

The Use of Computer-Generated Imagery in Socialization Media of Biopore Infiltration Hole

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Abstract

The biopore infiltration hole serves to increase water absorption and reduce inundation on the soil surface. This method will also help maintain groundwater reserves, especially in big cities where infiltration areas are increasingly narrow, as well as being a simple solution to solving the problem of accumulating organic waste at home. Based on the benefits of biopore which strongly support environmental conservation, it is necessary to socialize the utilization of biopore infiltration hole to the community. To increase the quality of messages in an animation, it can be applied by creating special effects using Computer-Generated Imagery (CGI). This study aims to create a socialization media of utilization of biopore infiltration hole based on two-dimensional animation using Computer-Generated Imagery.

Keywords

Computer-Generated Imagery, Two-Dimensional Animation, Biopore Infiltration Hole

1. Introduction

Floods often occur both in cities and villages, and one of the causes is poor drainage systems. In densely populated areas the drainage is usually poor due to the lack of water absorption by the soil. The biopore infiltration hole serves to increase water absorption and reduce inundation on the soil surface (Yohana et al. 2017). This method will also help maintain groundwater reserves, especially in big cities where infiltration areas are increasingly narrow, as well as being a simple solution to solving the problem of accumulating organic waste at home. The organic waste in the hole is food for earthworms. Worms that enter the hole will make small tunnels in the soil when they go to the hole containing organic waste (Permanasari et al. 2018). The tunnels made by earthworms will increase the surface area of the soil. This will certainly increase the capacity of the land to hold water. Based on the benefits of biopore which strongly support environmental conservation, it is necessary to socialize the utilization of biopore infiltration hole to the community. One way that can be applied is to create a socialization media based on two-dimensional animation.

The use of visual media to convey information between computers and their user has risen space. Computer graphics is a core technology in digital photography, film, video games, cell phone and computer displays, and many specialized applications. Computer graphics is responsible for displaying art and image data effectively and more quality to the customer. To increase the quality of messages in an animation, it can be applied by creating special effects. Computer-Generated Imagery (CGI) is the use of computer graphics to create special effects so that the audience can identify emotionally with certain characters in the reconstruction to increase the power of the message (Schofield 2016).

1.1 Objectives

This study aims to create a socialization media of utilization of biopore infiltration hole based on two-dimensional animation using CGI, so that can provide understanding to the audience so that they can independently make biopore infiltration hole to support environmental conservation.

2. Literature Review

CGI animation is the process used to produce an animated image aided computer graphics (Schofield 2016). CGI is a term commonly used for create static scenes and dynamic images, whereas computer animation only refers on the created moving image using a computer (Immaniar et al. 2015). CGI most commonly refers to the 3D computer

graphics used to create characters, scenes and special effects in films, television and games. The technology is also used in everything from advertising, architecture, engineering, virtual reality and even art (McDonald 2020). Immaniar et al. (2015) pointed out that CGI makes it possible filming will go well and the multimedia that is displayed will be in accordance with the scenario and according to the needs at the production stage. In its implementation, users of this CGI technology will had a positive impact on making films that used a lot of visual effects (Immaniar et al. 2015).

CGI animation uses the computer completely in the making of all films ranging from character creation, light effects, color, sound until rendering (Puspasari et al. 2012). Agustina et al. (2017) suggest that in order to make a realistic CGI, it needs a good texture of the model and the compositing technique to blend the footage with CGI and shadows. In their study conducted in Jakarta, Indonesia, Agustina et al. (2017) reveal that compositing is a technique which brings together several elements in the image or remove something that is not needed in the image. The purpose of the use of compositing namely to help realize the visual concepts that are not can be made at the time set.

3. Methods

3.1 Multimedia Development Life Cycle

This study uses procedural model, which is a descriptive model, presents the steps that must be followed to produce a product and test the feasibility of the resulting product. According to Moradmand et al. (2014), there are six stages of multimedia development life cycle. The animation of making biopore infiltration hole is made by following the stages in the multimedia development life cycle as follows:

3.1.1 Concept

The purpose of making animation is to make animation as a media of socialization to convey information about the benefits and ways of making biopore infiltration hole to the public. Concept preparation starts from determining ideas on how to provide an interesting spectacle of information for the audience (Martin et al. 2013), one of which is by making CGI animation. The conceptualization of the animation of making biopore infiltration hole can be seen in Table 1.

