

Conference Paper

Game Learning to Optimize Learning in Disaster Area

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Abstract

In terms of earth science, Indonesia is a very interesting area. But Indonesia is also the most affected country. One of the biggest natural disasters that struck Indonesia region is the 2004 Aceh Tsunami. This condition causes the destruction of various facilities including infrastructure in the world of education so that often hampers the learning process. Though education is a very valuable investment in human life. Therefore, various developments continue to be made to create various learning alternatives in supporting the education process. The use of technology will help the implementation of the learning process although facilities and infrastructure are minimal. One of the technologies used is the use of smartphones for learning. By using Android-based learning game is expected to be an alternative model of education that is effective, interesting, interactive and fun. Utilization of this android based learning game in addition to optimizing learning can also reduce trauma (trauma healing) in children after the disaster.

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1. Background

In terms of earth science, Indonesia is a very interesting area. In addition to having a large continental exposure area, it also has the highest crease mountains in tropical blood and eternal snow. Indonesia is a country located on a ring of fire that stretches along the Pacific plate which is the most active tectonic plates in the world. This zone contributes almost 90% of the occurrence of earthquakes that occur. It is also a country with the largest number of active volcanoes in the world. On average each year there is a volcano erupting in Indonesia. Indonesi is also the most affected country.

One of the biggest natural disasters that hit the region of Indonesia is the 2004 Aceh Tsunami. Between 2009 and 2010 the most frequent disasters in Indonesia are floods, landslides, earthquakes, and tsunamis. According to data from the Indonesian Disaster Information Database (DIBI) -BNPB, out of 1,800 disasters over the period 2005-2015 over 78% (11,648) disaster events are hydro meteorological disasters and 22% (3,810) are geological disasters. Hydro-meteorological disasters such as floods, extreme waves, land and forest fires, drought, and extreme weather. As for the frequent groups

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of geological disasters are earthquakes, tsunamis, volcanic eruptions, and landslides. The trend of total disaster occurrence for both types of groups is relatively steadily increasing.

This condition causes the destruction of various facilities including infrastructure in the world of education so that often hinder the learning process. Though education is a very valuable investment in human life. Therefore, various developments continue to be made to create various learning alternatives in supporting the education process. The use of technology will help the implementation of the learning process although facilities and infrastructure are minimal. This technology-based learning alternative is expected to answer the problem of limited educational facilities and infrastructure and reduce trauma in children after the disaster.

One of the technologies used is the use of smartphones for learning. The use of smartphones, ipad, playbook, tablet pc and the like is more widely used today for various reasons and options than the PC (Personal Computer) at home. In addition, there are many game features that not only as entertainment to play, but there are many games to hone the power of thought and logic that can introduce the material to be more interesting to be accepted and understood especially by the child.

By using Android-based learning game is expected to be an alternative model of education that is effective, interesting, interactive and fun. In addition to the things presented above, other uses of the use of this android based learning game, can create variations of information delivery so as not to generate boredom to the user. In distributing game android learning program is very easy, that is with some devices found on mobile phones such as Bloetooth, and data cable.

Utilization of smart phone to optimize learning in disaster area after the disaster can be a solution to the problem of limited education facilities and infrastructure destroyed after the disaster. Thus, the use of android-based learning games in addition to optimizing learning can also reduce trauma (trauma healing) in children after the disaster.

2. Research Focus

The focus of research is the development of android-based learning games to optimize learning and trauma healing in post-disaster children in areas in Central Java.

3. Problem Formulation

The formulation of the problem in this research is how to develop android based learning game to optimize learning and trauma healing in child after disaster in area in Central Java?

The concept of the model to be developed is a learning model of mobile game-based learning to optimize the learning process of emergency teaching in disaster areas, which will be made learning design concepts that facilitate researchers in developing products.

