Analysis of student response to earthquake disaster in high school physics learning

Fitrah Ayu and Ahmad Fauzi*
Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Negeri Padang, Jl. Prof Hamka, Padang 25131, Indonesia

*ahmadfauzi@fmipa.unp.ac.id

Abstract. Often devastating earthquake struck West Sumatra that have implications for the sustainability of the community. People who do not know the circumstances of how earthquake will aggravate the situation, because the earthquake was a natural disaster but could not be predicted. Communities should be given the socialization and education to reduce the risk caused by the earthquake. Socialization and education about earthquake disaster can be implemented in education institution. The purpose of this study to determine the response of students to the earthquake as the study of the early development of the electronic book. The method used in the study was descriptive method with data collection instruments that is questionnaire learners. The result of questionnaire analysis of students at SMAN 4 Padang obtained information that the interest of students to learn physics, the attention of the students to learn physics, the use of electronic books in the learning process of physics, and leaning through ICT, as well as the responses of learners to disasters earthquake in learning physics is still not optimal. This can be seen from the analysis of the physics learning process questionnaire and student’s response to the earthquake disaster in physics leaning are at simply criteria. Based on the results of questionnaire analysis show that the need to develop an electronic book school physics.

1. Introduction
An earthquake is a disaster that is prone to occur in Indonesia [1]. This is because Indonesia is situated between the Pacific Ring of Fire, Earthquake Belt Line Alpide, as well as on top of several tectonic plates, besides Indonesia has many volcanoes [2]. Earthquakes have occurred in Indonesia as many as 191 times in a span of ten years ie from 2009 to 2019, including as much as thirteen times that earthquakes occurred in West Sumatra [3].

West Sumatra is one of the areas in Indonesia are frequently hit by earthquakes, making an impact on the sustainability of the community. People who do not know how to deal with earthquakes will aggravate the situation, because the earthquake was a natural disaster but can not be predicted [4]. The earthquake struck the city of Padang, West Sumatra on September 30, 2009, which caused many casualties from the debris of the building, even the school building was severely damaged and razed to the ground. Communities should be given the socialization and education continuously to reduce the risk due to the earthquake. Socialization and education about the earthquake can be implemented in the educational institutions of the school.

School is believed to be the right path to an understanding of the earthquake for learners to then grow the responses of learners in the face of an earthquake. This became the reason for an educational campaign on disaster risk and safety in schools coordinated by the ISDR (International Strategy for...
Disaster Reduction) [5]. The main target of this campaign is to integrate education about the risks of natural disasters in the school curriculum in countries prone to natural disasters. Disaster education in schools can help children play an important role in the survival and protection of community members before, during and after an earthquake. Providing education about the risks of natural disasters such as earthquakes into the curriculum, help to foster learner responses in building awareness of the earthquake. Indonesia also has a principle in exercising their curriculum by utilizing the natural conditions, social, and cultural and regional wealth to educational success. Government Regulation No. 32 Year 2013 on National Education System explained that each educational unit provides local content and process of learning about the potential of the region, local uniqueness, and problem areas.

The government is very serious to balance the development of education by revising the old curriculum, and now applies the curriculum of 2013. Successful implementation of the curriculum in 2013 is one of them rely on the enforceability of such educational standards content standards. Government Regulation No. 32 Year 2013 clause 77 B verse 9 states that the structure of the curriculum for secondary education units, one of which is a common charge that represents the potential and uniqueness of the local [6]. So that teachers are given the opportunity to develop learning materials.

Innovative physics learning must keep up with the times. In this 21st century technological advances are developing rapidly so that information can be accessed anytime and anywhere [7]. Educators and students are challenged to be literate about the sophistication of information technology and communication. This 21st century enables information and communication systems to copy the physical world into virtual form. This advantage can be utilized by education to develop electronic books.

Learning material can be poured into teaching materials one electronic book or known electronic book (e-book). Electronic books are teaching materials prepared and developed using ICT porticoed tool to generate information [8]. Given the need for a response to the earthquake learners in high school can be done by implementing the results of the questionnaire analysis into the electronic book with the theme of earthquakes. The purpose of this research is to develop an integrated electronic book physics high school disaster earthquake.

