

The Use of Ladder Snake Games to Improve Learning Outcomes in Computer Networking

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Abstract—Educational games enable students to learn and play. The use of educational games as learning media can also encourage users to discover and build their own knowledge of learning. The purpose of this study is to show the impact of using educational games on student learning outcomes. Educational games can be used as an alternative choice as a learning media. The research instruments used were post test and pre test. Data analysis was done by comparing the results of the post test and pre test. This analysis was conducted to see whether there were changes in student learning outcomes. The results shows that students' learning outcome are increase by implementing educational games.

Keywords—Game, educational game, learning, learning outcome

1 Introduction

Educational games can be used as an alternative choice as a learning media. Educational games teach students to learn and play. Besides that the use of educational games as learning media can also provoke children's learning interest in learning material while playing. Educational games themselves are a combination of learning and playing activities. According to Prensky " Kids like all humans love to learn when it isn't forced upon them " [1]. According to Chan and Ahern "When people are intrinsically motivated to learn, they don't just learn more, they also have more positive experiences" [2]. While according to Brad Paras, "the game environment has great potential to be involved in the action of gaining this knowledge or skill, students must be motivated" [3]. From these statements, it can be concluded that educational games have the potential to motivate students and also provide positive experiences and the use of educational games as learning media can also encourage users to discover and build their own knowledge of learning.

Learning media has been developed in the form of snake ladder educational games using the Team Games Tournament (TGT) learning model [4]. This educational game run on desktop devices and are multiplayer. The game has been validated and tried. The validation are carried out by material experts and media experts by filling out instruments in the form of questionnaires and providing criticism and suggestions for the game, based on several aspects, namely content quality, learning goal alignment,

feedback and adaptation, motivation, presentation design, interaction usability, accessibility, and compliance standards [5]. This educational game gets 88.6% for media expert validation, 91.85% for media validation and for student trials it takes 91.33%. The snake ladder educational game is declared valid and feasible to use. Fig. 1 shows the main menu display.



Fig. 1. Main menu [4]

The menu page select the number of players in the educational game that has been developed is presented in Figure 3. On the main page there is a 2 player button, 3 player button, 4 player button, setting button, back button and hint button.

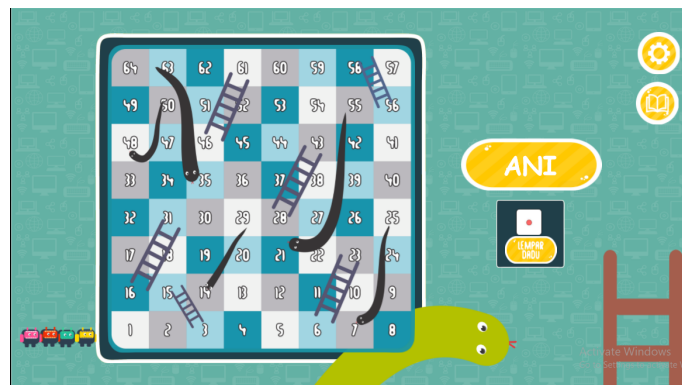


Fig. 2. Board game layout [4]

The snake ladder game page in the educational game that has been developed is presented in Fig. 2. On the snake ladder game page there is a snake ladder board display, player character, dice throw button, setting button, back button and hint button.

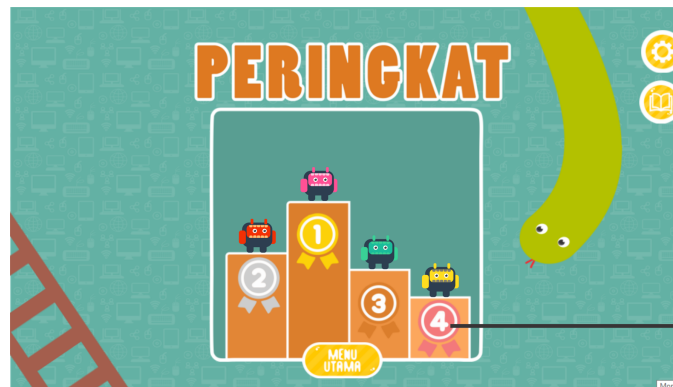


Fig. 3. Display of player ranking [4]

The player ranking page in the educational game that has been developed is presented in Figure 3. On the player ranking page there is a leaderboard display, player character, setting button, and hint button. The player's ranking page will appear when there is 1 player left who hasn't reached the last box.

This study aims to show whether educational games can improve student learning outcomes. The one group pretest posttest design will be used to analyze the study.

2 Related Works

This study integrates the educational game with the TGT learning model (Game Teams Tournament) on Computer and Basic Network subjects. The Teams Game Tournament (TGT) is one type of cooperative learning and is the same as the Student Team Achievement Divisions or STAD [6]. This study aims to show the impact of educational games on student learning outcomes. Educational game that will be used is educational game of snake ladder with TGT learning model. Educational games can train students' memory, because students will be trained to answer questions about the material. As well as, the educational game that will be developed contains questions about material that require student attention. The selection of snakes and ladders as a type of game is used because snakes and ladders are simple, global games. Snakes and ladders are games that have to be run in groups.

In addition, games developed are multiplayer, multiplayer games are effective in reviving the situation and livelihood of conflict or competition in a group in a new way [7]. Thus, in this study developed an evaluation tool in the form of a snake ladder educational game to improve student learning outcomes. In this study, it focuses on the impact of using educational games on learning outcomes, so the questions that arise in this study are student learning outcomes, increasing after using educational game of snake and leader?