3.1. Development of android-based learning game to optimize learning

The term android refers to an operating system for linux-based mobile devices that includes operating systems, middleware, and applications. Android provides an open platform for developers to create their apps. Android is an operating system that enables more than one billion Android smartphones and tablets is an operating system that runs on today's smatphone and adjusts specifications in low-end to high-end classes. Almost all vendors are currently developing products with the Android operating system, because the demand is increasing sharply. Android is a Linux-based operating system for mobile phones such as smart phones and tablet computers. Android provides an open platform for developers to create their own applications for use by a variety of mobile devices. Initially, Google Inc. buy Android Inc., a newcomer who makes software for mobile phones. Then to develop Android, the Open Handset alliance was formed, a consortium of 34 hardware, software and telecommunications companies, including Google, HTC, Intel, Motorola, Qualcomm, T-Mobile and Nvidia. At the inaugural release of Android, November 5, 2007, Android alongside the Open Handset alliance stated it supports the development of open standards on mobile devices. On the other hand, Google released Android codes under the Apache license, a software license and an open standard mobile device. In this world there are two types of distributors of the Android operating system. The first gets full support from Google or Google Mail Services (GMS) and the two are completely free of distribution without the direct support of Google or otherwise known as Open Handset Distribution (OHD).

In July 2005, Google teamed up with Android Inc., a company located in Palo Alto, California United States. Founders of Android Inc. working on Google, among them Andy Rubin, Rich Miner, Nick Sears, and Chris White. At that time many who consider the

function of Android Inc.. just as software on a mobile phone. Since then rumors surfaced that Google was about to enter the mobile phone market. At Google's company, Rubin's team is tasked with developing a mobile device program supported by the Linux kernel. This indicates that Google is preparing for competition in the mobile phone market.

Around September 2007 a study reported that Google filed for a patent for a mobile phone application (Google finally introduced the Nexus One, a type of GSM smart phone that uses Android on its operating system. The phone is manufactured by HTC Corporation and available on the market on January 5, 2010).

On December 9, 2008, new members joining ARM Holdings Android work program, Atheros Communications, were produced by Asustek Computer Inc., Garmin Ltd., Softbank, Sony Ericsson, Toshiba Corp. and Vodafone Group Plc. Along with the establishment of the Open Handset alliance, OHA announced their first product, Android, mobile device (mobile) which is a modified Linux 2.6 kernel. Since Android released has been made various updates in the form of bug fixes and the addition of new features. The first phone to use the Android operating system is the HTC Dream, which was released on October 22, 2008. At the end of the year 2009 is estimated in this world there are at least 18 types of mobile phones that use Android.

On March 9, 2009, Google released Android version 1.1. This version of Android comes with an aesthetic update on apps, alarm clocks, voice search, messaging with Gmail, and email notifications.

In mid-May 2009, Google again released a mobile phone using Android and SDK (Software Development Kit) with version 1.5 (Cupcake). There are several updates including the addition of some features in this version of the mobile: the ability to record and watch videos with camera mode, upload videos to Youtube and pictures to Picasa directly from the phone, A2DP Bluetooth support, the ability to connect automatically to a Bluetooth headset, screen animation, and on-screen keyboard that can be customized with the system.

Donut (version 1.6) was released in September by displaying a better search process than ever before, the use of an indicator battery and a VPN applet control. Another feature is the gallery that allows the user to select the photos to be deleted; integrated camera, camcorder and gallery; CDMA / EVDO, 802.1x, VPN, Gestures, and Text-to-speech engine; dial contact ability; text to change speech technology (not available on all phones; procurement of VWGA resolution.

December 3, 2009 re-launched Android phone with version 2.0 / 2.1 (Eclair), changes made are hardware optimization, improved Google Maps 3.1.2, UI changes with new

browser and HTML5 support, new contact list, flash support for camera 3, 2 MP, digital zoom, and Bluetooth 2.1. To move quickly in the next generation of device competition, Google invests by holding the best mobile app competition (killer apps - flagship apps). This competition is \$ 25,000 for every selected app developer. Competition is held for two stages with each stage selected 50 best applications. With the growing number and growing number of Android handsets, more and more third parties are interested to channel their applications to the Android operating system. Popular applications that are converted into the Android operating system are Shazam, Backgrounds, and WeatherBug. The Android operating system on the Internet site is also considered important for creating native Android apps, for example by MySpace and Facebook.