2. Research Method

The method used in this research is descriptive method. Descriptive method is a method used in the collection of data at a scientific background using the scientific method, and conducted by researchers who are interested in a scientific manner. Steps from the descriptive method begins by collecting data, analyzing the data and interpret it [9]. Data collection instrument in this study the questionnaire learners. Learners Questionnaire is closed questionnaire whose answers have been provided. The aim of this questionnaire learners to see the learning process of students of Physics and response to the earthquake in learning physics.

This research has been conducted in SMAN 4 Padang in June 2019. All of the students in class X MIPA is the population in this study consists of six classes. Learners class X MIPA 5 of 34 people is a sample is taken using purposive random sampling technique. Data analysis techniques in this study divided into two namely engineering techniques qualitative and quantitative data analysis. Questionnaire learners used consisted of four criteria based on modified Likert scale of Riduwan ie, strongly agree, agree, disagree, and disagree is qualitative data [10]. Then the results of these criteria is converted into quantitative data. The students questionnaire to see the physics learning process consists of four indicator namely the students interest to study physics, the attention of students to study physics, the use of electronic book in the physics learning process, and the learning process through ICT which is elaborated into seventeen questions, while to see student response to earthquake disaster in physics learning consist of three indicators namely the response of students before, during, and after an earthquake which is elaborated into fifteen questions.

Data analysis is the process of learning physics and the response of the students to the earthquake in physics learning is done in several steps that determine the highest score, determine the total score of each learner by summing all the scores obtained from each indicator, determining the value of a questionnaire with following ways:
Next determine the criteria, the criteria for the value obtained after the data processing can be determined using the criteria set forth by Muladi [11]. This criteria can be seen in Table 1.

**Table 1. Criteria Values Questionnaire**

| No | Criteria  | Value (%) |
|----|-----------|-----------|
| 1  | Very Good | 86-100    |
| 2  | Good      | 72-85     |
| 3  | Simply    | 56-70     |
| 4  | Less      | 0-55      |

### 3. Result and Discussion

The results obtained from the analysis of data based on questionnaire responses of learners the learners to the earthquake in teaching physics to the development of electronic book High School Physics. Based on questionnaires completed by the learners to see the learning process of Physics consists of four indicators, and to see the learners response to the earthquake in physics learning consists of three indicators that are analyzed each indicator. The results of the analysis of physics learning process can be seen in Figure 1.

![Figure 1. Graph Physics Education Process Analysis](image)

Based on Figure 1 the results of the analysis of the Physics learning process are seen. Analysis of the Physics learning process in SMAN 4 Padang precisely in class X MIPA 5 is divided into four criteria namely the value (0-55)% is in the less criteria, (56-70)% is in the simply criteria, (71-85)% is in good criteria, and (86-100)% are in very good criteria. The first indicator of students interest in studying Physics consists of three questions with a value of 52%. The second indicator of attention of students to learn Physics consists of five questions with a value of 74%. The third indicator of the use of electronic books in the physics learning process consists of five questions with a value of 56%. The last indicator is the learning process through ICT consisting of four questions with a value of 58%. The results of the Physics learning process analysis show that the value for the first indicator is in the criterion is less, the second indicator is in the good criteria, the third and fourth indicators are in the simply criteria. The
results of this analysis indicate that students interest to learn Physics is still less, students attention to studying Physics is good, the use of electronic books and learning through ICT is still simply. The average value of the Physics learning process is 60%, this number is in simply criteria. Furthermore, the results of the analysis of students’ responses to the earthquake in learning Physics can be seen in Figure 2.