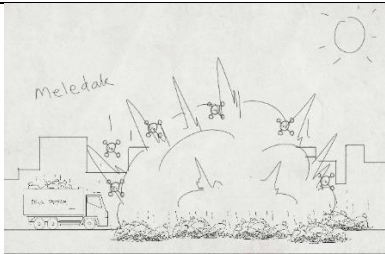
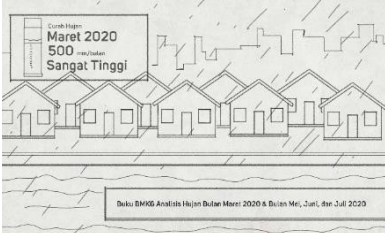


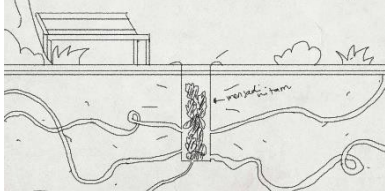
Table 1. Animation concept

| Category | Description |
|--------------------------|--|
| Title | Animation of Making Biopore Infiltration Hole. |
| Scope of Information | Groundwater crisis background, biopore introduction, the making of biopore infiltration hole, how the biopore infiltration hole works. |
| Type of Animation | Two dimensional (2D) animation. |
| Animation Technique | CGI Animation. |
| Audience | Public. |
| File Format of Image | .png and .jpeg |
| File Format of Audio | .mp3 |
| File Format of Animation | .swf and .mp4 |

3.1.2 Design

This is a stage of defining functional requirements and preparation for animation assembling, which includes making sketches and scenarios outlined in storyboard, and create narratives. The storyboard was made in fractions of scene and displayed guides like dialogues and actions shown in a scene (Blazer 2016). The animation design begins with the design of a storyboard that describes the sketches and scenarios for each scene (Orr et al. 2015). The storyboard helps to finalize the development of the storyline, and is an essential stage of the animation process. It is made up of drawings in the form of a comic strip, and is used to both help visualize the animation and to communicate ideas clearly (Gulati 2010). Table 2 shows the storyboard of scenes created using CGI animation.

Table 2. Storyboard

| Scene | Sequence | Scetch | Scenario | CGI Technique |
|-------|----------|---|--|---------------|
| 3 | 4 |  | Shows the methane gas explotion effect at the landfill | Glow |
| 4 | 1 |  | Shows the rain effect | CC Rainfall |
| 5 | 2 |  | Shows the effect of groundwater flow | Wave Wrap |
| | 4 |  | Shows the effect of landslide | Wiggle |
| 8 | 3 |  | Shows the weather change effect | Change Color |

3.1.3 Material Collecting

The necessary materials are collected before making the animation, including references related to biopore infiltration hole, images, animations, audio, and narratives. This stage can be carried out in parallel with the assembly stage (Ibrahim et al. 2015). However, in some cases the material collecting and assembly stages are carried out linearly and not parallel.

3.1.4 Assembly

The assembly stage is carried out based on the design that was made in the previous stage using compatible hardwares and softwares (Kumajas and Komansilan 2018). Some of the software used in the production of this animation includes

Adobe Photoshop CC 2018 which is used for editing images, Adobe After Effect CS6 for editing animation using computer-generated imagery techniques (Christiansen 2013), Adobe Audition CC 2017 for recording the narrator's voice, and Adobe Premiere CC 2015 for inserting sound effects, backgrounds, and narrator's voice in the rendered scene. Animation production using a computer with specifications including AMD A9-9420 Core Clock Processor, R5 Graphics, 8GB RAM, and 500GB Hard Disk.

3.1.5 Testing

Testing is carried out to measure the feasibility of animation that has been completed, whether the animation of utilization biopore infiltration hole is suitable for use as a media of socialization. There are two types of testing, namely alpha and beta. Alpha test is carried out by several practitioners in the field of two-dimensional animation, and beta test involves the heads of families as end users.

3.1.6 Distribution

If the test results decide that the animation of making biopore infiltration hole is suitable for socialization media, then at this final stage, the animation file is published via YouTube.

3.2 Likert Scale

The Likert Scale is a psychometric response scale, mainly used in questionnaire to get respondents preferences for a statement or set of reports (Subedi 2016). Likert scale method is used to analyze the answers obtained from the questionnaire. Through a Likert Scale, the variables to be measured are converted into variables indicators. Then these indicators are used as basis for making statements.

Researchers used five gradations of answers to statements from very positive to very negative, consisting of Strongly Agree, Agree, Agree Slightly, Disagree, and Strongly Disagree. Each answer is given a score as shown in Table 3.

Table 3. Answer score

| Criteria | Score |
|------------------------|-------|
| Strongly Agree (SA) | 5 |
| Agree (A) | 4 |
| Agree Slightly (AS) | 3 |
| Disagree (D) | 2 |
| Strongly Disagree (SD) | 1 |

The criteria for interpretation of respondents are determined by first calculating the interval between one criterion and another by reducing the highest score (5) to the lowest score (1), then dividing the results by the number of criteria (there are five), according to Equation 1 below:

$$\begin{aligned} \text{Interval} &= \frac{\text{The highest score} - \text{The lowest score}}{\text{number of criteria}} \\ &= \frac{5 - 1}{5} = 0,8 \end{aligned} \quad (1)$$

Thus, the criteria for interpretation of respondents are obtained as listed in Table 4.

