

CHAPTER I

INTRODUCTION

This chapter explains the initial foundation of research which includes the background of the problem, problem formulation, research objectives, research benefits, and research limitations.

1.1. Background

Education is an important need in human life because through education, a person can develop abilities, attitudes, and behaviors that affect individual development. Education aims to realize a learning process that is able to develop one's potential with the support of materials, strategies, and planned assessment techniques [1]. However, in practice, students or students still often experience difficulties in understanding learning materials due to internal factors such as interests and motivation as well as external factors such as the learning environment and learning media used [2]. Learning methods that are less varied and seem monotonous are also one of the factors that make it difficult for students to understand the learning material [3].

These problems are often found in the learning of social sciences (Natural Sciences and Social Sciences) in elementary schools. Social studies materials have a wide enough scope of scientific and social concepts so that students are not only required to memorize facts, but also understand the relationship between concepts through observation and learning experiences [4]. In the Independent Curriculum Phase C, students are expected to be able to understand natural phenomena, the relationship between environmental components, and their relationship with daily life [5]. The characteristics of these achievements show that the learning process emphasizes the ability to classify and associate concepts, not just the introduction of terms. However, teacher-centered learning and minimal interaction cause a gap between the learning achievement target and the student's actual concept understanding [6]. This shows the need for learning media that not only presents information, but also facilitates learning activities that represent the relationship between concepts directly.

One of the widely used approaches to increase student engagement is the use of interactive digital media and game-based learning (*Game-Based Learning/GBL*). This approach combines elements of entertainment and learning so that students gain a hands-on learning experience through play activities [7]. Quartet card games are an

effective medium because they train memory, conceptual grouping, and social interaction, and have been shown to increase student motivation and learning outcomes [8], [9].

However, in its implementation, conventional learning games still have limitations. The game process relies on the supervision of the teacher or the player's agreement so the rules of the game are not always executed consistently. As a result, play activities cannot guarantee the formation process of concept in a structured manner, because the game mechanics are not controlled by a system that validates player interaction.

This problem shows the need for a digital game system that is able to execute game rules automatically through system logic. In this system, each player's action is validated by the program's logic so that the learning process occurs as a direct consequence of the user's interaction with the system, not just from the delivery of material.

To realize this, the quartet card game was adapted into a digital game using the Roblox Studio platform. *Platform* It provides an interactive three-dimensional development environment as well as features *Multiplayer* which allows for direct interaction between players in a single game room [10], [11]. Through the system *Multiplayer*, the rules of the game can be applied automatically and consistently so that the process of classification of concepts does not only occur as a play activity, but as a result of the mechanism of the system that is designed.

Based on these problems, this study developed a multiplayer educational game based on quartet cards on IPAS materials with the aim of building a game system that models game rules as part of the learning process and evaluates user responses to the use of the system.

1.2. Problem Formulation

Based on the background presented, the following is a formulation of the problems that are the focus of this study:

1. How is the implementation of the quartet card-based educational game on the Roblox Studio platform for elementary school IPAS materials?
2. How did the students' learning motivation respond after using the quartet's educational game?
3. How did students' understanding of IPAS concepts change after using the quartet's educational game?

1.3. Research Objectives

Based on the formulation of the problem that has been described, the objectives of this research are:

1. Implement a quartet card-based educational game on the Roblox Studio platform for elementary school science materials.
2. Analyze students' learning motivation responses after using educational games.
3. Analyze changes in students' understanding of science concepts based on pre-test and post-test results.

1.4. Research Benefits

The benefits that can be obtained from this research include the following:

1. Theoretical Benefits
 - a. Contributing to the development of educational games as an interactive learning system based on game mechanics.
 - b. Adding studies on the application of game rules into computer systems as a learning medium.
 - c. It is a reference for the application of the Roblox Studio platform in the development of multiplayer educational applications.
 - d. It is a reference for the development of a game-based learning system that integrates user interaction and learning materials.
2. Practical Benefits
 - a. Produce multiplayer-based IPAS educational games that can be used as an alternative to interactive learning media.
 - b. Provide media that facilitates the process of understanding concepts through classification activities and game interactions.
 - c. Provides examples of educational game implementations on the Roblox Studio platform.
 - d. Providing an alternative to the use of digital game technology as a means of learning in schools.

1.5. Research Limitations

This research has several limitations so that the discussion is more directed and focused, namely the following:

1. The learning material is focused on the subject of Science Phase C, with the scope of certain material according to the applicable curriculum.
2. The Learning Media developed is an educational game of digital quartet cards using the Roblox Studio platform with the Luau scripting language.
3. The research subject is limited to elementary school students.
4. The Development Model used is the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model.
5. The evaluation is focused on the students' motivation to learn and understanding of the social sciences material.
6. The implementation in this educational game focuses on grouping activities and introduction of concepts based on the unistructural and multistructural levels of the SOLO (Structure of the Observed Learning Outcome) approach used in the design of the Science Learning Outcomes Phase C by the Ministry of Education.