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Designing 3D Animation about Breaststroke Swimming Technique Using MDLC Method

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Abstract

Drowning is serious, yet neglected health issue. Drowning is a leading cause of death for children and young people. The risk of drowning can be caused by many factors, one of them inability to swim. Swimming is a sports that exercise most parts of our body. Beside as a sport, swimming can also be a life saver. With this problem, author want to increase knowledge to prevent the risk of drowning by designing a 3D animation about breaststroke swimming technique. The design of animation uses Blender 3.6 and Adobe Premiere Pro software. Multimedia Development Life Cycle (MDLC) method was used on design process with interview to collect data. The result of this study is a 02:02 minutes 3D animation which is distributed using Youtube platform.

Keywords:

Drowning, Swimming, Breaststroke, Animation, MDLC

Introduction

Sports is a physical activity that plays an important role on body health and performance. Variety of sports simplify us from training our body, one of them is swimming. Swimming as a sport has been popular as it train all parts of our body and prevent the risk of drowning (Astuti & Ula, 2020). There are four swimming stroke that are effective to learn such as freestyle, breaststroke, butterfly and backstroke. Each has their own advantages, such as according to (Can et al., 2021), breaststroke swimming is mostly the first stroke taught during swimming lessons. That makes swimming a sport worth learning.

Swimming must be consider seriously not just as a sport, but a life saver. According to (World Health Organization, 2022), drowning is a leading cause of deaths for children and young people. The South-East Asia region has the second highest drowning rate in the world.

In Indonesia itself, there are estimately 4860 drowning reports which average 13 drowning per day. It conclude the importance of children and young people to learn how to swim.

Animation can be used as a tool to facilitate learning process. Animation is a collection of images that are arranged so it can look alive (Farida et al., 2022). Animation itself can be divided into 2 dimension and 3 dimension, which both have their own advantages. 2 dimension can be superior on the draw style while 3 dimension can show object from 3 view that can be more realistic (Aziz, 2019). Being interesting makes animation as a good information media so that it stays on audience memory for a longer time (Aisah et al., 2021).

In accordance to explanation above, author will design a 3D animation about breaststroke swimming technique using MDLC method as a knowledge that can prevent the risk of drowning.

Literature Review

Research conducted by (Novayani & Budiansyah, 2022) is a study to create a 3D animation as a learning media about history of Siak kingdom in Riau Province. The method used on this research is Multimedia Development Life Cycle (MDLC). The result of the research shows that MDLC method helps the process of animation clean and structured.

Research conducted by (Nofiar.Am, 2022) is a study to educate on process of palm oil processing using 3D animation. Method used by research is Multimedia Development Life Cycle (MDLC) that consist of 6 stages, concept, design, material collecting, assembly, testing and distribution. The result of the research is a 3D animation video on palm oil processing.

Research conducted by (Stevani & Santoso, 2019) is a study about short animation about chinese tradition and culture. Literature review and interview is used as a method to collect data. The result is a short 2D animation and culture.

Research conducted by (Can et al., 2021) is a study analyst on breaststroke swim technique on the athlete to improve their breaststroke technique. Research is supervised with 3 judgement that are expert on swimming sport. The result shows that the athlete technique is average and research can be used as a evaluation tool.

Research conducted by (Siswanto et al., 2023) is a study that make a 3D animated promotional video using Blender. Research uses Multimedia Development Life Cycle (MDLC) as method. The result of the study is a 3D animated promotional video using Blender that will attract visitor.

Based on the research above, author will design a 3D animation that can be used as a media (Nofiar.Am, 2022) about breaststroke technique (Can et al., 2021) based on data from interview (Stevani & Santoso, 2019). Multimedia Development Life Cycle (MDLC) will be used as a method so that research is clean and structured (Novayani & Budiansyah, 2022). Blender will be use to help author on 3D animation development (Siswanto et al., 2023).

Research Methods

This research was conducted first by collecting data with interview with swim coach on how to do breaststroke swim technique (Stevani & Santoso, 2019). The following questions will be asked to swim coach based on research conducted by (Can et al., 2021).

Table 1. Questionnaire

Number	Question
1.	What's breaststroke in swimming?
2.	Things to look out on performing breaststroke in swimming.
3.	Body position in breaststroke technique.
4.	Arm movement in breaststroke technique.
5.	Leg movement in breaststroke technique.
6.	Breathing in breaststroke technique.
7.	Movement coordination in breaststroke technique.

