Preliminary study to develop of learning media for Newton’s law of gravity using ICT based on contextual teaching and learning for senior high school

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Abstract. Learning of Physics should be a scientific work exercise conducted by students with teacher guidance. Such physics learning requires media and teaching materials that facilitate students to conduct scientific investigations. Besides the study of physics is a variety of events that occur either spontaneously or planned by humans. Because physics is contextual, it should be the subject of study in context-based learning. However, some of these contexts may not be presented directly in the classroom, because some are very fast, too long, or because they are very large or tiny. Therefore, engineering is required through the utilization of ICT. So, the learning media of physics as needed is contextual based and presented by ICT. A survey has been conducted to find out whether the scientific activities in physics learning have been done in accordance with the demands and whether there is available instructional media and teaching materials as per the learning needs for high school physics. The survey results show that only half of the scientific activities required in the curriculum are implemented and only one-third of contextual based learning media and utilize ICT appropriately. One of the lesson material in physics on X grade that do not have media and teaching materials as needed is Newton's law of gravity. 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 (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.

The essence of physics is the science that studies the phenomena through a series of processes known as the scientific process and the results are realized through scientific products that have three important components of universally applicable concepts, principles and theories [1]. Physical knowledge builds on the results of physicist investigations, drawing on existing knowledge, empirical data, mathematical studies and statistics, 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 must go on like a working physicist. In other words, the study of physics should be a miniature scientific investigation. Learning with a scientific approach is also a curriculum mandate that is currently applicable to secondary school level throughout Indonesia.

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. Observations have been made on ten 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 half of the scientific activities required in the curriculum are implemented and only one-third of contextual based learning media and utilize ICT appropriately. One of the lesson material that has not been supported by the media and the right material is the newton law of gravity. 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 are taken from some existing high schools in Sumatera Barat, which consists of SMA N 6 Padang, SMA N 1 Lubuk Alung, SMA N 1 Lembah Gumanti, 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. Discussion
To achieve the objectives of learning then it takes several aspects, including teachers, learners, learning models, learning methods, 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, Melinda, and Russell [3] 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 communication education is required vehicle message called media education / learning.

In this discussion will explain the results achieved in surveys that have been done in several schools, constraints and limitations faced, 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 of these contexts may not be presented directly in the classroom, as some are very fast, too long, or because they are very large or small. Therefore, engineering is required through the utilization of ICT. So, the necessary physical learning media is contextual based 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.

References
[1] Trianto. 2014. Mendesain Model Pembelajaran Inovatif, Progresif, dan Kontekstual : Konsep, Landasan, dan Implementasinya pada Kurikulum 2013 (Kurikulum Tematik Integratif/TKI). Jakarta : PT Kharisma Putra Utama.
[2] Slameto, Wardani, N., S., dan Kristin, F. (2016). Strategi Belajar Mengajar. Jakarta: Rineka Cipta. Meningkatkan Keterampilan Berpikir Aras Tinggi. Prosiding Konser Karya Ilmiah Nasional Vol.2, Agustus 2016. ISSN:2460-5506
[3] Heinich, Molenda, and Russel. 2001. *Instructional Media and Technologies for Learning*. New Jersey: Prentice Hall