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The Development of Digital Disaster Mitigation Module: An Earthquake Case Study in Wakatobi Regency in Geography Lesson of IPS Twelfth Grade at SMAN 2 Tomia

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ABSTRACT

The research aimed to develop and to produce a product namely the digital disaster mitigation module, an earthquake case study in Wakatobi Regency. This development research used ADDIE model. Data collection techniques used was validation sheet, observation, tests, literature studies and students' response questionnaires. The data analysis technique used was a descriptive percentage technique. The analysis result showed that the average value of product validation by media expert was 87%, material expert was 81% and geography teacher was 95%. The significant enhancement occurred in students' learning outcomes both in knowledge aspect and preparedness aspect. The knowledge aspect gained an average score of 59 in pretest and it increased in posttest which gained 76. Moreover, preparedness aspect gained an average score of 62 in pretest and it increased in the posttest which gained an average value of 76. The result of the study concluded that the digital disaster mitigation module of earthquake case study in Wakatobi Regency that was developed in this study can be classified to be valid and feasible to be used in learning activities.

Keywords: *digital disaster mitigation module, earthquake, knowledge and preparedness of disaster*

INTRODUCTION

The era of industrial revolution 4.0 is a challenge for all fields of science, especially in education field. Education plays an important role in nation. Education is a conscious effort to develop the potential of human resources through teaching. Android-based learning tends to have potential to help students in improving learning outcomes by reason of android is one of the information and communication technologies that is interesting and practical to use (Chuang, 2014; Jabbour, 2014). In addition, it can increase students' learning motivation because it has a modern, attractive and practical concept (Mardiana & Kuswanto, 2017; Pahlifi & Fatharani, 2019). The type of learning media that will be developed is a digital disaster mitigation module which can be easily accessed by anyone, anytime and anywhere. This media looks like a mobile application file in general when it is installed on an Android cellphone. It does not have to be connected to the internet network because it can be accessed both online and offline.

According to the data of Meteorology, Climatology and Geophysics Agency, Wakatobi is one of the regencies in Southeast Sulawesi Province that has potential for earthquake disasters. This is

considering that the four potential earthquake points such as Tolo fault, Buton fault, Flores fault and Banda fault flanked Wakatobi island and it threatened to happen at any times. Therefore, disaster-based learning is needed to give people an understanding what steps that they take before, during, and after disaster occurred and it also can increase students' knowledge and preparedness for disasters. One way that can be done to minimize disaster event is through applying disaster education, both disaster education held in the form of socialization in the community and disaster education which is integrated in school learning material. With the consideration that school is forum that aims to educate the nation's children so that it contributes to create people who are aware or literate about disaster (Suharini et al., 2015). A disaster is an event that occurs suddenly and it causes losses for those who experience it. Although disaster event cannot be avoided, the impact of a disaster can be minimized by increasing disaster knowledge and disaster preparedness (Setyowati et al., 2021). This research is expected to create a geography learning media that can be an alternative in learning media. It is expected to be a solution to the problems presented so as to increase students' knowledge and preparedness in dealing with earthquake disaster.

The use of digital media has many benefits such as being able to save costs, gaining broader knowledge, having the ability to store and record disaster data properly. By storing disaster data, it can take steps in efforts to mitigate disasters if the same disaster occurs again (Amin & Ahn, 2020; Gerster et al., 2022; Zambrano et al., 2017). Learning media is a means used both to obtain and convey information. There are two types of multimedia, the first is liner multimedia which is not equipped with any controller that can be operated by the user. The second is interactive multimedia which is equipped with a controller that can be operated by the user. The users can choose what they want for the next process (Sutirman, 2013). This study will develop an interactive multimedia which can provide stimulus and response activities between the media and the user. The activity occurs through the buttons that have been given by the hostpot to make it easier for users to choose what they want for the next process.

MATERIALS & METHODS

The aim of this study is to develop and to produce a development product namely digital disaster mitigation module with an earthquake case study in Wakatobi Regency. Development stage used is the ADDIE model. The stages of ADDIE development model consist of five stages. The first is analysis. Analysis stage is the beginning activity in the research process to obtain data or information about the research location. This stage is a fundamental stage because it will determine what research steps will be carried out or developed. The second stage is design. In design stage, the researcher arranges the media development plan which is started by making a planning design scheme in order to make the product design process easier. The third stage is development. The researcher creates the product according to the design that has been made in the previous stage. The complete product development will be validated by experts to determine the product's valid and feasible level. Further, the fourth stage is implementation. In this stage, the digital disaster mitigation model will be implemented to students after being validated by experts. The last is evaluation. The evaluation is done after implementing the product. It aims to find out how effective digital disaster mitigation module for student learning outcomes both in students' knowledge and students' preparedness aspects.

