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Preliminary study to develop of instructional media in momentum and impulses using ICT based on contextual learning for senior high school

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Abstract. Physics deals with the various events occurring in nature, whether naturally occurring or due to human engineering. It can be said that the subject of physics study is attached to the context in everyday life and technology. Physical knowledge is built on the results of physicists' inquiry, drawing on existing knowledge, empirical data, mathematical and statistical studies, and utilizing technology. So, physics is the scientific work of physicists. Therefore, physics has three characteristics, namely scientific, contextual, and evolving along with technological advances. Physical learning should go on like a working physicist. In other words, physics learning should be a miniature scientific inquiry. Learning with a scientific approach is also a curriculum mandate that currently applies to high school levels throughout Indonesia. It takes media and teaching materials that facilitate and motivate students to learn by scientific approach. Contextual based learning with a scientific approach will be effective and interesting when utilizing ICT. Observations have been conducted on ten schools in West Sumatera, to find out whether the physics learning on senior high school is going according to the demands and whether media and teaching materials are available according to the learning needs. The result shows that only 52% of scientific activities are conducted in class X and the learning media is only 35%. The media and teaching materials used in current senior high school physics learning are not yet contextually-based and also some are utilizing ICT in a useful way. One of the lesson materials that has not been supported by the media and appropriate teaching materials is momentum and impulse. Therefore, it is necessary to do further research.

1. Introduction

Education plays an important role in efforts to improve the quality of Human Resources (HR). The quality of human resources is expected to follow the development of science and technology. The development of science in the era of globalization requires human resources that are able to compete globally that is human having high skills, critical thinking, systematic, logical, creative, and able to cooperate effectively. Human capital must be enhanced through innovations and lessons tailored to the demands of the times through education both formally and informally.

Education that plays a role in improving the quality of human resources needs to be supported with mastery in technology. Science in Indonesia known as Natural Science (IPA), is the backbone for technological advancement. The development of science shows that IPA plays a very important role in life. The development of science and technology today, increasingly provide reinforcement that IPA can



improve human welfare in various areas of community life, such as health, transportation, telecommunications and education system. IPA as a subject has been introduced to learners since elementary school (SD), and junior high school (SMP and MTs). At the level of Senior High School (SMA) based on the curriculum 2013 IPA learning into the group of IPA interest, which consists of Chemistry, Biology, and Physics.

Physics deals with the various events occurring in nature, whether naturally occurring or due to human engineering. It can be said that the subject of physics study is attached to the context in everyday life and technology. Physical knowledge is built on the results of physicists' inquiry, drawing on existing knowledge, empirical data, mathematical and statistical studies, and utilizing technology. So, physics is the scientific work of physicists. Therefore, physics has three characteristics, namely scientific, contextual, and evolving along with technological advances. Physical learning should go on like a working physicist. In other words, physics learning should be a miniature scientific inquiry. Learning with a scientific approach is also a curriculum mandate that currently applies to high school levels throughout Indonesia.

Technological advances facilitate the formation of creative and innovative elements in physics learning. But whether the current learning media has been in accordance with the needs of learners in supporting the learning of physics? The reality of conditions in the field said other, the lack of empowerment and development of learning media in supporting the implementation of scientific activities with optimal in school resulted in less effective learning and felt monotonous and boring. Observations have been made on eight schools in West Sumatra, to find out whether the physics learning in high school runs in accordance with the demands and whether media and teaching materials are available according to the learning needs. The results show that only 52% of scientific activities are conducted in class X and learning media is only 35%. The media and teaching materials used in high school physics learning are not currently based on context and also some have not used ICT in an optimal way. It takes media and teaching materials that facilitate and motivate students to learn by scientific approach. Contextual based learning with a scientific approach will be effective and interesting when using ICT. One of the lesson material that has not been supported by the media and the right materials is momentum and impulse. Therefore, it is necessary to do further research.