On May 20, 2010, Android version 2.2 (Froyo) was launched. Changes common to previous versions include Adobe Flash 10.1 support, performance speed and applications 2 to 5 times faster, integrated V8 JavaScript engine used by Google Chrome that accelerates browser rendering capabilities, installation of applications in SD Card, WiFi capability Portable hotspot, and auto update capabilities in the Android Market app.

While on December 6, 2010, Android version 2.3 (Gingerbread) was launched. Common changes that come from this version of Android include gaming, improved copy paste function, redesigned user interface, support for VP8 and WebM video formats, new audio effects (reverb, equalization, headphones virtualization, and bass boost), support for Near Field Communication (NFC) capabilities, and support for multiple cameras. Android Honeycomb is specially designed for tablets. This version of Android supports larger screen sizes. User Interface on Honeycomb is also different because it has been designed for tablets. Honeycomb also supports multi processors as well as hardware acceleration (hardware) for graphics. The first tablet made with running Honeycomb is Motorola Xoom. Tablet device with Android 3.0 platform will be coming soon in Indonesia. The device is called Eee Pad Transformer production from Asus. Indonesia market entry plan in May 2011. Announced on October 19, 2011, brings Honeycomb features to smartphones and adds new features including unlocking facial recognition, network monitoring and usage monitoring, integrated social network contacts, photography enhancements, offline email searching and sharing information using NFC. Features available on Android are:

- Application framework: it allows the use and deletion of available components.
- Dalvik virtual machine: virtual machine optimized for mobile devices.
- Graphics: graphics in 2D and 3D graphics based on the OpenGL library.

- SQLite: for data storage.
- Supports media: audio, video, and various image formats (MPEG4, H.264, MP3, AAC, AMR, JPG, PNG, GIF)
- GSM, Bluetooth, EDGE, 3G, and WiFi (hardware dependent)
- Camera, Global Positioning System (GPS), compass, and accelerometer (hardware dependent)

Android has many advantages as software that uses a computer code base that can be distributed openly so that users can create new applications in it. Android has built-in Google native apps like pushmail Gmail, Google Maps, and Google Calendar. Open source fans then build a community building and sharing of Android-based firmware with a number of customizations and additional features, such as lossless audio FLAC and the ability to store downloaded apps on microSD cards. They often update firmware packages and incorporate elements of Android functionality that have not been officially launched in a carrier-sanctioned firmware.

4. Game in Learning

4.1. Understanding the game

The word Game comes from English. In Indonesian Dictionary the term "game" means game. The game is part of playing and playing as well as part of the game, the two are interconnected. The game in this case refers to the notion of intellectual agility (Intellectual Playability Game) which is also defined as the arena of decisions and actions of players. In the game, there are targets to be achieved by the players. The game is a complex activity in which there are rules, play and culture. A game is a system where players engage in artificial conflict. Here players interact with systems and conflicts in the game is engineering or artificial. In the game there are rules that aim to limit the behavior of players and determine the game.

The definition of a game is a voluntary interaction activity, in which one or more players follow the rules that limit the behavior of these players, enforcing a conflict that can produce a clear and calculated ending. There are some notions about the game by some experts namely:

1. According to Augustine Nilwan, the game is a computer game made with techniques and methods of animation. If you want to deepen the use of animation

must understand the making of the game. Or if you want to make a game, then it should understand the techniques and methods of animation, because the two are related.

2. According to Hans Daeng, the game is an absolute part of the child's life and the game is an integral part of the process of forming the child's personality
3. Joan Freeman and Utami Munandar, Game of an activity that helps children achieve full development, whether physical, intellectual, social, moral, and emotional. So the definition of the game is an activity undertaken by some children to seek fun that can shape the child's personality process and help children achieve physical, intellectual, social, moral and emotional development.
4. Meanwhile, according to Kimpraswil in As'Adi Muhammad, said that the definition of the game is effort if self (if mind and physical) which is very useful for improvement and development of motivation, performance, and achievement in performing duties and interests of the organization better.