Table 4. Respondent interpretation criteria

| Range | Interpretation |
|-------------|----------------|
| 1,00 – 1,80 | Very Poor |
| 1,81 – 2,61 | Poor |
| 2,61 – 3,41 | Acceptable |
| 3,41 – 4,21 | Good |
| 4,21 – 5,00 | Very Good |

3.3. Weight Means Score

The score of respondents interpretation of the statements in the questionnaire was obtained using the Weight Means Score analysis (Helmi et al. 2016), as shown in Equation 2.

$$M = \frac{\sum fx}{n} \quad (2)$$

M is the interpretation score, f is frequency, x is answer score, and n is number of respondents.

4. Data Collection

References related to biopore infiltration hole were obtained through interviews with Biology lecturers and literature studies sourced from books, journals, and the internet. The data collected for alpha and beta tests is through a questionnaire to determine the perceptions of practitioners and end users (Che Ku Mohd and Shabbodin 2015). Analysis of the answers obtained from questionnaire used calculations with the Likert Scale method, which was developed by Rensis Likert (1932).

5. Results and Discussion

5.1 The Results of The Use of Computer-Generated Imagery

Computer-Generated Imagery is used to provide special effects so that the visual animation look more attractive and realistic. The making of special effects in this animation lies in the effects of rain, weather change, water wave, gas explosion, earth rotation, and landslide. *Computer-Generated Imagery* software systems generally perform calculation for lighting, shading, depth-cueing, and antialiasing using approximations to tristimulus values, so as to model the physical mixing of light.

a. Change Color

Change Color is used to create a weather change effect, as shown in Figure 1.

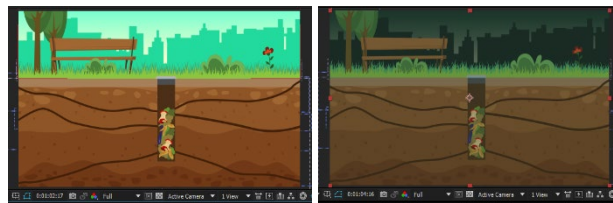


Figure 1. Implementation of change color for weather change effect

b. CC Rainfall

CC Rainfall is used to provide a rainfall effect, as shown in Figure 2.



Figure 2. Implementation of cc rainfall for rainfall effect

c. Wave Warp

Wave Warp can be used to create wave effects such as water, wind, or fire. In this animation, Wave Warp is used to provide a groundwater flow effect, as shown in Figure 3.



Figure 3. Implementation of wave warp for groundwater flow effect

d. Glow

Glow can be used to create light effects on objects. In this animation, glow is used to give the effect of the methane gas explosion to make it appear lit, as shown in Figure 4.



Figure 4. Implementation of glow for methane gas explosion effect

e. CC Sphere

CC Sphere is used to create a flat object effect into a sphere and control its rotation, such as the rotation of the earth. In this animation, CC Sphere is used on earth objects in the closing scene, as shown in Figure 5.

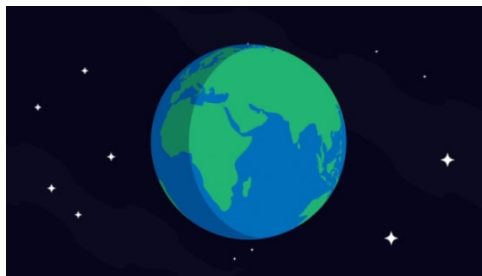


Figure 5. Implementation of cc sphere for rotation of the earth effect

f. Wiggle

Wiggle is used to create a vibration effect on random objects with a certain speed and distance. In this animation, Wiggle is used for the landslide effect, as shown in Figure 6.



Figure 6. Implementation of wiggle for landslide effect

5.2 Alpha and Beta Tests Results

Alpha test is carried out by five respondents who are practitioners in the field of two-dimensional animation. There are three assessment criteria, including visual clarity, consistency, communicative and aesthetics which are assessed by respondents by providing responses to the indicators of each criterion through a questionnaire, as shown in Table 5.