Based on the data collected, author will design a 3D animation on breaststroke technique using Multimedia Development Life Cycle (MDLC) method. Multimedia Development Life Cycle (MDLC) will be carried out into 6 stages, such as concept, design, material collecting, assembly, testing and distribution (Nofiar.Am, 2022).

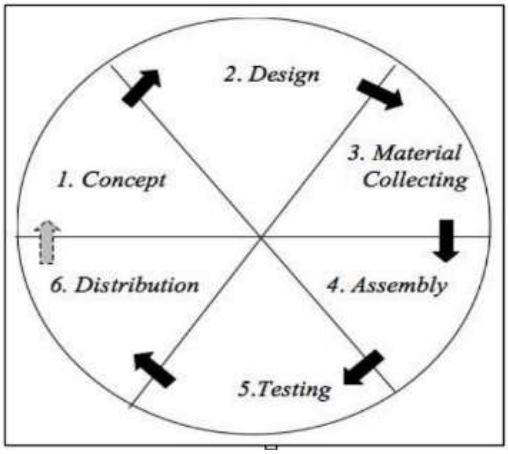
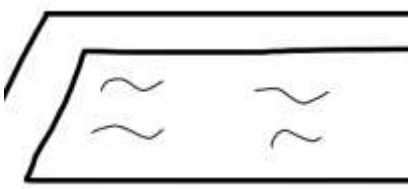
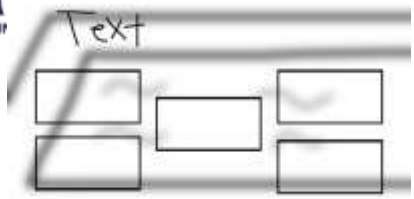
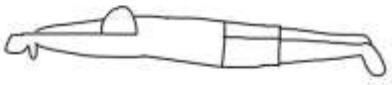
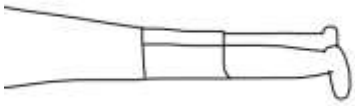
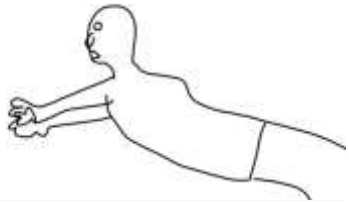


Figure 1. Multimedia Development Life Cycle (MDLC) stages

1. Concept
   In this stage, author will create a concept on how the 3D animation will be create based on data collected. The concept that will be implemented on the video will cover explanation of breaststroke, things to look out, arm, leg, breathing movement and movement coordination.
2. Design
   On design stage, author will make a storyboard based on the concept. Storyboard will give an explanation on how to animation will look like. The storyboard design will be shown below.

Table 2. Storyboard

Number	Scene	Explanation
1.		On first scene, background shows swimming pool and short explanation of breaststroke swimming.

2.		On second scene, the swimming pool as a background will be blurred and text will show what to look out on breaststroke technique.
3.		On third scene, scene will explain body position
4.		On forth scene, scene will explain arm movement with camera from top view
5.		On fifth scene, scene will explain leg movement
6.		On sixth scene, scene will explain breathing technique
7.		On the last scene, scene will explain movement coordination

3. Material Collecting
   On material collecting stage, author collect material that can help design process, such as 3D model and material texture. Male 3D human model obtained from Blender Studio and texture material from BlenderKit.
4. Assembly
   Assembly stage is the stage where 3D animation will be create based on material collected and storyboard design. Hardware and software that will be used will be shown below.

a. Software
   1) Blender 3.6
      Blender 3.6 is a open source 3D software. Blender 3.6 will be used to model swimming pool, pants, water. Male 3D human model will also be rigged using Rigify from Blender, then will be animated.