4.2. Educational game

Educational games are games specifically designed to teach the user a particular learning, developing concepts and understanding and guiding them to practice skills and motivating them to play them. According to Hurd and Jenuings, good design must meet the criteria of education game itself. There are several criteria of the educational game, among others:

1. Overall Value. The overall value of a game is centered on the design and length of game duration. This app is built with an interesting and interactive design. For long duration determination, this app uses the timer feature.
2. Can be used (Usability). Easy to use and accessible are important points for game makers. This application designs the system with a user friendly interface so that the user can easily access the application.
3. Accuracy (Accuracy). Accuracy can be interpreted as how the success of the model / picture of a game can be poured into the experiment or design. The design of this application must be in accordance with the game model at the planning stage.
4. Appropriateness (Appropriatness). Compatibility can be interpreted how the contents and design of the game can be adapted to the user's ability well. This

application provides the menu and features required by the user to help the user understanding in using the application.

5. **Relevance (Relevance).** Meaning can apply the contents of the game to the target user. In order to be relevant to the user, the system must guide them in achieving the learning objectives. Because this app is intended for children, the interface design must be in accordance with the nuances of children that display bright colors.
6. **Objectives.** Objectivity determines the purpose of the user and the criteria of success or failure. In this application objectivity is an attempt to learn the outcome of the game.
7. **Feedback.** Feedback should be provided to help the user understand that their game (performance) matches the game object or not. This app provides animations and sound effects that indicate the success or failure of the game.

4.3. Impact of education game

According to Edward, educational games have many positive impacts, among others: (1) Game widely used to teach a knowledge and build skills both in the field of education, business and military; (2) Effective games are used to build mathematical and reading abilities in children, evidenced by research conducted by Murphy and his colleagues in 2002; and (3) Games proven to be effective for helping asthmatic and diabetic children manage healthy living habits, research conducted by Lieberman in 1997 and McPherson and colleagues in 2007. Many businesses use educational games to build their employee skills as Cisco teaches their employees the introduction of basic tolls and network security through a game. In 2007 the US military used games in military personnel training such as aircraft flight simulations and the use of weapons systems.

In its development, the game can also be used as therapy for children. The benefits of this therapy include: First, children 'awake' when faced with the prospect of 'playing'. They are directly involved in social situations that teach skills while they are having fun. Those who are familiar with elements of play such as turn-taking, guarding rules, winning, losing and co-operative; Second, while children are actively involved with the game playing process, social and emotional challenges arise when educating or crises occur, thus providing a meaningful learning experience immediately; Third, play therapy children by providing a safe environment to practice new skills. The children feel relaxed

and the flow of discussion is easy in this setting; and fourth, clinical observations can be made and conclusions are drawn about children who do not increase the use of prosocial skills after extra learning and practice guidance. The existence of organic syndrome, mental health problems or child protection issues need to be investigated. Game progress on skills development and complexity with a strong focus on early intervention, ranging in age from 4 to 14. The game can be used sequentially for six to eight weeks and one session to cover certain skills. Young people will start with the game 'Joint Preparation' and work with 'Friendly Friends' and possibly for 'Thinkers'.

4.4. The criteria of children's games by age

Choosing the right child play for a child can be one of the most important things to do for children. Children are identical to play. Play is the world's most dominant child. In fact, to be more leverage in delivering lessons, early childhood education implements a system of learning while playing. This is due to the ability of the child's own brain who likes to do fun things like playing. Therefore, the learning method used must be tailored to the child's ability according to the age level. Thus, the lesson will be more easily accepted and absorbed by the child. However, parents should be wise in choosing the right kind of games for children.

There are several important phases in the child's age that need to be considered when choosing the right game for our children, among others:

1. Phase 0-2 years. In this early phase the child has an ability that is dominated by motor sensor capabilities in the child's brain. So it will be effective if the toys given to the child with a more striking form of color, smell and texture. Toys that use expressions can also be an alternative.
2. Phase 3-6 years. At this age children are getting interested to explore so that games that provoke their adventurous interests will greatly support the interests of children. It can also be used as a means to encourage children's self-confidence so that they do not hesitate to explore new things.
3. Pre-school phase. In this phase, children need a type of game that can develop their sense of cooperation and socialization skills. They need a kind of game that stimulates the ability to socialize with their new surroundings.

