Practicality of high school physics e-book integrated materials of meteor fall disaster mitigation based on guided inquiry model assisted google classroom

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

robikaalkadri@gmail.com

Abstract. Learning media is a very important learning component who use by teachers for students in the learning process. The development of Information, Communication and Technology have big contributed for teachers to develop learning media as needed by students in learning. The purpose of this research is to analyze the media used by students in high school physics learning and to determine the right media in the development of flood-themed teaching materials. This research method is descriptive qualitative approach. Descriptive method is a method used to examine the condition of the natural objective. To obtain research data used questionnaire instrument. Instrument for retrieving data in the form of a questionnaire for analysis of learning media filled in by students. The result of the study showed that the use of learning media based on electronic can be used in physics learning and develop flood-themed teaching materials based on electronic.

1. Introduction
Indonesia is a country that is prone to natural disasters. The National Disaster Management Agency (BNPB) recorded 1,426 natural disasters that occurred in Indonesia in 2019. Natural disasters that occurred in Indonesia such as floods, landslides, drought, tornadoes, abrasion, forest and land fires, earthquakes, tsunamis, and volcanic eruptions[1]. In addition, natural disasters that have occurred in Indonesia are meteor falls. Meteor fall disasters receive less attention in Indonesia, because meteor falls rarely occur in Indonesian territory and the impact caused is not as big as the impact of other disasters. However, a meteor fall can hit any part of Indonesia and can happen at any time.

Meteor crash disasters that have occurred in the territory of Indonesia based on the records of the National Space Aviation Institute (LAPAN) include a meteor crash near the Bone Bay (South Sulawesi), in October 2009 which caused a large explosion in the air. On April 29, 2010, a meteor fell in a densely populated settlement, Duren Sawit, causing damage to residents' homes. Then, in the Bengkulu area which caused a tremor and a thud on October 26, 2015. Even though the meteor crash that had occurred in Indonesia did not have a major impact, this incident indicated that the meteor crash event remains a threat to Indonesian territory.

Community preparedness in the face of disasters is an indicator of reducing the risk and impact of a meteor crash[2]. Preparedness will help the community to control and control their mental emotions in facing the catastrophic meteor fall. Concerning disaster management states that every person is obliged to maintain a harmonious social life of the community, maintain balance, harmony in
environmental functions, and take disaster management actions as well as provide correct information to the public regarding disaster management[3]. One strategy that can be done for disaster risk reduction is to integrate disaster to education in schools[4]. Thus, efforts to mitigate meteor falls is an obligation for all parties in Indonesia and one of the efforts that can be made to reduce the risk of a meteor falling disaster is through education.

Education is a process of educating and transmitting knowledge carried out by educators to students to free ignorance, increase knowledge, and form a better and useful personality for everyday life[5]. Education is becoming increasingly important to ensure students have learning and innovation skills, skills to use technology and information media, and can work and survive by using life skills. Education in Indonesia is required to develop skills needed by students in the current era of globalization and in areas where students live that are prone to natural disasters. It is hoped that students' knowledge of disasters will become skills in reducing the risk of natural disasters. One strategy that can be taken to provide understanding and knowledge of disasters is by integrating disaster materials into the curriculum.

The 2013 curriculum basically demands active learning to seek, which is to provide opportunities for active students in building knowledge and needs of students[6]. The 2013 curriculum does not only emphasize the aspects of knowledge, but emphasizes the three aspects of assessment, namely aspects of attitudes, skills and knowledge. Regulation of the minister of education and culture, Number 81A of 2013 explains that the curriculum is developed in accordance with the characteristics, potentials, advantages, local wisdom and regional needs. Regional potential is one of the things that should be considered in curriculum development. Regional potential is useful as a source of learning aimed at students so that they have the ability to recognize and understand regional characteristics in learning. In line with Government Regulation No. 32 of 2013 Article 77 B paragraph 9 states that the curriculum structure for secondary education units is one of which is general content which is local potential and uniqueness. Local potential and uniqueness can be integrated into Physics subjects without the need for special subjects. Thus, teachers are given the opportunity to develop integrated learning material with local potential and uniqueness in Physics subjects in high school.