![Graph Response Analysis of Students Against Earthquake in Physics Education](image)

**Figure 2.** Graph Response Analysis of Students Against Earthquake in Physics Education

Based on Figure 2 we can see the results of the analysis of students responses to the earthquake disaster in Physics learning. Analysis of students responses to the earthquake disaster in learning Physics at SMAN 4 Padang precisely in class X MIPA 5 divided into four criteria namely the value (0-55)% is in the criteria of less, (56-70)% is in the criteria simply, (71-85)% are in good criteria, and (80-100)% are in very good criteria. The first indicator of student response before an earthquake consists of five questions with a value of 69%. The second indicator of students responses during an earthquake consists of five questions with a value of 70%. The last indicator of students responses after an earthquake consists of five questions with a value of 69%. The results of the analysis of students responses before, during and after an earthquake are in simply criteria. The average value of the responses of students that is 69% of this analysis shows that students responses to the earthquake disaster in physics learning are still not optimal.

Based on the analysis of questionnaires learners obtained information that the interest of students to learn physics, the attention of learners to study Physics, the use of electronic books in physics learning process, and learning through ICT, as well as learners’ response to the earthquake in the learning of physics is still not optimal. Therefore, students should have an interest and concern for studying physics, because it will affect the response of learners in the face of the earthquake.

Physics learning process can not be separated from physics learning materials. Physics learning materials can be contained in teaching materials. Instructional materials are part of the learning resources. Teaching material is any material used to assist teachers in implementing the learning activities. One example of teaching materials is an electronic book or known by the electronic book (e-book). Electronic book reader that integrates the earthquake will increase the motivation and attention learners in the learning process of Physics, but it also utilizes ICT facilities in schools in the learning process of Physics and improve the response of students in the before, during and after the earthquake to reduce earthquake risk.
4. Conclusions
The conclusion of this study is based on results and discussion is a learning process of Physics and learner response to the earthquake in Padang SMAN 4 has not been optimal. This can be seen from the result of the analysis of the physics learning process being at simply criteria with a percentage of 60% and students response to the earthquake disaster in physics learning being at a simply criteria with percentage of 69%. So that needs to be developed for electronic book Integrated High School Physics earthquake.

5. References
[1] Sunarjo et. al 2012 Gempa Bumi Indonesia Edisi Populer (Jakarta : Badan Meteorologi Klimatologi dan Geofisika)
[2] Rustam, Nurul Ilmarsah, Ahmad Fauzi. 2019. Effectiveness of Integrated Science Textbook Theme Earthquake Using Connected Model SSCS Problem Solving. The 2018 Int. Conf. on Research and Learning of Physics. 1185 012092 : 2.
[3] BNPB 2019 Data dan Informasi Bencana Indonesia, gathered on 19 June 2019 from http://dibi.bnpb.go.id/
[4] BNPB 2017 Buku Saku Tanggap Tangkas Tangguh Menghadapi Bencana (Jakarta : BNPB)
[5] ISDR 2004 International Strategy for Disaster Reduction (ISDR), Living with Risk – A Global Review of Disaster Reduction Initiatives. United Nations Publication. New York and Geneva.
[6] Peraturan Pemerintah Nomor 32 Tahun 2013 tentang perubahan Peraturan Pemerintah Nomor 19 Tahun 2005 Tentang Standar Pendidikan Nasional.
[7] Ibda H 2018 Penguatan Literasi Baru pada Guru Madrasah Ibtidaiyah dalam Menjawab Tantangan Era Revolusi Industri 4.0. Journal of Research and Thought of Islamic Education. Vol 1, No 1 : 2.
[8] Direktorat Pembinaan Sekolah Menengah Atas 2010 Panduan Pengembangan Bahan Ajar Berbasis TIK (Jakarta : Kementrian Pendidikan Nasional)
[9] Suryana 2010 Metodologi Penelitian Model Praktis Penelitian Kuantitatif dan Kualitatif (Bandung : Universitas Pendidikan Indonesia)
[10] Riduwan 2010 Belajar Mudah Penelitian Untuk Guru-Karyawan dan Peneliti Pemula (Bandung : Alfabeta)
[11] Muladi et al 2011 Pengembangan Laboratorium Biologi Virtual Berbasis Multimedia Interaktif. Seminar on Electrical, Informatics, and Its Education. A3-10 : 8.