STATISTICAL ANALYSIS

The data analysis used in this research is descriptive percentage. It is included the validation results of media experts, material experts, geography teachers and students.

Then, those values are adapted to the value criteria of the validation results and the media effectiveness of students' learning outcomes. The validation criteria can be seen in table 1 bellows:

Table1. Product validation criteria by experts

Achievement (%)	Qualification
85.01-100.00	Very Valid
70.01-85.00	Valid
50.01-70.00	Less Valid
01.00-50.00	Not Valid

Sources: (Akbar & Hartono, 2017)

Based on the criteria on the table, the validation of the media can be classified into valid if it has a percentage ≥70%. Then, the determination of product development effectiveness in students' learning outcomes, both in knowledge and aspects of preparedness can be seen in table 2 below:

Table 2. Criteria for the effectiveness of product development on learning outcomes

No.	Achievement rate (%)	Category
1	76-100	Very effective
2	51-75	Effective
3	26-50	Less effective
4	0-25	Not effective

Source: Research Data Processing, 2022

Based on criteria on the table, the media can be categorized into effective if it has a percentage of ≥51%. The data analyzed used descriptive quantitative. The value is regarding to the result of experts' validation, teachers, and students that become ideal assessment criteria.

RESULT

Regarding to the result of the data analysis, data collection and observations obtained in research location, there are two things found. The first is related to the learning conditions, especially the facilities and infrastructure used or commonly referred to learning media. So far, SMA Negeri 2 Tomia is used to utilize printed book and printed media for learning. Concerning to the learning process appointed in the industrial era 4.0 or commonly referred to the 21st century learning style, the characteristic of learning style is regarded by using technological information and communication tools. Thus, it is necessary to use an innovation or renewal of learning media in SMA Negeri 2 Tomia. The second is related to the condition of research location. The location has potential for earthquake disaster. It is very important for students to get disaster education. Thus, they have knowledge and action taken before, during, and after the disaster occurred.

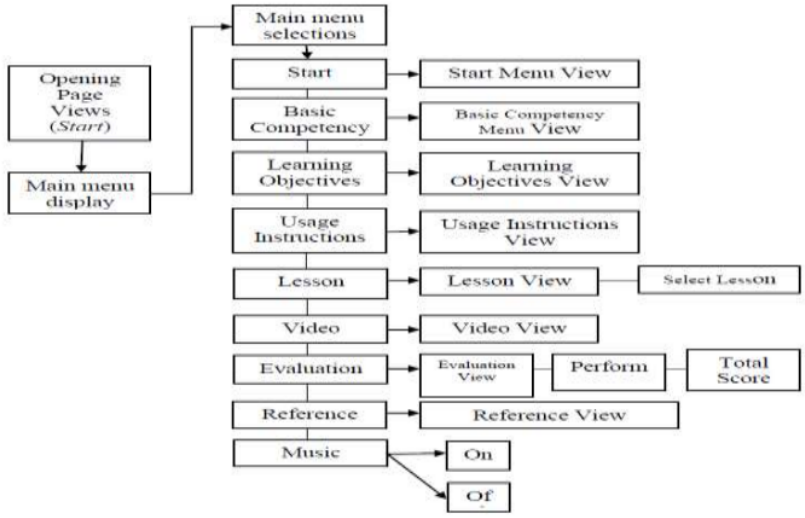

Figure1. Product Development Design Scheme

Regarding to the explanation, the innovation or renewal learning media that will be carried out is in form of developing and producing a digital disaster mitigation module. In design process of development product, it requires a scheme to design the product development. The scheme is formed in a storyboard. It is a design to describe the functions used which can be seen in the scheme below:

After creating development product design scheme, the next step is carrying out the editing process starting from editing the layout, content composition such as size, language, information or material to be loaded, and colors and images. Some of the results of the learning media development products that have been developed can be seen in Figure 2 below:

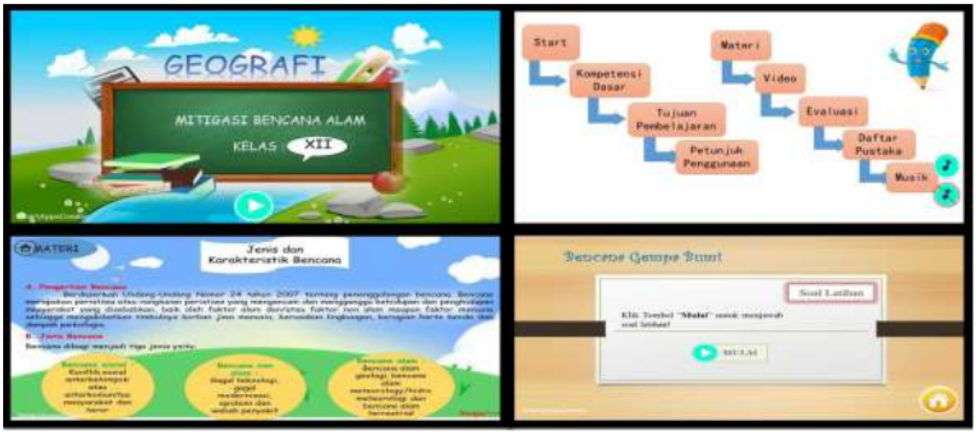

Figure 2. Product display of digital disaster mitigation module development

The product development is ready to be used after everything is completed. Further, the next step is validating the development product to experts and geography teachers. It is undertaken to determine the feasibility level of digital disaster mitigation module development product. The validation data of the digital disaster mitigation module feasibility level is shown in Figure 3 below:

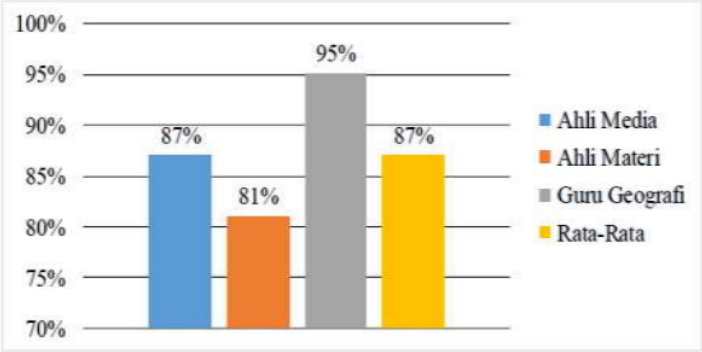

Figure 3. Product Development Validation

Based on Figure 3 above, it shows that the validation result of this development product obtained an overall average score of 87% which is included the validation of media expert is 87%, material expert is 81% and geography teacher is 95%. Based on the

validation result, it can be concluded that this digital disaster mitigation module is very feasible to be used in learning activities because the overall average score is 87%.

Moreover, the next stage is the implementation result of the digital disaster mitigation module to IPS twelfth grade students at SMAN 2 Tomia. It is to obtain the students' learning outcomes both of knowledge and student preparedness for disaster. The result of the analysis shows that there are significant differences and improvement in student learning outcomes before and after learning by using the digital disaster mitigation module. It can be seen in Figure 4 below:

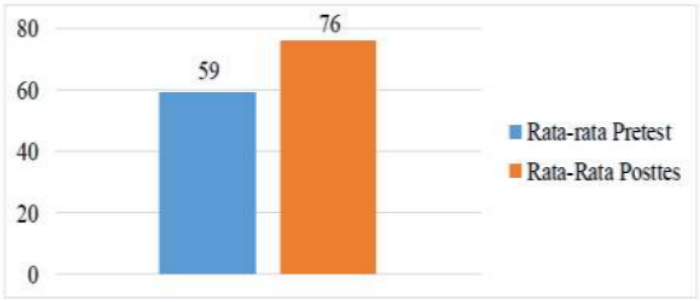

Figure 4. The Results of Learning Outcomes Analysis on Students' Knowledge aspect of Disaster

Figure 4 shows the increasing of learning outcomes on students' knowledge aspect. The students' average score in pretest is 59 and the score increases in the posttest which gains average score 76. Concerning to the media effectiveness level table, the disaster digital module product development is classified into very effective category.

Besides, the significant enhancement can also be found in learning outcomes in students' preparedness aspect, for more details it can be seen in Figure 5.