Physics is a subject that studies phenomena that occur in nature. One of the phenomena that can be studied is the fall of a meteor, because there are physics concepts that can be integrated into physics material in high school[7]. The existence of physics material related to the meteor fall disaster should be used by an educator to integrate it, because this is one of the efforts of an educator in mitigating the meteor fall disaster through physics material in schools.

Physics Education should adopt a 21st century learning (21st Century Learning). Competency in the 21st century has been adapted in the education system in Indonesia through Curriculum 2013[8]. The 2013 curriculum adopts two main concepts, namely the scientific approach and authentic assessment. The scientific approach is the implementation of the efforts of the National Education Standards Agency (BNSP) on education in Indonesia which has experienced a change in the learning paradigm, such as from being educator-centered to student-centered, from one direction to interactive, from isolation to a networked environment, from passive to active, investigate, from virtual / abstract to real-world contexts, from personal to team-based learning, and from single tools to multimedia tools. Authentic assessment in the 2013 Curriculum is used to measure student learning outcomes in the realms of attitudes, skills and knowledge[9]. Distance learning is corresponding to the demands of Physics Curriculum 2013 using a scientific approach, authentic assessment, and learning resources that match the characteristics of the 2013 curriculum will encourage students to be active[10].

Teaching material is a learning resource that contains learning materials or materials used by educators and students. Teaching materials used contain phenomena related to learning materials, make it easier for students to understand learning materials, contain the Core Competencies and Basic Competencies that have been determined, describe scientific work, help students in solving problems, and describes the learning model[11]. Teaching materials can be in the form of printed teaching materials or non-printed (electronic) teaching materials. Print teaching materials have several shortcomings, such as not interactive and multimedia. In learning Physics, printed teaching materials
are not able to display real phenomena related to learning materials. Electronic teaching materials can present real phenomena into learning materials, manipulate objects, and are able to take advantage of the advantages of technological devices. Electronic teaching materials are more environmentally friendly because they save paper usage. In addition, electronic teaching materials are interactive and multimedia in nature. One of the electronic materials that can be used in learning physics is an electronic book.

Electronic book is a digital version of a text book. The advantage of e-books are digital enhancements and interactive links provided by publishers in them which include practice quizzes, flashcards, find options, content link tables, and other resources for content reinforcement, whereas general textbooks not interactive. Ease of use of e-books, which can be accessed anytime and anywhere using electronic devices and e-book readers (plug-ins) such as the Adobe reader and Adobe Flash Flask. The e-book can include various media, such as video, audio, images, and animation. Potential advantages E-books are greater flexibility and accessibility than textbooks, because they have visual appeal such as still and moving images, video clips, as well as the potential to add supporting materials such as audio collections, links to activities and websites[12]. This makes e-books able to display phenomena that are difficult to see and observe directly in physics learning. E-books at this time have been widely supported by technology to access them easily. Existence teaching materials in the form of e-books, an educator can show phenomena, such as meteor falls through video. This can help students understand physics material well. E-books can be published and used through a google service, namely Google Classroom.

Google Classroom is a free service application provided by Google with users having an account at Google. Google Classroom is an application that allows the creation of classrooms in cyberspace[13]. Classroom helps students and teachers organize assignments, increase collaboration, and foster better communication. In Google classroom, the class is designed to help educators create and collect assignments without paper, including time-saving features like the ability to make copies of Google documents automatically for each learner. Google Classroom can create drive folders for each assignment and for each student, to keep things organized. Thus, Google Classroom is an e-learning system designed to help educators create and collect paperless assignments, distribute electronic teaching materials, and conduct assessments and evaluations.

