3 domain dimensions, namely: attitude dimensions, knowledge dimensions and skills dimensions. This shows that the analysis of the passing standards is shown in Figure 1 below. [16]

![Graph showing analysis of graduation standards](image)

**Figure 1.** Analysis of graduation standards

In Figure 1, it can be seen that the analysis of passing standards on the attitude dimension has a higher value than the knowledge and skills dimension. This is that the learning process only demands an attitude dimension, resulting in the lack of formation of 21st century learning. So that the highest average value is found in the attitude value of 86.15 while the lowest average value is found in the knowledge value of 74.71.

3.2. Teaching materials used by teachers in schools.

Teaching materials play a role in improving the learning process in the classroom. In order for further learning to be meaningful, learning materials are linked to textbook teaching materials and LKPD. This can be seen in the graph.
In Figure 2, it can be seen that the average teaching material used by the teacher is in the textbook of 85.53. While the average LKPD teaching materials was 77.6. This shows that teachers only dominantly use textbooks and LKPD in schools because other teaching materials such as modules and handouts are not used by teachers in schools because of the lack of time and facilities at school.

3.3. Physics learning outcomes of students at KD 3.3

Based on an interview with a physics teacher at school that the results of student learning physics at KD 3.3 which explain about static fluid material, Bernoulli's law, elasticity, and dynamic fluid can be seen in Figure 3 as follows:

In Figure 3, it can be seen that the average value of the daily test results of students' physics based on KD 3.3 on static fluid material has the highest value of 85.56. The lowest student learning outcomes are in Bernoulli's law with an average daily test score of 74.85. It can be seen that students' learning outcomes based on KD 3.3 have improved.
4. Conclusion

It can be concluded that the analysis of the development of textbooks with static fluid material of 21st century skills so that the analysis of textbook development has 3 (three) aspects carried out in SMA Negeri 1 Lengayang. First, the analysis of the competency standards of graduates shows that the learning process only demands an attitude dimension, which results in the lack of formation of learning in the 21st century. Second, the teaching materials used by teachers in schools. This shows that the teaching materials that can be applied are in textbooks and LKPD. The three learning outcomes are student learning outcomes in KD 3.3 with Static Fluid material. The highest average value is found in the attitude value of 86.15 while the lowest average value is found in the knowledge value of 74.71. The value of daily tests on static fluid material has the highest value of 85.56. The lowest student learning outcomes are in Bernoulli's law with an average daily test score of 74.85. The analysis of teaching materials can be in the form of textbooks used by students so that learning has increased sufficiently.

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