Disaster mitigation tutorial based on android

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Abstract. A natural disaster is a situation where an unexpected arrival. In that condition damage and even death can occur for humans, animals and plants. The occurrence of natural disasters cannot be prevented, but the community can minimize the impact that occurs by seeking knowledge about how to reduce the impact of disaster risk or what is called disaster mitigation. The development of android-based technology is very popular with the community as a tool for communication and other work. Therefore this research develops a natural disaster mitigation application that can be run on an android phone. This tutorial application is built using Adobe Flash and uses the programming language Actionscript 3.0. The application development method uses the Multimedia Development Life Cycle (MDLC) model with six stages namely concept, design, material collecting, assembly, testing, and distribution. The seven types of natural disasters conveyed in this application are natural disasters that often occur in Indonesia, namely earthquakes, landslides, floods, volcanic eruptions, tornadoes, fires, and tsunamis. This tutorial application provides an explanation of the understanding of each type of natural disaster, how to reduce the impact of disaster risk, and a scientific video on the process of disaster occurrence. This application can be run does not have to use internet access to access information in it, so it can be used at any time.

1. Introduction
A disaster is a situation that arrives unexpectedly. In that condition, damage can occur to humans, animals, and plants. Natural disaster is a disaster caused by natural events. Disasters can occur through a long process or a certain situation in a very fast time without any signs. Disasters often cause public panic, cause prolonged suffering and sadness, such as: injury, death, economic pressure due to loss of business or work, loss of family members, and damage to infrastructure and the environment [1]. The occurrence of natural disasters cannot be prevented, but the community can minimize their impact. Therefore we need a tool to guide and guide the community in dealing with natural disasters.

The development of information technology that is so fast has brought the world into a new era faster than ever imagined before. The development of this technology brings changes in various fields of human life. One result of technological advances is the Android-based system. Android is an operating system for cellular phones based on Linux. Android provides an open platform for developers to create applications on a variety of mobile devices. Android is an open source smart device that has an impact on increasing the number of users and application developers in a continuous and significant way. The above reason is a very good opportunity for IT practitioners, students, and even a hobbyist to participate in developing Android applications [2]. Android users to date are more than 50% of Indonesia's population of 268.2 million [3].

As a device that is widely used by humans, an Android-based system can be used as a tool in helping minimize the impact of natural disasters in the form of a tutorial [4]. This is where disaster mitigation
information technology plays an important role in providing early warning before a disaster occurs and knowledge of various types of disasters [5]. Related to the use of information technology in dealing with natural disasters, several studies have been carried out including by [6] who built a disaster management system application in the Philippines using genetic algorithm optimization methods to determine the most optimal route. Furthermore [7] made a disaster-prone map in the Manado area based on Android by utilizing the services of Google maps as its map view display, and [8] also utilized the Google Maps API to build a logistics management information system in the aftermath of a mobile web-based natural disaster. Ref. [9] conducted a disaster data acquisition through a mobile device by utilizing SMS gateway technology to monitor natural disaster events and continued by [10] who conducted research on finding information on natural disasters for evacuation victims. In addition, [11] has developed a logistical assistance calculation system for victims of natural disasters.

Based on this description, in this study a multimedia application was designed to use flash as a natural disaster mitigation tutorial. This application contains a combination of text, images, graphics, sound, animation, and video elements that are digitally manipulated with a clear, concrete, and attractive display so that users can easily absorb the information contained in it [12]. This application can be installed easily, and can be used in various brands of mobile phones and smartphones. This application can be used in the learning process independently or in groups because this application is also equipped with a self-test to find out how much absorption of knowledge is transferred through this application.

2. Method
This research is a development research, which is building a natural disaster mitigation tutorial system as an android-based information media. Research data were collected through documentation methods from various book sources, especially from disaster preparedness books [13]. The method for developing the system is the Multimedia Development Life Cycle (Figure 1) which includes the stages of concept, design, material collecting, assembly, testing, and distribution [14].

![Figure 1. Multimedia development method](image)

**Concept.** This tutorial application was built using multimedia concepts [12] using Macromedia Flash Professional 8 software [15] with ActionScript support for creating web pages, animations, games and other interactive applications [16]. It also uses Adobe Photoshop to edit photos and images and create other effects [17].

**Design.** The design of this tutorial application is in the form of use case diagram as shown in Figure 2.
Figure 2. Use case diagram for the natural disaster mitigation tutorial system

**Material Collecting.** The materials used in the development of this natural disaster mitigation tutorial are texts about disaster material, types of disasters, questions for self-testing, animated pictures, and videos.