Table 5. Respondents assessment for alpha test

| # | Criteria | Indicators | SA | A | AS | D | SD |
|---|------------------------------|---|----|---|----|---|----|
| 1 | Visual Clarity | Character design looks attractive so that the relationship between the character and the audience is easy to build. | 3 | 2 | 0 | 0 | 0 |
| | | Coloring is able to convey the mood that is in each scene. | 3 | 2 | 0 | 0 | 0 |
| | | Lighting is able to emphasize the details in an image. | 3 | 2 | 0 | 0 | 0 |
| 2 | Consistency | The placement of the characters and the arrangement of the elements show a composition that is comfortable for the audience to see. | 1 | 4 | 0 | 0 | 0 |
| | | The background meets distance and perspective suitability. | 0 | 5 | 0 | 0 | 0 |
| | | Layout design can convey the right mood and support the story. | 0 | 5 | 0 | 0 | 0 |
| 3 | Communicative and Aesthetics | The use of a combination of images, animation | 5 | 0 | 0 | 0 | 0 |
| | | The use of Computer-Generated Imagery can be seen in animation effects. | 2 | 3 | 0 | 0 | 0 |
| | | The narrative voice is clear and understandable. | 3 | 2 | 0 | 0 | 0 |
| | | Background is able to add accent or meaning to the images that appear on the screen. | 1 | 4 | 0 | 0 | 0 |
| | | There is a common thread that unites in the story. | 1 | 4 | 0 | 0 | 0 |
| | | Stories can be surprising and unpredictable. | 0 | 3 | 2 | 0 | 0 |
| | | Stories can arouse audience curiosity. | 1 | 4 | 0 | 0 | 0 |
| | | Stories are trustworthy and logical. | 1 | 4 | 0 | 0 | 0 |
| | | The scenario flow shows the movement of the story from one event to another that is related to each other. | 4 | 1 | 0 | 0 | 0 |

The acquisition of interpretation scores from two-dimensional animation practitioners through alpha test using Equation 2 shows that the visual clarity criteria is 4.60, the consistency criteria is 4.07, the communicative and aesthetic criteria is 4.36. So that the interpretation score average from alpha test is 4.35.

The beta test was conducted by thirty-two respondents who were the head of the family as the end user. Assessment criteria which include accuracy, relevance, and completeness are assessed by respondents by providing responses to the indicators of each criterion through a questionnaire, as shown in Table 6.

Table 6. Respondents assessment for beta test

| # | Criteria | Indicators | SA | A | AS | D | SD |
|---|--------------|--|----|----|----|---|----|
| 1 | Accuracy | The biopore infiltration hole animation video is suitable for socialization media. | 15 | 15 | 2 | 0 | 0 |
| | | Making biopore infiltration hole is the right way to support groundwater return. | 18 | 10 | 4 | 0 | 0 |
| | | Making biopore infiltration hole is very useful so that it needs to be applied in the neighborhood. | 15 | 13 | 3 | 1 | 0 |
| 2 | Relevance | The information presented is clear and easy to understand. | 18 | 13 | 1 | 0 | 0 |
| | | Biopore infiltration hole need to be made in the environment where you live. | 17 | 12 | 3 | 0 | 0 |
| | | How to make biopore infiltration hole can be practiced alone in the neighborhood. | 15 | 12 | 5 | 0 | 0 |
| 3 | Completeness | Interesting animation display. | 13 | 14 | 4 | 0 | 1 |
| | | The animation looks good in scenarios, characters, settings, animation effects, text, layout, coloring, and backgrounds. | 11 | 15 | 5 | 1 | 0 |
| | | The narrative that is conveyed is clear and understandable. | 32 | 0 | 0 | 0 | 0 |
| | | The narration that is conveyed shows the suitability of the animation shown. | 14 | 15 | 2 | 1 | 0 |

The acquisition of interpretation scores from the heads of families through beta test using Equation 2 shows the accuracy criteria is 4.39, the relevance criteria is 4.43, the completeness criteria is 4.41. So that the interpretation score average from beta test is 4.41.

Based on the results of the alpha and beta tests, it can be concluded that two-dimensional animation using Computer-Generated Imagery techniques is very good to serve as a media for socializing biopore infiltration hole.

5.3 Distribution Result

The two-dimensional animation of biopore infiltration hole that have been rendered and compressed into .mp4 file format, then distributed to end users via publication on YouTube, as shown in Figure 7.



Figure 7. Socialization of biopore infiltration hole on YouTube

6. Conclusion

Two-dimensional animation created using Computer-Generated Imagery techniques to socialize biopore infiltration hole can provide understanding to the audience so that they can independently make biopore infiltration hole to support environmental conservation. Based on the results of the alpha and beta tests, it can be concluded that two-dimensional animation using Computer-Generated Imagery techniques is very good to serve as a media for socializing biopore infiltration hole. This research can be further developed using three-dimensional animation to make it look more real and improve the CGI technique so that it can provide a more lively effect.

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