A good e-book is determined by the quality of the development results. The quality of e-books is determined by several criteria, namely validity, practicality, and effectiveness. Practicality is described as a product that is designed to be consistent and logical between expectations and actuals[14]. Expectations are defined as products that will be used; actual means the product can be used. Physics e-book must fulfill practical aspects, namely understanding and implementing the teaching material. The level of practicality is seen from whether the users (educators and students) consider that e-books are easy and usable[15]. The practicality assessment by the user is seen from the answers to the questions, namely (1) whether the user thinks that the e-book being developed can be used in normal conditions; and (2) whether the reality shows that the e-book developed can be applied by educators[16].

Practicality components include: 1) ease of using the product, 2) ease of understanding the material and language used, 3) ease of finding concepts, 4) increasing activity, independent learning, fostering learning experiences, and learning motivation of students, 5) efficiency of use time and effort in using the product, and 6) interesting[17]. A product developed is said to be practical if practitioners state that theoretically the product can be applied in the field and the level of implementation is included in the practical category. The term practical here refers to the components of the product that can be used by teachers and students in learning. Practical criteria refer to the ease of use of the Physics e-book developed, time suitability, the benefits of the Physics e-book for educators and students. The practicality of the Physics e-book is seen from the results of trials in learning Physics. Then, it is said to be practical if the Physics e-book will be applicable and in fact proven to be applicable which is assessed by users (students and educators) through a questionnaire on the responses of educators and students.
2. Research Method

The method used is descriptive research method. Descriptive method (qualitative) is a method used to examine the condition of the natural objective. The descriptive method is a research method that is intended to gather information about the status of an existing symptoms, namely according conditions to what their symptoms at the time of the study. A product is said to be practical if educators and students can use the product in practical and efficient learning. The practicality of the product was analyzed based on a questionnaire that had been filled in by educators and students. Analysis of the practicality of the e-book based on a questionnaire filled out by educators and students using the following formula:

\[ P = \frac{f}{N} \times 100 \% \]  

where \( P \) is end value, \( f \) is getting score, and \( N \) is maximum score. Criteria of practicalities can be seen in Table 1[18].

| No. | Score | Criteria       |
|-----|-------|----------------|
| 1   | 80\% < x \leq 100\% | Very practical |
| 2   | 60\% < x \leq 80\% | Practical      |
| 3   | 40\% < x \leq 60\% | Pretty practical |
| 4   | 20\% < x \leq 40\% | Less practical |
| 5   | 0\% < x \leq 20\% | Not practical  |

3. Results and Discussion

The results of this study were assessed for practicality according to students and teachers based on 6 practical aspects of a product consisting of: ease of using the product; ease of understanding the material and language used; ease of finding concepts; increase activities, independent learning, foster learning experiences, and learning motivation of students; efficient use of time and energy in product use; and interesting.

3.1. Practicality according to students

Practicality according to students can be seen in the following graph:

![Figure 1. Practicality Graph According to Students](image)

Based on Figure 1 show that ebook is used practically by students. The use of e-books by students is in the practical category, so that e-books are very easy to use by students both in learning at school and outside of school. The material presented in the e-book uses very easy to understand language, with a simple presentation and accompanied by pictures to help understand the material properly. In
this e-book students can find concepts well through scientific-based learning activities, where this e-book is based on a guided inquiry learning model with clear and systematic steps. The development of e-books aims to improve the performance of learning Physics, especially making students learn independently and providing learning experiences. From the table above, it can be seen that e-books can increase students' interest in learning and make learning more active. Based on the table above the e-book can save time and energy, because e-books are digital versions of books, of course there are many features and all learning needs have been presented in the e-book.

3.2. Practicality according to teacher
Practicality according to students can be seen in the following graph:

![Practicality Graph According to Teacher](image)

Based on Figure 1 show that ebook is used practically by teacher. Ebooks that are used are practically used by both teachers and students. The use of simple language can be understood well and clearly. The concept in the ebook is easy to understand because it is assisted by various media, such as videos, images, and animations. In addition, the use of ebooks can increase student interest and motivation in learning physics in schools. In terms of time efficiency, the ebook has a hyperlink feature that makes it easy for students to find concepts and move to the desired section. The use of ebooks in learning can improve student learning activities. This learning activity is in accordance with the demands of the 2013 curriculum, where students are actively involved in learning. So, the ebook will be able to encourage the performance of learning physics and be able to keep up with the times based on technology.