**Assembly.** The assembly phase is the stage of converting the design into program code that can be understood by the machine. Coding is done using Actionscript 3.0. The next two steps are testing and distribution. Application testing is functional in developing this application using the Black Box Testing method. Meanwhile, the distribution stage processes the project to become a .apk file to be ready for publication and access by the user.

3. Results and Discussion

The natural disaster mitigation tutorial application uses Indonesian (Bahasa) as its communication media. The material in this tutorial application consists of two main groups namely various types of natural disasters and self-tests (Figure 3). The types of natural disasters presented in this application consist of 7 types of disasters with their understanding, pictures and animations in the form of videos that explain the time of the disaster and the scientific process of the disaster. Meanwhile, the self-test contains questions related to natural disasters, which aim to test the user's ability to understand natural disaster material. The image representation in this tutorial application uses the .png file format, while the animation uses the.gif file format. Meanwhile, the video representation uses the .mp4 file format.

Figure 3. Display of the main menu natural disaster mitigation tutorial

In Figure 3 there are three buttons namely "MACAM BENCANA" (kinds of disaster), "UJI DIRI" (self evaluation), and "KELUAR" (exit). In accordance with its function, the first button will process information about the seven types of natural disasters, while the second button will display questions related to natural disaster material to measure the user's ability to understand the material. If the user wants to exit the application, then the user can choose the third button that is "KELUAR".
3.1. Kinds of disaster
The seven types of natural disasters in this application are natural disasters that often occur in Indonesia, namely “GEMPA BUMI” (earthquakes), “ERUPTSI GUNUNG API” (volcano eruptions), “BANJIR” (floods), “TANAH LONGSOR” (landslides), “KEBAKARAN” (fire), “ANGIN PUTING BELIUNG” (windstorms), and “TSUNAMI” (tsunamis). Next Figure 4 shows the seven types of natural disasters in question.

![Figure 4. Display of disaster name menu](image)

This tutorial application will convey information in the form of text, images, sound, and video about the definition of disaster in question, information that contains efforts that can be made before a disaster occurs, when a disaster occurs, after a disaster, as well as the scientific process of the occurrence of disasters from the seven types of disasters referred to in Figure 4. For example if the user selects earthquake, the application will display a page like in Figure 5.

![Figure 5. Display of earthquake sub menu](image)

One menu that is not less interesting is the “VIDEO ILMIAH” (Scientific Video) which contains an animated video that illustrates and explains scientifically the process of natural disasters. Some of the preview images from this scientific video are presented in Figure 6.
3.2. Self-evaluation materials

Besides containing material on various types of natural disasters, this tutorial application also contains self-test material consisting of 5 question groups in which each group contains 7 items according to the type of natural disaster (Figure 7). When the user does the work, the application will immediately display the score obtained by the user. After finishing working on the problem, the user can see the answer key along with the discussion of the question that was just done.

Figure 6. Some examples of disaster scientific video advance views: (a) earthquake; (b) landslides; (c) volcanic eruption

Figure 7. Display of self evaluation menu

Figure 7 displays two sub menus from the self test page. The "DO" button (do) means the user starts working on the problem. Each question group consists of 7 items and each item has 3 answer options to choose from. Each item will get a score of 1 if the answer is correct and 0 if the answer is wrong. After finishing working on the problem, the user will get score information as shown in Figure 8.

Figure 8. Display of score achievement

Figure 8 contains in addition to the acquisition of scores, it also contains sub menu options for viewing material, repeating questions, or viewing discussion items.

3.3. Testing

The last step in developing this tutorial application is testing the application which includes integration testing and system testing. Integration testing is done using the blackbox method of functions in the application, by running each menu and button to see whether there are errors or not. Based on the test results, obtained a success rate of 100%, which means that the menus and application buttons function
as expected. Meanwhile, System Testing is the second stage of application testing using the instability test method to test aspects of compatibility. Based on the results of compatibility testing on five types of operating systems namely Ice Cream Sandwich, Kit Kat, Lollipop, Android Marshmallow, and Nougat shows that the application is running well and normal, which means the application has 100% compatibility.

4. Conclusion

The natural disaster mitigation tutorial application that was successfully built with its various features can be run on smartphones with the Android operating system with a percentage of successful testing of 100%. This application is able to provide information to users about natural disaster mitigation and can be used as a medium of learning about natural disasters especially about things that can be done to prevent natural disasters and efforts to overcome them after a natural disaster occurs.

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