One of the studies conducted on Roslina about Students Perceptions of Using Educational Games to Learn Introductory Programming [8]. In the study found findings that most students are interested in using educational games. Previously the Introduc-

tory Programming subjects was considered a difficult and boring subject but with educational games can increase learning motivation. In addition, the study found that crossword puzzles and guessing games can improve students' understanding but need to pay attention to the design of questions.

On the other side, Mania conducted a study of The Effect of Using Educational Games on the Students Achievement in English Language for the Primary Stage and found that the use of educational games can create a rich environment full of interaction and can improve learning outcomes [9]. The increase in learning outcomes is shown from the results of the posttest which has a higher value. Similarly, Emilija and Natasa about Game-based learning: educational games Azbuka to help young children learn writing Cyrillic letters found that with educational games, students are motivated to learn and receive material faster [10]. According to Duh et.al, what needs to be done at the time of their research is using applications for graphic users and playing logic. Interface design and game planning are easily understood by users without training.

In another study, by Virou suggested that with educational games students prefer even more amusing educational games than on conventional educational games [11]. In another study, it was also mentioned that educational games were more effective than traditional programming assignment for learning [12]. But it should be noted that not all educational games are good for learning. In the application of educational games, it is important to pay attention that digital games have a place in class but not to replace teachers [1]. So that educational games are expected to help teachers, not replace teachers because of the important role of teachers in learning. In addition, the educational games must have harmony with subjects, learning strategies, students learning styles, and the desired learning outcomes [13].

3 Method

The study used pre-experimental one group pretest-posttest design. This design observes one group without using a control group. The group will be treated during the experiment and changes will be seen. Fig. 4 shows the diagram of one group pretest-posttest design. The use of one group pretest-posttest design as a research design because it is considered suitable with the purpose of research is to show differences in learning outcomes. Differences in learning outcomes will be seen from the pretest and posttest. This research has been carried out with 30 students

Pretest is done before the group gets treatment so the pretest can represent the group's initial ability. The treatment here is the application of media to the group. posttest was conducted after the group received treatment so that the posttest could represent the group's final ability.

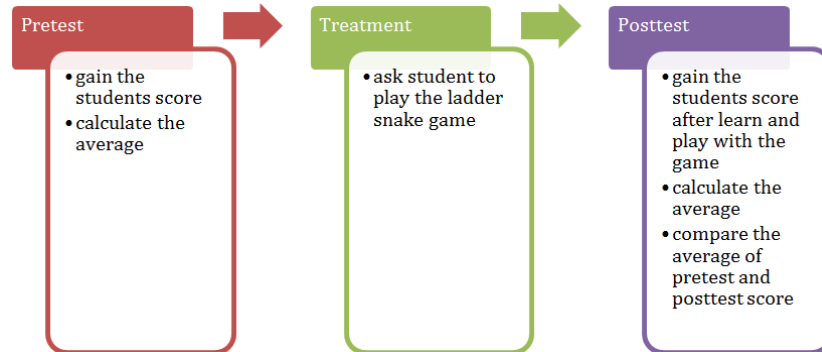


Fig. 4. One group pretest posttest design

There is one class that is used as the test subject in the 11th class. For determining the sample in this study using the probability sampling technique. This study uses two variables, namely the independent variable and the dependent variable. The independent variable is the educational game that used, and the dependent variable is student learning outcomes. The research instruments used were post test and pre test. Data analysis was done by comparing the results of the post test and pre test. This analysis was conducted to see whether there were changes in student learning outcomes.

4 Result and Discussion

After the research design implementation, the score was obtained from pretest and posttest stage. Figure 3 shows the average of pre test and post test that have been carried out.

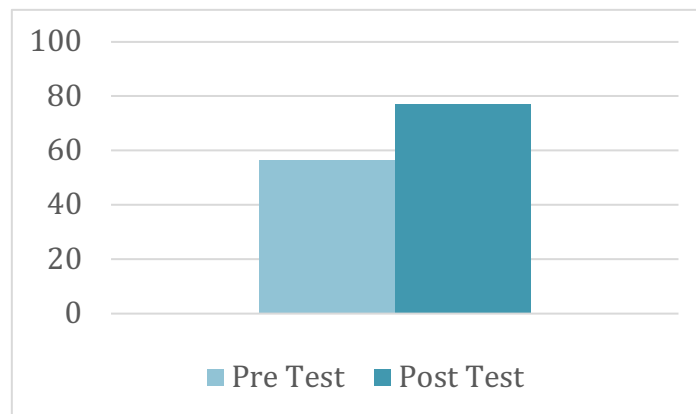


Fig. 5. The average of the pre test and post test

Based on the Fig. 5, it can be seen there is an improvement in the average student learning outcomes. The improvement of pretest and posttest score average is 56.56 to 77.22. With conditions where the post test score is higher than the pre test it can be concluded that there is an increase in student learning outcomes. The improvement in learning outcomes is 20.66 points. This result supported by other related research educational based games can increase the frequency of learning [14]. Besides that educational based games can increase students' motivation to learn. In addition, the educational game has two criteria for creating effective learning, namely by the existence of active experience and educational games capable of providing intrinsic motivation [3].

Although, learning through game is interesting and can increase the learning outcomes, it can also increase the game addiction. Therefore, the use of game on learning should consider its side effect in order to conduct the effective game-based learning.

5 Conclusion

This study assessed the educational game based learning media in the form of Snakes and Ladder. This educational game-based learning media is the same as the snake ladder game in general. The difference is that every time a player throws a dice, the player must answer the question correctly in order to walk or move the plot. The questions raised on this media are related to computer networking. This media allows students to play and learn simultaneously. The use of fun learning media is expected to motivate students to learn. Based on the results, there are improvement on the students learning outcomes. It shows from the improvement of the pretest and posttest average scores around 20%.

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