4. Conclusion
The conclusion in this study is that the integrated physics ebook material for disaster mitigation of meteor falls based on the guided inquiry model used through google classroom is practically used in physics learning.

References
[1] BNPB, ‘Potensi dan Ancaman Bencana’, BNPB, 2017.
[2] W. N. Edwards, D. W. Eaton, dan P. G. Brown, ‘Seismic observation of meteors: Coupling theory and obervations’, Reviews of Geophysics. 2008, doi: 10.1029/2007RG000253.
[3] Anonim, ‘UU no. 24 tahun 2007 tentang Penanggulangan Bencana’, Pemerintah Republik Indones., 2007.
[4] UNISDR, ‘What is Disaster Risk Reduction?’, www.unisdr.org, 2015.
[5] A. A. Hasmori, H. Sarju, I. S. Norihan, R. Hamzah, dan M. Sukr Saud, ‘Pendidikan, Kurikulum Dan Masyarakat: Satu Integrasi’, J. Edupres, vol. 1, no. September, h. 350–356, 2011.
[6] M. Ali, ‘Implementasi Kurikulum Pendidikan Nasional’, J. Pedagog., vol. 2, no. 2, h. 49–60, 2013.
[7] A. Fadhila, A. Fauzi, dan H. Rifai, ‘Effectiveness of integrated science (IPA) textbook nested with landslide theme to improve preparedness of students’, in Journal of Physics: Conference Series, 2019, doi: 10.1088/1742-6596/1185/1/012055.
[8] - Rusman dan - Lukman, ‘The Implementation 2013 of Curriculum in Vocational School A Study on “Best Practices” Done by Vocational School Teachers in Planning, Implementing, and Evaluating the Curriculum’, Int. Res. J. Eng. IT Sci. Res., 2017, doi: 10.21744/irjeis.v3i2.387.
[9] Asrizal, A. Amran, A. Ananda, F. Festiyed, dan S. Khairani, ‘Effectiveness of integrated science instructional material on pressure in daily life theme to improve digital age literacy of students’, in Journal of Physics: Conference Series, 2018, doi: 10.1088/1742-6596/1006/1/012031.
[10] Asrizal, A. Amran, A. Ananda, F. Festiyed, dan R. Sumarmin, ‘The development of integrated science instructional materials to improve students’ digital literacy in scientific approach’, J. Pendidik. IPA Indones., 2018, doi: 10.15294/jpii.v7i4.13613.
[11] R. Angelia, A. Fauzi, dan Yohandri, ‘Validity and practicality of IPA textbook integrated the theme of a hurricane with the type of shared inquiry-based training’, J. Phys. Conf. Ser., vol. 1185, no. 1, 2019, doi: 10.1088/1742-6596/1185/1/012088.
[12] W. D. Woody, D. B. Daniel, dan C. A. Baker, ‘E-books or textbooks: Students prefer textbooks’, Comput. Educ., vol. 55, no. 3, h. 945–948, 2010, doi: 10.1016/j.compedu.2010.04.005.
[13] D. M. Ridho, I. D. Sawitri, dan N. A. Amatullah, ‘STUDENTS’ PERCEPTION TOWARD GOOGLE CLASSROOM APPLICATION IN EFL CLASSROOM’, h. 1325–1332, 2019.
[14] N. Nieveen, ‘Educational design research: An introduction’, in An introduction to educational design research, 2009.
[15] T. Plomp dan N. Nieveen, Educational Design Research Educational Design Research. 2013.
[16] N. Nieveen dan E. Folmer, ‘Formative evaluation in educational design research’, Educ. Des. Res. Part A An Introd., 2013.
[17] M. Yoneda, ‘Designing Assessment Tools: The Principles of Language Assessment’, h. 41–49, 2012.
[18] Riduwan dan Sunarto, Pengantar Statistika untuk Penelitian: Pendidikan, Sosial, Komunikasi, Ekonomi dan Bisnis, vol. 91. 2017.