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The Effects of Game Simulation Implementation on Economics Concept Understanding

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ABSTRACT

Education in the 21st century integrates literacy skill, knowledge, life skills, attitudes and mastery of ICT. These skills can be developed by using learning methods, one of which is game simulation. This study was intended to analyze whether game simulation methods can improve students' conceptual understanding. This study employed a quasi-experimental with non-equivalent control group design. The samples were selected using a purposive sampling method. In this study, class X.IPS.1 was obtained to be the experimental group with a total of 30 people. The data were collected by using tests. Then, they were processed by using SPSS Version 25 software. The result indicated that the hypothesis testing was accepted which implied that there were differences in students' ability to understand Economics concepts after using the game simulation method. It was concluded that there were differences in students' conceptual understanding abilities before and after using the game simulation method. Therefore, this study was expected to be used as an alternative for Economics learning to construct a more meaningful atmosphere for students.

Keywords: *Game Simulation Method, Conceptual Understanding, Economics Learning*

1. INTRODUCTION

The 21st century is marked by rapid development of technology. Moreover, this century, also known as the century of information technology, globalization, and industrial revolution 4.0, is characterized by uncertainty, and increasingly complex lives and the economy [1]. In the 21st century, students require a diverse set of competencies to thrive in an ever-changing world. Here are several competencies that are often emphasized: (1) critical thinking and problem solving; (2) ability to communicate and elaborate; (3) ability to create and improve; (4) ability to use information and communication technologies to enhance performance and day-to-day tasks; (5) ability to engage in independent learning activities as part of personal development; and (6) media and information literacy skills [2], [3].

Education in the 21st century is integrating literacy skills, knowledge, life skills, attitudes, and ICT proficiency. Through activity-based learning can be developed which is integrated with competences and learning materials. The skills important for the 21st century also include high order thinking skills which are needed to prepare students to deal with the global

challenges [4]. One of the learning models which can be used to improve Economics decision making ability was the simulation model [5], [6]. In addition, one of the simulation models is game simulation.

According to [7] the methodology of "game simulation" refers to the use of games as instructional tools. According to [8], using game components and techniques in game setting helps learning and improves their effectiveness and efficiency when used during the learning process. Several researchers found that gamification can be a strong motivator [9] and a technique to enhance learners' abilities [10]. Game simulation is a game to enrich skills and knowledge acquisition [11]-[14]. Furthermore, game simulation can improve class dynamics and strengthen the interaction of students and teachers.

In Economics learning, the game simulation method was known since the 1960s. It is a learning model known as experiential learning [15]-[17]. The current study used *virtonomics games (business simulation games)* which provided an example on how to make a product until it is sold to the customer by considering several aspects such as how to make the product, the intended customers, and the media promotion as the way to attract customers. The business simulation can

be connected to modern economic challenges material in Social Science Class for grade 10 so that students would not feel bored and they could learn business processes.

The simulation was created to allow students to experience different social processes and realities and to test their reactions, as well as to acquire the concept of decision-making abilities. This was in line with [18] and [19] stated that the simulation method was also utilized as a tool in the learning system (assisting during decision making). The simulation method also provided an opportunity to do an experiment on a phenomenon and give a "sense" to something abstract.

A method of learning simulation is game simulation. According to [20] defined a game simulation is a setting in which students make and implement their choices, and accept the consequences of their choices to achieve the goal. In addition, the goal corresponds to the rules explicitly stated or referred to the system in the real world. Simulation games may involve collaboration or competition among players. Sometimes there are more than one winner in the game. A simulation game usually involves a number of actors who are required to act out of their roles according to certain guidelines. The interaction among the actors is essential, not only for realizing the simulation but also for the success of the game to get the objectives of the simulated teaching materials.

Davis (1994) explained that simulation games are different from other forms of simulation. He also stated that games can be separated from other types of simulation by the rules that govern what it means to 'win' the game and the sense of competition that they foster. There are usually winners and losers in games. Moreover, simulation games provided varied experiences for the players compared to conventional learning although the experience might be different from one another [21]. Some evidence proved that game simulation is as effective as other teaching methods. Therefore, some conditions should be put in consideration as followed:

1. Every student or group of students has equal opportunity to do the simulation.
2. Every student is involved directly in their roles.
3. Simulation procedure should be detailed or in outline.
4. The situation in simulation and the process expected to happen should be described in detail.

Business game simulation plays a crucial role in teaching and learning [22]. Several researchers have proven the great benefits of using game simulation in the classroom such as increasing students' enthusiasm

for learning, making students feel easy to understand the material being studied and creating more meaningful learning [23]-[25].

Business simulation game is one of the learning tools in the business world which can capture the processes occurred in a business. Players will learn to understand economic problems, so that they can choose the production to be carried out, how to produce it, for whom the goods are produced and market the products to consumers by considering several parameters such as economic problems, the amount of material, the number of products to be produced, the quantity of the products to be sold, the targeted customers and media promotion to attract consumers.

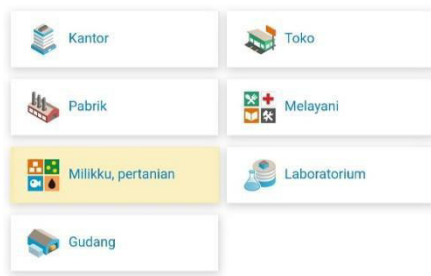
The expected learning to be obtained by students, in this case, is analyzing the relationship among decision choices that will affect the company. Thus, this business simulation game can be a reference for players to run a business in the real world. Hence, the hypothesis in this study: Is there an influence on understanding the concept of modern economic problems on students who use the game simulation method before and after being given some treatments?