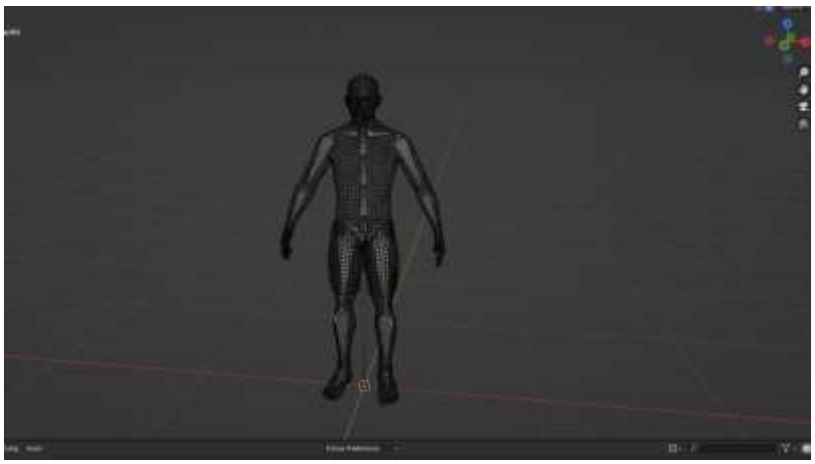


Figure 2. Rigging process

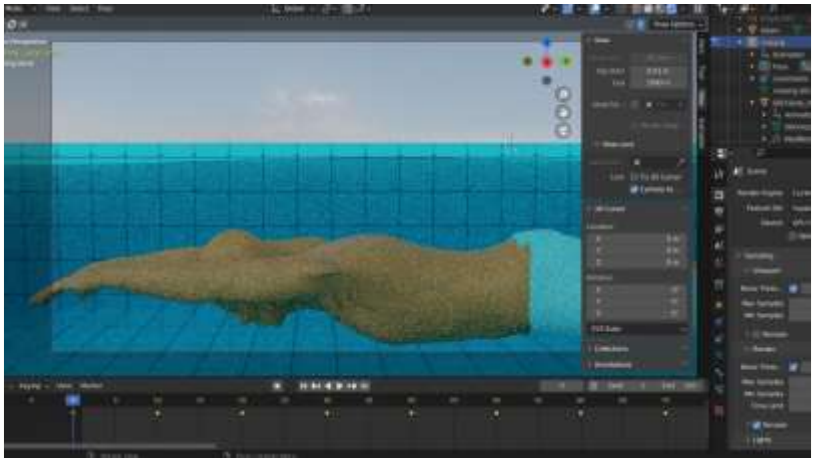


Figure 3. Animation process

   2) Adobe Premiere Pro
      Adobe Premiere Pro is a video editor software. 3D animation that has been create will be finalize with text and transition using Adobe Premiere Pro.

b. Hardware
   Hardware that will be use by author will be shown below.

Table 3. Author's Hardware

Operating System	Windows 11 Home 64-bit
System Manufacturer	HP
System Model	Victus by HP Laptop 16-e0088ax
Processor	AMD Ryzen 5 5600H with Radeon Graphics
Video Graphic	NVIDIA GeForce RTX 3060 Laptop GPU
Memory	32.00GB

5. Testing
   On testing stage, author will do a test of the finished result. Animation will be run and checked to make sure animation works properly before proceeding to next stage.
6. Distribution
   After all previous stage been completed, author will distribute 3D animation about breaststroke swimming technique on youtube to improve knowledge and prevent the risk of drowning.

Results and Discussion

Interview result with swim coach will be use as a data to design animation. Interview result based on questionnaire from Table 1 will be shown on shown below.

Table 4. Interview Result

Number	Interview result
1.	"Breaststroke is one of swimming strokes. It's the most common stroke that is learned by beginners."
2.	"There are alot of things to look out, but the most important thing is to master the basics. Such as body, arm, leg movement, breathing technique and movement coordination."
3.	"Body position of breaststroke swimming is to float, with body and head facing the water."
4.	"Where you should put your arm, your arm start from in front of your chest, your palm should clamped together vertically, then you push forward to top of your head. Then you pull your arm back to your chest by making a circle from the side of the body at once."
5.	"From the base body position, your leg should be floating, straight. You pull both of your knee closer to the stomach so your leg's opened. Next thing to do is kick the leg horizontally that bring the open leg to base position."
6.	"Breathing technique is easy, it's like a reflex from beginnner. You just pull your head up from the water to take a breath then put it back to the water. It should be coordinate with your arm movement."
7.	"With those basics, you should combine them with a coordination so it flows. First, you do the arm movement, when you about to pull your arm back to chest. You pull your head up from the water to breath. Next when the arm is pushing forward, your head goes back down and leg movement should start simultanously."

The final result of this research is a 3D animation about breaststroke swimming technique with 02:02 minutes duration as a media for knowledge and prevent the risk of drowning. Animation was designed using Multimedia Development Life Cycle (MDLC) method. Data from interview result helps author animation design more structured. The result will be shown as following.