For the next phase, games that are suitable for children are games that have the ability to stimulate the ability of roles, agility, and creativity in children. By choosing the

right toys for children, we support their chances to learn more effectively and efficiently according to their own age phases. A wise selection of game types can help children to have a more balanced life ahead. Here the role of parents is very important in determining what is required by children by choosing the right type of game for them.

4.5. Model design

Design of learning according to experts known several models that have been developed. In general, the instructional design model can be classified into a class-oriented model, a system-oriented model, and a product-oriented model. The existence of these existing model variations can actually be beneficial. Some of these advantages, among others, are able to choose and apply one of the design model of learning that matches the characteristics encountered in the field. It can also develop and create derivative models from existing models, or can also research and develop existing designs to be tested and improved. In the development of this model, the ADDIE model, the researchers selected and used in the development of mobile learning learning model design.

4.5.1. Conceptual model

The conceptual model is an analytical model that describes the components of the product to be developed and related to its components. This model shows the relationship between concepts and does not show the sequence gradually. The order can start from anywhere. The conceptual model in this study is designed with functional process features that can be utilized by users to run android based learning games. The approach used as a conceptual model in the development of android based learning games. is the 3 P approach of people, process, and product. People are parties or people who utilize the android-based learning game model.. Process related to the ability of learning products based on android. in carrying out certain functions, while the product is a variety of services that can be utilized by people through a process run by a learning strategy.

Components of product users to be designed are learners who are in disaster areas for children aged between 6-8 years and teachers or facilitators. Teachers or facilitators have a responsibility and play an important role to run an android-based learning game product. It ensures that the learning strategy developed has been working as it should.

Components of learners in the assistance of teachers or facilitators actively follow the learning process and give his opinion about the android-based learning game products used in the learning process. The resulting product is an android based learning game product process components are the steps that must be done in the design of the model and materialized in creating a quality training process. Conceptual models in research and development are as follows: Based on the identification of post-disaster learning needs, it will be able to formulate the objectives of the learning that children can still learn although infrastructure facilities damaged by the disaster and trauma in children after the disaster can be reduced. The learning objective is the answer to the learning problems that emerged after the disaster occurring in the identification of the problem.

4.5.2. Procedural model

A procedural model is a descriptive model that describes the flow or procedural steps that must be followed to produce a particular product. Development process is the second stage. This stage includes (1) learning analysis, (2) determining mobile learning design, (3) development of mobile learning design, (4) implementation and (5) evaluation. This process includes analysis of learning needs, objectives, learning resources, and media. The materials are prepared based on the learning objectives to be achieved. The material is prepared based on the nature or scope and sequence of learning logic that has been prepared. In this process will involve many experts, in the field of education, multimedia, children, and psychology, content and evaluation. Preparation of android-based learning game design on the principle of learning is to provide a game method that contains learning elements and reduce trauma in children after the disaster.

Process evaluation in development is done by using formative and summative evaluation. Evaluation is a process to see if the learning system being built is successful, in accordance with the initial expectations or not. Actually the evaluation stage can occur in each of the four stages above. Evaluation can be done in two forms of evaluation that is formative and sumatif. Formative evaluation is carried out during and between these phases. The purpose of this evaluation is to improve the learning system created before the last version is implemented. Summative evaluation is done after the last version is implemented and aims to assess the effectiveness of the overall learning. Questions that can be asked in the evaluation phase are: (1) Is the learning objective achieved by the learner?; (2) How does the learner feel during the learning process? like

or dislike?; (3) Is there a learning element that works well or not well; (4) What should be improved?; (5) Is the information and or the message conveyed sufficiently clear and easy to understand?; and (6) Are learning interesting, important, and motivating?

The model concept developed in this research is the ADDIE model. The use of the ADDIE model in the development of audio-visual multimedia products for learning is well known. Parekh lists ADDIE as one of the multimedia application development methods for CBT products. The ADDIE model is also used for the development of multimedia-based websites, as well as other multimedia-based learning applications.

4.5.3. Physical model

After the development of android-based learning program is evaluated, the model of learning based on android is called the physical model. In the physical model is the implementation phase of the model. Implementation of the model implemented after declared effective and efficient.

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