Analysis of the competency standard of its graduates for the developing of physics e-book with earthquake theme

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Abstract. The earthquake is one of the disasters that occur in Indonesia. Knowledge about earthquake disasters can be integrated into physics through an e-book with the theme of earthquake disasters. One of the initial analyzes in e-book development is the analysis of graduate competency standards, which is one of the criteria to see student abilities in terms of attitudes, knowledge and skills competencies. The purpose of this study was to analyze the standards of graduates in the development of high school physics e-book on the theme of earthquake disasters. This type of research is a descriptive study with a population of all SMA in the city of Padang. The research instrument was in the form of a questionnaire sheet filled out by educators. The conclusions obtained from this study are the standard analysis of graduates that has been carried out with a competency value of student attitudes of 74.44%, knowledge competence of 56.37% and competency of skills of 67.95%. The results of this analysis can be used as a guide in developing an e-book on earthquake physics. The results of this analysis can serve as a guide in developing an e-book on physics on the theme of earthquake disasters.

1. Introduction

Earthquakes are one of the most frequent disasters in Indonesia. This is due to Indonesia's position which is in a subduction area, namely the meeting of the active Eurasian and Indo-Australian plates [1]. Earthquakes are a great vibration that spreads to the surface of the earth caused by the movement of the earth's plate [2]. An earthquake is one of the natural disasters where the location, time of occurrence and magnitude of the earthquake can not be predicted properly [3]. Some of the effects of earthquakes and their associated hazards, such as tsunamis, land cracks and landslides. Therefore, socialization is needed to the community regarding preparedness in facing earthquake disasters.

One way to provide socialization and knowledge about earthquakes is starting from formal educational institutions. Through disaster education in schools students can understand the actions to be taken before a disaster occurs, when a disaster occurs and after an earthquake occurs [4]. Providing socialization regarding disaster mitigation is very important to reduce the impact of natural disasters, with the aim of reducing the number of victims and reducing losses caused by disasters. Therefore, knowledge about earthquake disasters really needs to be given to students so that students have preparation if one day an earthquake occurs.

The implementation of education on earthquake disaster mitigation into the curriculum is very helpful for increasing the awareness of students about earthquake disasters, so that they are able to take appropriate action when an earthquake occurs. Education about earthquake disaster response in
schools is one of the strategic objectives. Based on Government Regulation Number 32 of 2013 concerning the National Education System, it is clear that educational institutions must have learning materials that contain regional capabilities, local uniqueness, and regional problems [5].

Disaster mitigation in the form of formal education is carried out through disaster education. Disaster education is implemented by integrating disaster material into the subject matter in schools. Subjects that are suitable for integration with earthquake material are Physics subjects. Because physics is a subject that studies natural phenomena and their causes related to everyday life. Meanwhile, an earthquake is a natural phenomenon. So that physics material is suitable to be integrated with earthquake material.

Giving knowledge about earthquake disasters can be given through learning physics. The physics learning process currently uses the 2013 curriculum. In the 2013 curriculum, the resulting learning outcomes are based on three competencies, namely attitude competence, knowledge competency and skills competency. It is hoped that this competency will produce students who have character education, literacy and skills in the 21st century. The skills required in the 21st century are 4c skills. The 4c skills referred to are critical, creative, communicative, and collaborative) [6]. This demand can be fulfilled by following the advancement of science and technology and applying it to the learning process. The use of technology in education is very helpful in the learning process. One of the advantages is that educators and students can obtain information without being limited by time and space. Not only that, the use of technology can help in the problem of tool shortages in the learning process. One of the technologies that can be utilized is the use of ICT in learning media such as the use of electronic books. E-book or electronic book is a book in electronic form. Books generally consist of a collection of paper containing text and images, while e-books contain digital information which can contain text, images, audio, video [7].

Physics learning essentially focuses on an active learning process through learning activities about the natural surroundings. The physics learning process aims to improve students’ scientific skills, critical thinking and scientific attitudes. This goal is in line with the skills demanded in the 21st century. 21st century learning is applied to all physics learning, be it activities in class or during practicum [8]. One of these skills can be fulfilled by developing a physics e-book that is integrated with earthquake disaster materials. Physics e-book on the theme of earthquake disasters must be adjusted to the competency standards of existing graduates.

Graduate competency standards are criteria regarding the qualifications of graduate abilities which include attitude competence, knowledge competency and skills competence [9]. Competency standards of graduates at each level of education are developed to meet the competence demands of the 21st century. So that graduates of education will be able to compete globally and meet local, national and international needs. The qualification standard of graduate competence at each level of education is different. The e-book that is compiled must be in accordance with the applicable graduate competency standards, so that the desired graduate competency standards can be achieved. So it is necessary to do an analysis of the competency standards of student graduates in the development of a physics e-book on the theme of earthquake disasters. Through the analysis of the competency standards of these graduates, the results of which competencies have very high, medium and low scores will be obtained so that they can be a guide in developing a physics e-book on the theme of earthquakes later.

