ATLANTIS PRESS
Advances in Social Science, Education and Humanities Research, volume 440
International Conference on Online and Blended Learning 2019 (ICOBL 2019)

Development of Web-Based Disaster Preparedness Knowledge Measurement Instruments Using the Wondershare Quiz Creator Software

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***Abstract*—The high risk of natural disasters in Indonesia awakens all parties to the importance of disaster mitigation. One of such efforts is increasing disaster literacy ability. The purpose of this study was to develop a valid, reliable and practical disaster preparedness knowledge test. This research used research and development design from Plomp consisted of stages of identification, problem, development, and evaluation. Indicators of measuring disaster preparedness knowledge were taken based on a comprehensive literature study. Test items were validated by material and language experts. The test was tested on Geography Education students used wonder share quiz creator. The results of the development were disaster preparedness knowledge test instruments that were valid with a value of 0,000 - 0,028, reliable with Cronbach alpha value of 0,970> 0,306, difficult level of questions in the medium category with a value of 0,53-0, 77, and the discriminating power of the category was good with the Pearson correlation value of 0,401 - 0,843. The students' response to the disaster preparedness knowledge test was considered very good with 86,25% satisfaction level. Based on the research conducted, disaster preparedness knowledge test instruments has a high level of validity, reliability, and practicality to measure the level of knowledge of student disaster preparedness.**

Keywords: web-based disaster, Wondershare quiz

I. INTRODUCTION

Disasters are natural and human events that cause harm to humans [1]. Indonesia is a country that is prone to natural disasters, especially tectonic based on the geographical position. The disaster has affected millions of lives, property and objects. The disaster that is still inherent in the memory is the Aceh earthquake and tsunami in 2004 resulted in hundreds of thousands of lives dying and loss of property. It was caused by the unpreparedness of the community to deal with disasters. One of the factors of this unpreparedness is the lack of public knowledge about the potential disasters that are owned by the area where people live. Lack of knowledge of the community causes untrue and unaccountable news (hoax) about the potential and magnitude of the disasters impact that occur in the area is easy to be spread.

To prepare the community for the disaster phase, efforts are needed to improve disaster preparedness [1 - 3]. This is a concern of the world to continue to be developed. Some research results state that efforts to build disaster preparedness include development of disaster-resistant facilities and disaster response attitudes [1] [4] [5]

Disaster literacy refer to as an effort to raise awareness of the community to face a disaster. Disaster literacy not only understands post-disaster efforts, but also understand disasters and pre-disasters, areas of residence, and in terms of the vulnerability of the surrounding area. Disaster literacy have four factors, namely 1) knowing the source of disaster information, evaluating disaster information, organizing disaster information, and utilizing and delivering disaster information [6].

Based on the importance of disaster preparedness efforts, a solution is needed to provide education for the younger generation in disaster risk reduction activities. The activities referred to mandated in Law No. 24 of 2007 concerning disaster management integrated into educational development programs [7]. It means that efforts to strengthen disaster literacy are very important to be included in the learning curriculum so as to create a young generation who are disaster literate. Through the national curriculum, strengthening knowledge can be done by providing active and innovative learning [8].

To prepare for disaster literacy generation, disaster-responsive teachers are needed. The steps was taken to increase disaster literacy in higher education, especially in high-rise institutions that produce educators [9] [10]. However, before it is done, efforts are needed to find out the extent to which disaster preparedness knowledge has been possessed by prospective teaching staff.

The development of a knowledge preparedness test instrument used web-based assessment. Web assessment is used to collect assessment data without classroom limitations [11]. Through web-based assessment, research subjects can fill out tests anywhere and anytime. Data will automatically be collected through software, making it easier to retrieve and analyze as quickly and easily. Web assessment provides

an interesting test experience because of its more attractive appearance. Furthermore, assessments using the web are considered more interactive because there are various feedback features that can improve students' to understand the material [12].

The development of web-based tests in this study used the wonder share quiz creator software. This software have many conveniences, which are easy to apply and do not require coding data in programming. Therefore, it can be used on all people who do not understand programming languages [13]. Wonder share quiz creator software have facility of 1) feed-back that displays the correct answer along with the reasons, 2) total score that displays the overall score as a guideline for assessing students' abilities, 3) instructions on how to answer the questions, 4) edit text for question makers, 5) insert sounds and colors according to test requirements, 6) hyperlinks to send test results to e-mail, 7) display settings that can adjust the display, 8) facilities for making random questions, and 9) facilities to store results in flash format that easy to distributed to students.

