

# Game Design Education "Terjumlah" Using Kinect Sensor

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**Abstract**— At present, the development of the game world is increasing. A lot of which utilize various sensors as input. However, many of these games have no educational value. Therefore, the game titled "Terjumlah" is designed, which has educational value, in this case math material. In the making of the game, collaborated using kinect sensor that can detect the movement of the user, to be more active and interactive.

**Keyword**— game education, kinect, creative

## I. INTRODUCTION

Technology provides facilities to help people. Today, technology has become a part of human life. Almost all aspects of human life using technology such as transportation, telecommunications, bisnis, finance, and others.

In fact, the game world cannot be separated from technological advances. There are so many tools that created the game, either a game console or even sensors for play. Technological developments are also triggered many emerging games that use technology as an input to be more interactive.

But many of these games have no educational value. Many of the game developers only prioritize the benefits only.

Because of that, many parents see that the game has no educational value. In fact, the game also has penetrated the world of education. One game that has educational value is "Terjumlah".

"Terjumlah" is a math game that utilizes the kinect sensor as a controller in the game. The title "Terjumlah" itself is an abbreviation of "terjun" which means plunging and "jumlah" which means summing in the Indonesian language, which is become the

theme of the game. In this design, the author will discuss about game design "Terjumlah".

The purpose of this paper is to explain how the game design process "Sums" by utilizing kinect sensors. How games are designed to be exciting, interactive, and educational.

## II. METHOD

### A. Game

The game is all activities performed only with pleasure and without a specific purpose. Thus everything that is fun is the game. For example, people who dance, playing music, and play as an actors are also called playing games [1].

### B. Game History

At first digital games are known as video games. Because at that time the public is not familiar with games that use the console. According to H. Bastian and Khamadi, digital games are games that are played with electronic media or games based on computer systems. The development of digital games began only as a commercial entertainment medium. Then the evolution of digital games began when the computer was developed as a game console. Steve Russel started this evolution with a game that uses computers as a console, namely "SpaceWar!". The popularity of digital games began to increase, and many electronics companies are competing to make a new breakthrough, until now [2].

### C. Kinect sensor

Kinect is a sensor that can detect the depth / distance of an object / point. Using the array system, kinect can see an object in three-dimensional form by utilizing the reflection of infrared light that has a certain pattern. Microsoft, as the developer of this device take advantage of it to recognize a person's

movement, which is then translated to run the command [3][4].

**D. Unity 3D**

Unity is a game engine that is quite popular among game developers. About 34% of the 1,000 free games made using Unity [5]. This software is in great demand because it can support many platforms, including PC (windows, Mac, Linux), Android, IOS, Windows Phone, even game console [6].

**E. Game Design**

In the game-making stage begins with the designer and the concept of the game to be created. Followed by the process of making game assets such as pictures, packages, as well as some supporting assets. When the game asset design is considered appropriate then the next stage is the stage of making the game. At this stage the assets that have been made are combined and added programming scripts. When the merging process is complete, beta testing begins, to ensure no bugs in the game are made. Once it has been confirmed there are no bugs, the game is ready for release.

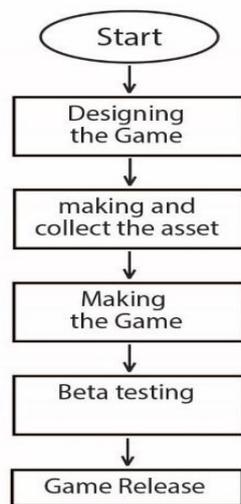


Figure 1. Flowchart game creation

**III. RESULT AND DISCUSSION**

**A. Design Process**

The process of making games there are several steps that must be passed, namely: (1) planning, (2) asset collection, (3) manufacture, and (4) testing. By using these stages game making will become more structured and efficient.

**B. Design**

The first stage is the design of the game itself. Game design includes the determination of goals, themes, until the course of game applications. The purpose of making the game "Terjumlah" is to serve a game app that has educational value in children. As the title stated, the theme taken is a fun parachute activity combined with the learning of mathematics.

Planning the way of application is depicted with the concept of the game. The game concept "Terjumlah" the main character acting as a paratrooper who must calculate the issues listed. How to answer the problem, is hitting a cloud that has same value. Total value of the cloud that was hit will be accumulated until it reaches the correct answer value or more. If the answer value is correct, it will get the score. Meanwhile, if the value exceeds the correct answer, it will lose one life reserves. Each game is given three life reserves in the form of a parachute.

**C. Collecting Assets**

In the making of games required assets. Assets are all materials needed in the making of games, such as pictures, sounds, programming scripts, and others.



Figure 2. Cloud and parachute assets



Figure 3. Button and icon image assets

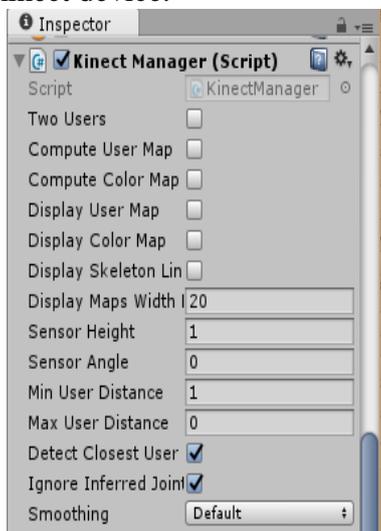
Figure 2 and Figure 3 are examples of assets for cloud images with numeric values, buttons, and icons.