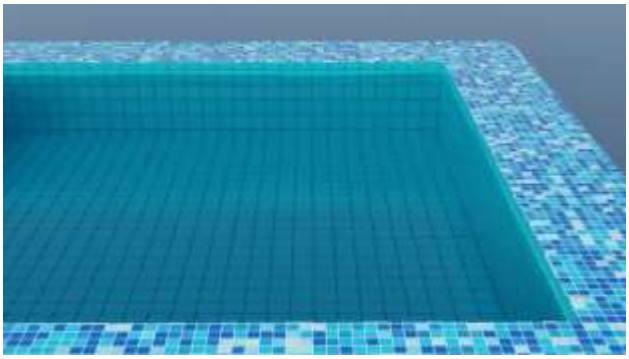


Figure 4. Swimming pool

The first scene starts with a swimming pool that camera panning from left to right. The first scene will also include short explanation about breaststroke swimming with text.

Figure 5. Things to look out

On the second scene, the background of the swimming pool from Figure 4 will be blur using Gaussian Blur. Text and videos will be played based on audio explaining things to look out on breaststroke swimming technique.

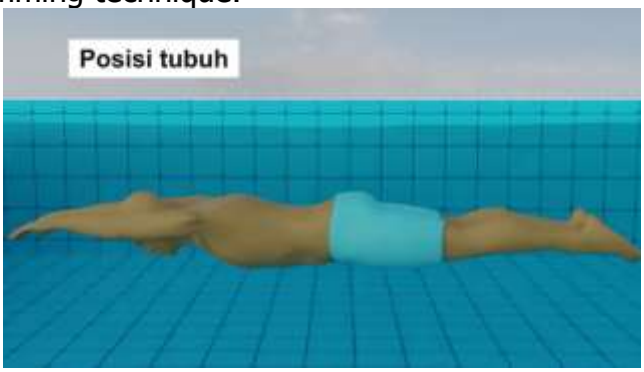


Figure 6. Body position

On the third scene, scene will show the body position of breaststroke swimming. Character will not be keyframed so it stay still while audio of body position being explained.

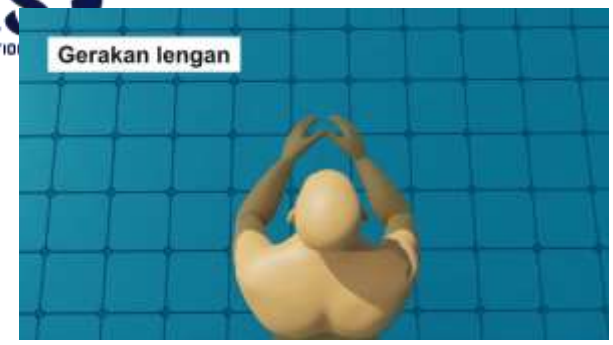


Figure 7. Arm movement

On the forth scene, camera will focus on top view of character to give a better view of arm movement. Character arm movement will be animate using keyframe.

Figure 8. Leg movement

On the fifth scene, character leg movement will be animated using keyframe as the forth scene, but with the camera focusing on character leg.

Figure 9. Breathing technique

On the sixth scene, character will be animated doing breaststroke breathing technique. The head will come out of the water to take a breath. The water from this animation is added using Ocean Modifier in Blender.

Figure 10. Movement coordination

On the last scene, camera will focus on the whole body of the character. Character will do arm, leg movement and breathing technique with coordination from data collected. Repeated movement will be looped using Cycles Modifier in Graph Editor.

Implementation of project has helped author to use animation to facilitate learning process. Animation is designed to be interesting, so it can stay in audience memory for a longer time. Data from interview result with swim coach helps author on how breaststroke swimming is done. Blender 3.6 as a open source 3D software makes animation process more simple. One of them is Rigify add-on from Blender that provide basic human bone on rigging. Animation then transferred to Adobe Premiere Pro to finalize by adding text and transition with keyframe function. Multimedia Development Life Cycle (MDLC) helps design process more structured. Final result is a 02:02 minutes 3D animation about breaststroke swimming technique that can be used as a media to prevent the risk of drowning.

Conclusions

The conclusion from the result of study "Designing 3D Animation about Breaststroke Swimming Technique Using MDLC Method" are shown below.

1. The design of animation can be used as a tool to faciliate learning process. Interesting 3D animation also helps as it stays in audience memory for a long time.
2. The design of animation collect data from interview with a swim coach and design using Multimedia Development Life Cycle (MDLC) method in 6 stages.
3. The process of designing animation is supported by using Blender 3.6 to model, rig and animate and Adobe Premiere Pro as a video editing software.
4. The result is a 02:02 minutes 3D animation about breaststroke swimming technique, that can be used as a media to prevent the risk of drowning.

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