The specification requirements must be fulfill to run the software are: 1) Microsoft Windows 2000 / XP / 2003 / Vista / Win7 / Win8 / Win10, 2) minimum processor 233 MHz Inter Pentium or AMD K6 processor, 3) RAM of at least 250 MB, and 4) have minimum 50 MB hard disk space [14]. Additional requirements are recommended to have Macromedia Flash Player 8 and a sound card windows-compatible [13]. It causes the specifications are not too "heavy" for users of computers or laptops. The wondershare quiz creator software is easy to implemented for research subjects and is an option in the development of disaster preparedness knowledge test instruments.

Based on these problems, the researchers want to develop a web-based disaster preparedness knowledge test instrument. This research was a small part of mind map-based multimedia development research to improve knowledge of disaster preparedness. This research can be used as a basis for efforts to find out the knowledge level of disaster preparedness.

II. METHOD

2.1 Procedure

This research was used a research and development model from plomp, which consisted of 3 stages, namely: 1) problem identification, 2) Development and implementation, 3) evaluation [15].

At the problem identification stage, the researchers conducted a needs analysis to find out the development needs. The analysis was carried out through a comprehensive literature study. [2] [3] [9] [16-20] Based on literature studies, indicators of appropriate disaster preparedness knowledge are prepared.

At the development stage, the researchers was developed test items based on knowledge indicators on disaster preparedness. Development of test instruments was assisted by geography learning experts and disaster material. Then, the web-based development phase was done by compiling tests and distributing the results of the development of tests to students. The software was used wondershare quiz creator which had the following stages: 1) installation of wondershare quiz creator to input test instruments, 2) input test instruments that include the test title, instructions for filling out the test, and supporting images, 3) arrange the display of tests in a ramdomization manner or randomly, 4) set the type of answer submission which after carrying out the test, the answers are immediately submitted, 5) determine the graduation score by entering the passing rate value of 80% of the answered questions, 6) set the workmanship, 7) determine the final display test that stored directly on the data base, 8) publish the instrument test by selecting the file type in flash format.

At the evaluation stage, the researchers conducted material reviews and assessments and language by 2 experts namely disaster material experts and linguists. The results of suggestions and comments from experts were corrected to continue the testing phase of the disaster preparedness knowledge test instrument. The trial test involved 30 students of Geography Education Study Program STKIP Al-Washliyah. Students were asked to fill out a questionnaire for responses to the disaster preparedness knowledge questionnaire. The results of student responses were revised again to produce ready-to-use products.

2.2 Instrument

The instruments were used validation sheets for disaster and language material experts, as well as student responses questionnaire on disaster preparedness knowledge test instruments.

2.3 Data Analysis

Data were analyzed for validity, reliability, level of difficulty, and discrimination power using he statistical assistance of SPSS 23. Reliability test used Cronbach alpha.

Questionnaire of student responses to knowledge tests on disaster preparedness was analyzed using descriptive percentage statistics using the following formula:

$$\text{Percentage} = \frac{\sum(\text{the overall score of the questionnaire answer}}{\text{n x highest value for question x number of respond}}$$

Where: [21]

n = The number of all questionnaire items

To see the conclusions, the following table 1 was used:

Table 1. Percentage Criteria for Disaster Preparedness Knowledge Tests

Percentage of Achievement (%)	Qualification	Note
81 – 100	Very Good	No need for revisions
61 – 80	Good	No need for revisions
41 – 60	Enough	Revisions
21 – 40	Less	Revisions
0 – 20	Very Less	Revisions

Source: [22]

III. RESULTS AND DISCUSSION

3.1. *Problem Identification Phase*

The stages of problem identification in the development of disaster preparedness knowledge test instruments got the fact that special instruments for assessing disaster preparedness knowledge that were appropriate to the research subject had not been found. The disaster preparedness knowledge assessment that had been developed by LIPI provides a general picture of the subject of government, society and schools. As with research from [23] which states that to measure preparedness using a measurement instrument from LIPI in collaboration with UNESCO because it has a comprehensive study in assessing critical factors using several approaches in the form of brainstorming, focus group discussions, clue cards and desk reviews. However, research by [24] states that a process for modifying one instrument is needed according to the needs in the field.

3.2. Development Phase

The product development phase was carried out with a comprehensive literature study. Development was carried out by researchers in collaboration with disaster and learning material experts. The results of the development showed there are four indicators of knowledge on disaster preparedness namely, 1) basic knowledge of disasters, 2) planned activities during disasters, 3) disaster warning systems, and 4) resource mobilization.

The results of the instrument development was inputted using the wondershare quiz creator software. Questions were categorized into 4 indicators of disaster preparedness. The test was determined by 45 minutes to answer 50 MCQs. Research from [25] reveals that MCQs make it easy for teachers to research and can get many student answers with a short time.