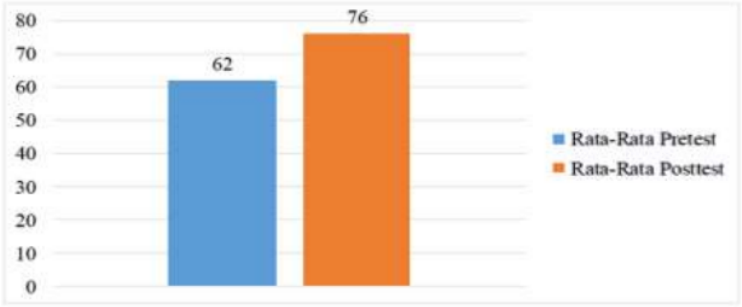

Figure 5. The Results of Learning Outcomes Analysis in Students' Preparedness aspect of Disaster

Figure 5 shows that there is a significant enhancement in students' learning outcomes in preparedness aspect for disasters. It can be seen in the pretest questionnaire average score that is 62. The enhancement found in the posttest average value which gains 76. Concerning to the media effectiveness level table, the disaster digital module product development is classified into very effective category.

DISCUSSION

Humans as nature are never satisfied to fulfill their needs so that they are required to follow and to adapt the current development as the natural selection theory requires humans to adapt to circumstances in order to survive (Yuberti, 2015). The current development of industrial era 4.0 requires people to use communication and information technology tools both in

community and school environment. In school environment or education field, the communication and information technology tools has become a challenge for teachers because they try to make these tools such as android smartphone as a learning media. Thus, the use of the media will enhance students' interest and motivation to learn. Android considers as one of communication and information technology tools which is familiar and loved by nowadays students because it has a modern and practical concept (Banowati et al., 2019). This research referred to develop and produce a development product namely a digital disaster mitigation module, an earthquake case study in Wakatobi Regency. It aimed to create an innovation or renewal in learning media which is appropriate with students' needs and potentially disaster-prone condition in where the research location conducted so that having knowledge about disaster is very notable. It is also concerning to the learning process appointed in the industrial era 4.0 or commonly referred to the 21st century learning style, the characteristic of learning style is regarded by using technological information and communication tools.

Education is one of the important factors in supporting the quality of human resources. There have been many previous studies aimed to improve the quality of education by developing methods, learning materials, curriculum and learning media. In this research, the media is one of important aspect to note because it is in line with its function which is used to convey information. The use of media will greatly affect the motivation, interest, and learning outcomes of students (Gunawan, 2014; Widyawati & Prodjosantoso, 2015). Further, the development of digital disaster mitigation module is conducted to aid students easily to access information or materials related to disasters especially earthquakes through their respective Android phones. This development product is made like a digital module which can be installed on an Android cellphone and the display is in the form of applications in general. It is also quite easy to access because it can be accessed both online and offline. so that it the students can use the application anytime and anywhere.

Based on the result of the study, this development product gained an average validation value from experts with a very valid category, such as the average validation value from media expert was 87%, material experts were 81% and geography teachers was 95%. The overall average is 87% and it is included in the very valid category concerning on product validation criteria table by experts. In addition, the result of the study shows that this development product also improves students' learning outcomes both in the knowledge aspect and preparedness aspect. In the knowledge aspect, the pretest average score is 59 and it increases after being given treatment which is shown by posttest average score is 76. Regarding to the table criteria of the product development effectiveness on learning outcomes, it classified into very effective category. Furthermore, the enhancement also occurred in students' learning outcomes of preparedness aspect which can be seen from the pretest score of 62. However, the enhancement is showed by pretest score 76 after conducting treatment. Concerning to the table of criteria for the effectiveness of product development on learning outcomes, it is categorized into very effective category. To sum up, the results of the analysis indicated that the digital disaster module development product is valid and feasible to be used in learning activities.

CONCLUSION

Based on the results of the study, it can be concluded that this research activity has succeeded in producing a development product in the form of a digital disaster mitigation module with a case study of the earthquake in Wakatobi Regency. It is showed by the validation results of product development experts such as media expert is 87%, material expert is 81% and geography

teacher is 95% and the average value is 87% which is included in the very valid category. Students' learning outcomes also have a significant enhancement both in knowledge aspect and preparedness aspect. In knowledge aspect, average score pretest is 59 and after giving treatment, the score increases in posttest which gains 76. Regarding to the media effectiveness level table, the score is included in the very effective category. In addition, a significant enhancement also occurs in students learning outcomes in the preparedness aspect. It is shown by the average score pretest is 62 and it has a significant enhancement in posttest which gains the average *score* of 76. Thus, it indicates that the product development of digital disaster mitigation module with an earthquake case study in Wakatobi Regency is valid and feasible to use in learning activities.

Conflict of Interest: None

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