2. Research Method

The type of this research is qualitative descriptive research conducted in June and July 2018. The data of this research are descriptive and qualitative data. Samples were taken from several SMAs in West Sumatra, consisting of SMA N 6 Padang, SMA N 1 Lembah Gumanti, SMA N 1 Lubuk Alung, SMA N 2 Bukit Tinggi, SMA N 1 X Koto, SMA N 1 Lubuk Basung, SMA Pembangunan Laboratorium UNP, SMA N 1 Gunung Talang.

Data collection is an important work in a study. Correct conclusions can only be obtained from correct data collection [2]. Therefore, errors in collecting data will lead to erroneous conclusions. The data collection instruments used in this study consist of questionnaires and observation sheets. The questionnaire sheets are filled by the physics subject teachers at the school. For the observation sheet is done in the physics laboratory filled by the observer to know the development of instructional media conducted by lecturers and students.

3. Result and Discussion

3.1. Result

The development of contextual based media using ICT is done in an effort to overcome the problems found in surveys in several schools in West Sumatra. The results of the analysis obtained through the questionnaire questioned two aspects of learning, namely the implementation of scientific activities demanded by the curriculum and the availability of media, sources and teaching materials on the learning of physics.

Based on surveys conducted in several schools in West Sumatera by providing a questionnaire to physics teachers, indicating that in general schools have provided internet facilities that can be used by teachers and learners in learning. Learners also have learned and quite proficient in information and communication technology. In these schools have also implemented the 2013 curriculum in learning. Teachers in schools are generally certified as professional teachers and most of these schools have computer labs.

From these surveys, some problems were obtained. First, the implementation of scientific activities in the learning process has generally been done. However, the quality of its implementation needs to be improved in accordance with the mandate of the curriculum. Where the percentage obtained from the activities of scientific activity on the learning of physics is 52%.

The second problem obtained when research is the availability of media, sources, and teaching materials that are not optimal to support in the learning process. This can be seen from the percentage of media availability, source, and teaching materials obtained. Where the percentage of learning using appropriate media, resources, and teaching materials is 35%.

3.2. Discussion

To achieve the objectives of learning, it takes several aspects, including teachers, learners, learning models, learning strategies, learning media, learning resources, teaching materials and so on [3]. In accordance with the development of science and technology, some aspects must get renewed and developed well for the creation of human resources ready to compete with the outside world. Surveys have been conducted in some schools by analyzing one of the aspects that influence the achievement of learning objectives, namely learning media.

Heinrich, Molenda, and Russell [4] define media as a means of communication channels. The term media itself comes from the Latin and is the plural of the word “medium” which literally means “intermediary” is the intermediate source of the message (a source) with the receiver of the message (a receiver).

In the learning activities, there is a learning process that is basically a communication process. In the process of communication, the teacher acts as a communicator (communicator) in charge of delivering messages of education (message) to the recipient of the message (communicant) is learners. In order for educational messages submitted by teachers can be well received by learners, then in the process of educational communication is required vehicle sender message called education / learning media.

In this discussion will explain the results achieved in surveys that have been conducted in several schools, constraints and limitations encountered, as well as some alternative solutions to overcome these obstacles and limitations.

Based on the results of surveys on scientific activities that must be done in the process of physics learning and the availability of media, resources, and teaching materials in schools, the percentage of scientific activities obtained from the analysis of the questionnaire indicates that there are still some scientific activities mandated by the curriculum not yet optimal. This is due to some damage to the supporting tools of the implementation of such scientific activities. In addition to damage, scientific activities can not be done properly because the supporting tools are not yet available in schools.

The percentage of media availability, resources, and teaching materials also shows a low number. This is due to the fact that some media are not yet available in schools. Since physics is contextual, then physics must be the subject of study in context-based learning and this is also consistent with the physical characteristics itself. In the results of this survey, some damaged media, not available in schools, may not be presented directly in the classroom, too big and small should get a good solution. With this idea, the authors will develop the necessary physical learning media based on contextual and presented by ICT.

4. Conclusion

Based on surveys conducted, it is found that the implementation of activities has not been optimally implemented in schools and the availability of insufficient media, resources, and teaching materials.

Therefore, it is necessary to develop the necessary physical learning media based on contextual and presented by ICT.

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