2. Research Method
This research is descriptive research. Descriptive research aims to describe a phenomenon or event [10]. The purpose of this study was to analyze the competency standards of graduate students in developing high school physics e-book on the theme of earthquake disasters. The population used is all SMA in the city of Padang. The sampling technique used was purposive sampling technique. The samples taken were SMAN 12 Padang and SMAN 16 Padang. The research instrument used was in the form of a standard analysis sheet for graduate competencies that was filled out by educators. This analysis sheet contains three main components, namely competence attitudes, knowledge and skills
with a total of 41 statements. The scale on the questionnaire uses a Likert scale which consists of 4 alternative answers. Score 1 if “never”, score 2 if “sometimes”, score 3 if “often” and score 4 if “always”. Next, calculate the total score obtained on each indicator and then convert it into a value ranging from 0-100. Presentation of data in this study is presented in graphical form and analyzed in every aspect. The value for each indicator is determined by the equation below [11].

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Value = \frac{total\_score}{highest\_score} \times 100\%
\]

(1)

3. Result and Discussion

This analysis of graduate competency standards aims to see the competencies that must be achieved by students. There are three competencies that must be achieved in the current 2013 curriculum, namely attitude competence, knowledge competency and skills competency. The results of the analysis of the competency standards of graduates on attitude competence can be seen in Figure 1.

Figure 1. Attitude competence

On the analysis sheet of the graduate competency standards for attitude competence has 14 items. Based on Figure 1 it can be seen that of all the statements that have the maximum weight, namely the first statement, that is, each student shows an attitude of faith in God by earnestly praying the opening of learning. The statement that has the lowest weight is the seventh statement, namely that students do not copy the work of other students. Overall, the average results of the attitude competency analysis have a good score with a score of 74.44%. This is a great start in the learning process. Attitude competence also needs to be improved so that later graduates who have good attitudes can be created.

The second competency is knowledge competency. The results of the analysis for knowledge competencies can be seen in Figure 2.
In the analysis sheet of the graduate competency standards for knowledge competencies, it has four indicators, namely factual, conceptual, procedural and metacognitive with a total of 16 statements. Based on the results of the analysis that has been carried out, the indicator that has the highest value is the second indicator, namely the conceptual part. The indicator that has the lowest value is the third indicator, namely the procedural part. Overall students' knowledge competencies have an average value of 56.37%. Based on the results obtained, the competence of students' knowledge is still low because students still do not understand the concept of physics as a whole. Students still cannot understand the problem solving process with correct scientific steps. Based on the results of this analysis, knowledge competency needs to be improved so that it becomes better.

The third competency is the competence of student skills. The results of the skills competency analysis can be seen in Figure 3.

On the standard analysis sheet of graduate competencies for skills competencies has 11 statement items. Based on the analysis that has been carried out, the fifth indicator has the highest value while the eleventh indicator has the lowest value. Based on the results obtained, the competency skills of
students were 67.95%. From the results obtained that students are still not able to carry out practical activities properly. Students have not been able to prove the phenomena in their environment. Students have not been able to prove the theory they have obtained and cannot explain it well. From this result, the competence of student skills must be improved again.

Every competency in learning is closely related to one another. Competence is the learning result obtained after each learning implementation. In the formulation of the implementation of learning, competence is an essential part and has a very important role. Competence has a function to show the direction of learning. There are three competencies that every student must have, namely attitudes, knowledge and skills. Every student must have good competence to make learning goals. Every competency always develops according to the times.

In the attitude competency in the current 2013 curriculum, students are expected to have attitudes of religiosity, nationalism, independence, mutual cooperation and integrity [12]. Knowledge competencies are divided into four parts, namely factual, conceptual, procedural and metacognitive. Each student is expected to be able to have knowledge competencies and be able to relate them to every field in science, technology, arts, culture, and humanities. Every high school education graduate is expected to be able to have knowledge of physics and be able to understand it well within himself and his environment. In the skill competency, students are expected to be able to have a critical.

The improvement of the three student competencies can improve the quality of education [13]. Increasing the quality of education can create graduates who are skilled and can meet the challenges of the 21st century. One of the demands is that a person must master various skills so that later he will become a successful person in life [14]. Competency standards of graduates must also be flexible to the times. The integration in learning can make the learning process closer to real life and learning fun [15]. Therefore, the competency standards of student graduates must be improved so that the desired goals can be achieved.

Competency standards of graduates are always developing at any time. This development is expected to be able to create students who have good competence so that they can be strong in the current era of globalization. From the results obtained, it can be seen that the competence of students' knowledge is still low. This happens because when the learning process has not been carried out optimally. The factors that cause such as not maximally available teaching materials for students, the implementation of practicum that has not been carried out optimally, and the implementation process which is still teacher-centered.

4. Conclusions
The conclusion obtained from this research is that the competence of attitudes, knowledge and skills of students is still not optimal. This can be seen from the analysis of the competency standards of graduates that have been carried out with the competency value of students' attitudes of 74.44%, knowledge competencies of 56.37% and skill competencies of 67.95%. The results of this analysis can serve as a guide in developing an e-book on physics on the theme of earthquake disasters.

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