2. RESEARCH METHODS

The current study was a quantitative study using a quasi-experimental design and non-equivalent control groups. This study's participants were students of Grade X.1 majoring in Social Science in a senior high school in Merauke. The total of the participants were 30 students consisting of 18 female and 12 male students. They should have learned about the basic concept of modern economic problems. However, they have not studied how to solve the problems in detail. Therefore, the students needed to use scientific models in game simulation to make decisions.

This study investigated the effect of game simulation that assisted students in understanding the basic concepts of modern economics and making the learning process more meaningful. This game used integrating computer game discipline principles [26] which combined activities and the game context. When students were involved in this activity, they must connect the game action with the interpretation of the action in decision making context. Figure 1 illustrates how the business context is simulated into a game which requires students to choose a type of business based on the economic problems they face. After understanding modern economic problems and choosing the type of business to be carried out, students will be led to an initial view of the selected type of business (Figure 2). Moreover, students are asked to complete the raw materials, the method to produce the product, the number of products to be produced, and for whom the goods are produced.

Pilih tipe unit yang akan dibangun



Buat unit bisnis



Figure 1. Virtonomics Game



Figure 2. The Initial View of Business

This game simulated business making based on the existing modern economy. The students were demanded to analyze data presented by the simulation, build a business model, experiment and test their business to solve the modern economic problems. The game is structured into subsequent sessions to help students solve economic problems sequentially through different models.

Modeling-based learning activities were carried out in two lesson hours or 90 minutes per session. In the first 45 minutes, students were given short material on the core problems of modern economics, and in the second 45 minutes, students were free to explore the problems, play simulation games, do the simulation and

build their own business model. Students were free to move anywhere during this activity with their own pace of learning. Then, students proceeded to the game. They were free to switch types of business depending on their conditions. Thus, they can solve modern economic problems by using a trial-and-error approach.

3. RESULTS AND DISCUSSION

The data acquired in this study were tested by using normality test and test of homogeneity before hypothesis testing was done. The hypothesis testing employed non parametric analysis using two related sample tests since the data from post-game simulation variables were not normally distributed.

Table 1. Normality Test Result

N		Mean Rank	Sum of Ranks
Post-simulation	Negative Ranks	1 ^a	2.00
Pre-simulation	Positive Ranks	29 ^b	433.00
Ties		0 ^c	
Total		30	

- a. Post-simulation < pre-simulation
- b. Post-simulation > pre-simulation

Table 2. Homogeneity Test Result

		Post-simulation – pre-simulation
Z		-4.683 ^a
Asymp. Sig. (2-tailed)		0.000

Table 3. Hypotesis Test

N		Mean Rank	Sum of Ranks
Post-simulation	Negative Ranks	1 ^a	2.00
Pre-simulation	Positive Ranks	29 ^b	433.00
Ties		0 ^c	
Total		30	

- a. Post-simulation < pre-simulation

b. Based on negative ranks

The test was a two-related sample test that was used to examine whether there were differences in test results achieved by students in the experimental class utilizing the game simulation approach between the pre-test and post-test. Because the significance of 0.000 was less than 0.05, the H_0 hypothesis was rejected. As a result, differences between pre-test and post-test result acquired by students in the experimental group employing the game simulation method can be concluded.

Learning success in the classroom is determined by many factors. One of which was the learning method. In learning, especially in Economics, teachers should avoid verbalism. Various methods can be used in learning and each of them had many activities that must be adapted to certain materials [27] stated that lessons would be more interesting and successful if they were connected to experiences in which students could see, feel, say, try, think and etc. Lessons were not only intellectual but also emotional. Thus, enjoyment during the learning can enhance learning outcomes. One of the ways was using realia or games.

The findings of this study suggested that comprehending the notion of modern economic problems was more appropriate by using game simulation method. This result was caused by many factors, one of which was making learning more fun and meaningful so that students could easily understand the concept of the material. Moreover, the result also emphasized the theory of behaviorism and constructivism. Behaviorism theory puts great emphasis on behavior that can be measured or observed. In addition, Edgar Dale's cone of experience explained the level of experience ranging from direct to experiences through communication symbols from concrete to abstract.

Constructivism theory builds an understanding of economic concepts through the students' experiences. The stronger the new experience attaches to students' mind, the deeper students' understanding would be. Students' understanding on economic concepts that was very close to students' daily life must be optimized into a stimulus in the economic learning process aimed at improving economic concept understanding.

There were several limitations of the current study. First, limited time to communicate with students. Moreover, the teacher had inadequate descriptions about intelligent and confident students', and the students with highly intelligent but shy. Some variations of the simulation were not pictured and the story was considered monotonous. Moreover, psychological factors such as shy and fear usually affected students in doing game simulation.

4. CONCLUSION

Overall, this study reviewed the effect of game simulation methods on students' understanding of the modern economic problems. Based on the research results demonstrated that game simulation played an important role in teaching and learning. This game simulation involved competition, experience, practice, analysis, strategy, decision making, collaboration, teamwork, motivation, understanding and application of theoretical concepts, active learning, integration of ideas and elements of fun. According to the findings of this investigation were differences in understanding the concept of modern economic problems in experimental group using game simulation methods.

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