To save the instrument to the flash view, the instrument was changed with the web option. The results of student responses were then collected to email rima.meilita@yahoo.com as the student answer database.

3.3. Evaluation Phase

In the evaluation phase, an assessment of the disaster preparedness knowledge test item was carried out. Evaluations carried out were expert validation, validity, reliability, and testing. The validation stage was carried out by material expert and linguist. The expert validation was completed with a validation sheet for assessment items compiled by researchers. The validation sheet for disaster material experts consisted of 4 assessment indicators. The assessment results of the material experts can be seen in the following Table 2.

Table 2. Validation Results of Material Expert

Assessment	Percentage	Category
The depth of questions with disaster preparedness material	91%	Very good
The truth of data / facts	84%	Very good
The truth of concept	89%	Very good
The suitability of images with material	85%	Very good
Percentage Average	87,25%	Very good

Next, the results of Linguist validation are as follows

Table 3. Results of Linguist Validation

Assessment	Percentage	Category
The suitability of using Indonesian Language	82%	Very Good
Language Clarity used	89%	Very Good
Communicative language	85%	Very Good
Conformity to the use of punctuation	80%	Good
Use of consistent terms	78%	Good
Suitability instructions with test items	90%	Very Good
Average percentage	84%	Very Good

After being validated by experts, the tests were then tested. The trial was conducted on geography education students of STKIP Al-Washliyah. The trial involved 30 students consisting of 20 female and 10 male. Students were required to complete tests with real abilities and leave an email address in the identity section.

The results of the tests were analyzed for the level of validity, reliability, difficulty, and discriminating power. The results of the validity calculation indicated that 50 items were valid questions with values between 0,000 - 0,028. Calculation of reliability produces Cronbach alpha values> r table which was 0.970> 0.306. It mean that disaster preparedness knowledge test instruments were reliable. The level difficulty of test was done by calculating the average frequency of answers per test item. The results showed the test items 1-50 had range value between 0.53 - 0.77 which mean medium. Meanwhile, the test item "how to inform about disaster preparedness" had a difficulty level of 0.83, which mean level of difficulty in the high category. Discriminating power was known by looking at the value of the Pearson correlation on the validity of the test item. Based on the Pearson correlation value, it was known that the test had a good discriminating power with range value 0.401 - 0.843.

Students were asked to answer the questionnaire responses to the disaster preparedness knowledge test. The results of student responses to the disaster preparedness knowledge test were as follows:

Table 4. Student Response Results Table

Assessment	Percentage	Category
Questions are arranged systematically	86%	Very Good
The instructions for filling are very clear	90%	Very Good
Attractive web appearance	80%	Good
The sentences are clear and systematic	89%	Very Good
Average percentage of response ratings	86,25%	Very Good

Based on the results of Table 4, it is known that the average student response to the knowledge preparedness test instrument is very good. This can be seen from the questions are arranged systematically, the instructions for filling are very clear, the sentence are clear and systematic. While, the results of attractive web appearance to students look good. Students' responses are important to assess the success of developing teaching materials. This is because students are the main subject of achieving the ultimate goal of learning. Therefore, it is very important to hear their responses regarding the teaching materials they use. This is in line with the opinion of [8] which states that in learning, the teacher needs to know the wishes and expectations of students towards learning to increase the effectiveness of learning and improve learning outcomes.

IV. CONCLUSION

The study resulted a web-based disaster preparedness knowledge test instrument using the wondershare quiz creator software. The process of developing test instruments was carried out through three steps, namely problem identification, development, and evaluation. At the problem identification stage, the researchers conducted a literature study to find out the availability of instruments for disaster preparedness knowledge tests. Besides, at the development stage, the writer was assisted with learning and material. Then, at the evaluation stage, the test instrument was through the validation stages of the disaster material expert and linguist. The instrument revised based on expert validation was tested. The trial disaster preparedness knowledge test instrument obtained the results of each test item had a high level of validity, reliable questions, moderate difficulty, and high discriminating power to measure disaster preparedness knowledge. Then, test instruments showed a positive response from students. Based on the results of the study, it can be suggested to be able to conduct a wider trial. The results of the development of test instruments can be implemented to assess the knowledge of disaster preparedness as a basis for knowing disaster preparedness

V. ACKNOWLEDGMENT

The researchers would like to thank to Educational Fund Management Institute (LPDP) for providing sponsors to the researchers to participate in international conference. The researchers also want to thank to Geography Education Study Program, Faculty of Social Sciences, Malang State University, which has provided the opportunity for writers to study. The gratitude is also for all people who helped in research and development.

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