**D. Game Making Plan**

When finished collecting the required assets, creating a game begins. This process is done inside the game engine which is a software to create an application. In the game design is used game engine Unity 3D, because when compared with other game engine, Unity 3D is relatively easy and familiar to game developers, making it easier to find reference usage or tutorial.

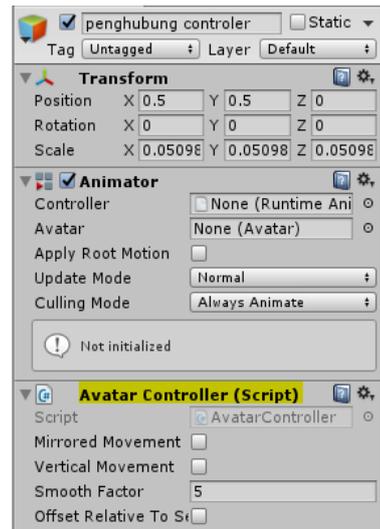
To utilize the kinect sensor as a game controller input, a "Kinect for Windows SDK" plugin is required. This plugin will read data from kinect device which then process it as input source. In addition it is also required asset "Kinect with MS-SDK" this asset can be obtained for free on Unity asset store.

After installing the "Kinect for Windows SDK" plugin and get the "Kinect with MS-SDK" asset, then sync game object, which is driven by kinect device input. In the game object main camera must also be given KinectManager.cs, that script to be able activate kinect device.



**Figure 4. Inspector window on the main camera**

Then prepare a game object "penghubung" that will be driven by kinect device. The game object will be as a parameter of movement on the main character, then add the AvatarController.cs script, which is on the Unity Package "Kinect with MS-SDK".



**Figure 5. Inspector window on "penghubung" game object**

After the game connecting object is complete, game development is done by combining the programming script with other assets. Game development "Terjumlah" is divided into two stages, which is the main menu section and the game play.

**E. Main Menu**

The main menu is a display where the user selects the arithmetic operation will be done when in the game. There are four choices of counting operations to choose from: sum, subtraction, multiplication and division.



**Figure 6 Main menu Display**

To select arithmetic operation menu, the player must position the main character on the options given, by moving to the left and to the right in front of the sensor kinect. The sensor will capture the player's movements and move the main characters on the game. The game will run if the main character is on a certain counting operation for 4 seconds.

## F. Game Play

In accordance with the title and theme, this game invites users to learn mathematics, as well as doing fun activities.

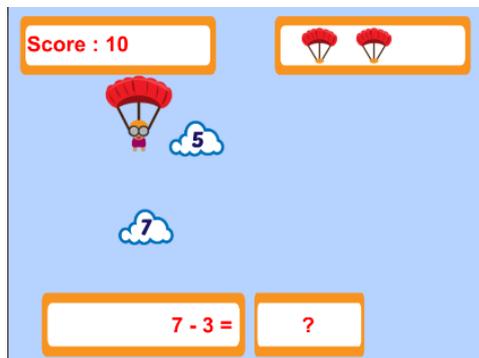


Figure 7. Gameplay display

As shown in Figure 7, players will be given a matter of choice according to the chosen oration. The main character described as a jumper should answer the question correctly to get a score. To answer the player must move the main character so that hit a cloud that has a certain value, the amount will be accumulated according to the correct answer.

If the answer is correct, it will get a score of 10. But if the accumulated value exceeds the correct answer, then the life will be reduced by one. Each game has 3 additional lives, if life is exhausted, it will return to the main menu. Just like the main menu, the main character movements are moved using kinect devices.

## IV. CONCLUSION

In designing the game "Terjumlah" is divided into two stages, namely the main menu and game play. then, to use the kinect sensor for input, a "Kinect for Windows SDK" plugin is required and an "Kinect with MS-SDK" asset from the Unity store. And also required game Unity 3D engine to build the game.

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## REFERENCES

- [1] W. Kramer, "What is a Game?," *www.thegamesjournal.com*, 2000. [Online]. Available: <http://www.thegamesjournal.com/articles/WhatIsaGame.shtml>. [Accessed: 30-Aug-2016].
- [2] H. Bastian and Khamadi, "Dampak Digital Game Terhadap Perkembangan Sosial Budaya Masyarakat," *Andharupa*, vol. 2, no. 1, pp. 33–44, 2016.
- [3] K. Khoshelham and S. O. Elberink, "Accuracy and resolution of kinect depth data for indoor mapping applications," *Sensors*, vol. 12, no. 2, pp. 1437–1454, 2012.
- [4] C. White, "Kinect 101: Introduction to Kinect for Windows," p. 1, 2014.
- [5] -, "Thirty-Four Percent Of Top Games Are Made With Unity," *unity3d.com*. [Online]. Available: <https://unity3d.com/public-relations>. [Accessed: 30-Aug-2016].
- [6] A. Luthfi, "Mengenai Unity, Engine Game Untuk Developer," *celebrity.okezone.com*, 2014. [Online]. Available: <http://celebrity.okezone.com/read/2014/11/28/207/1071900/mengenai-unity-engine-game-untuk-developer>. [Accessed: 30-Aug-2016].