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# THE EFFECT OF SOCIAL SIMULATION LEARNING MODELS ON IMPROVING SKILLS PROBLEM SOLVING FOR COLLAGE STUDENTS IN COLLEGE

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**Abstract**

This study was conducted to (1) test the social simulation learning model on college students ' problem-solving skills and (2) explore the social simulation learning process of college students' problem-solving skills. This research was developed with Joyce and Weil's learning model covering syntax, social systems, reaction principles, support systems, instructional impact and accompaniment impact. The developed learning model integrates social simulation models to improve problem-solving skills for college students in College. Three hundred one college students at five universities in West Sumatra were involved in the social simulation model. The results showed that the social simulation model had more impact on college students ' problem-solving skills when compared to the use of conventional learning models. Implications of findings in this research to understand the advantages and disadvantages of learning models developed and integrated into learning models.

**Keywords:** Social Simulation, Problem-Solving Skills

## INTRODUCTION

Simulation is often referred to as a situation that is not real because simulation is a model that adheres to abstract concepts and is difficult to understand when applied in the learning process (Sudrajat & Ujang, 2012). Simulation is a method that continues to be sought and integrated into teaching. Many researchers recommend simulation models as an efficient learning method for teaching social learning concepts in order to find solutions to existing problems. There are several definitions of summation found in a number of literature, for example, learning experiences through the use of situations that are not real by involving college students to prepare and find solutions to problems. Instead, college students are directed to determine specific characteristic decisions in modifying the actual situation. Another definition of simulation in the learning process refers to actual conditions that make changes during simulation activities (Subyantoro & Fadhilah, 2020); (Nhac, 2023).

Simulation models have been applied and taught on various topics in social learning, including essential social and cultural science learning that discusses social problems in society. This social simulation is also used in science learning. Most of the literature states that it is necessary to use simulation models to improve problem-solving skills in society (Ananda et al., 2022). The use of simulation models provides benefits to college students and lecturers. Lecturers can use this model for teaching methods with the assumption that all learning processes can be carried out directly on actual objects (Obro et al., 2021). One example of a simulation is a dress rehearsal, namely demonstrating the process of a particular ceremony as a practice for the actual ceremony so that it does not fail later. Likewise, to develop understanding and

appreciation of an event that is more directed towards psychomotor (Keskitalo, 2022). College students can use this simulation model to deal with actual situations in the field. Apart from that, simulations can develop college students' creativity by playing roles according to the topic being simulated.

A number of other literature recommend the use of simulation models to develop knowledge, attitudes and skills needed to deal with various problematic social situations. This simulation model represents various forms of learning, such as learning about social interactions, individuals, communities, cooperation and decision-making. Simulation models can also help college students build concepts by role-playing the material provided through learning videos (Wall et al., 2014).

Although many researchers have applied this social simulation model, which provides abstract concepts, in a review of other literature, it is also stated that there is little empirical research that recommends the use of social simulation models in improving college students' problem-solving skills in various social problems in society. In principle, most of the simulation models recommended for use in science are outside of empirical research studies.

Although other knowledge is supported by research, the development of simulation models has an impact on the learning process, which emphasizes social problem-solving. Several results that have a significant impact have been found, such as Hasturkoglu (2019) stating that the simulation model developed for training translators and interpreters is helpful for college students in the metacognitive aspect when compared with conventional models (Hasturkoglu, 2019). Johansson and Davidsson (2021) explored a social simulation model during COVID-19 based on a systemic review taken from 72 international journals (Hasturkoglu, 2020); (Lorig et al., 2021). The results show that the use of social simulation models can facilitate policy and take into account the prevailing circumstances. Anisah, Khadijah, and Ahkas (2020) found that college students who applied a social simulation model enhanced with children's social knowledge had better social intelligence than those who used conventional methods (Anisah et al., 2020).

In fact, empirical research on simulation model learning still needs to be carried out, especially when integrating social simulation models for social teaching for solving problems found in social life. This research was conducted to describe the effects of the Social Simulation Learning Model on Problem Solving for college students in College. There are a number of reasons to integrate social learning for problem-solving using social simulation models.

First, lectures appear monotonous due to college students' perception that social learning has not had an impact on daily life; Second, there is limited time to provide learning materials; third, the lack of facilities and infrastructure to support easy access to learning materials; fourth, college students lack interest in completing assignments given by the lecturer; fifth, lack of college students curiosity about the learning material provided.

In addition, current research focuses on evaluating the learning benefits of integrating social simulation models with other learning materials with varying impacts. Various factors have an impact on college students' problem-solving skills, such as the use of videos in learning, which can increase college students' competence in learning (Wamala, Robert; Seruwagi, 2013); (Tortorelli et al., 2021). A study of social simulation models applied using applications shows that simulation models on social systems

relate to a conceptual framework not only for the modeller but also for the social system processes that produce system specifications and system diagrams (Awad, 2020). The relationship between these systems provides a solution to the use of models when compared with ordinary simulation models. The process of understanding the application of this simulation model system is a tool for developing understanding and gaining new knowledge in certain situations.

Other researchers discuss simulation models in an educational context that are linked to science teaching and learning, increasing college students' creativity, fostering college students' interest (Brigas, 2019), and increasing motivation (Sahudra et al., 2019). Apart from that, this research shows that college students learning interactions in the classroom have increased (Saputra & Couch, 2018).

Although simulation models are often used to present concepts and practices, empirical research shows that social simulation models can be used in learning, both in applications and directly. In particular, there has yet to be research that integrates social simulation models for problem-solving in social life, especially in universities (Mulyaningtyas, 2018).

This research aims to elaborate on social simulation-based learning for solving problems in social life, especially in college (Chernikova et al., 2020). In particular, this research is helpful in the abstract for teaching actual situations using social simulation models for college students in ISBD courses. Apart from that, this research explores college students ' student's knowledge so as to develop creativity and foster college students ' student's interest in playing roles according to the material taught to them. To test the social simulation model used to improve college students' skills in problem-solving, the simulation model was integrated into ISBD learning. College students play roles with simulations to deal with various social situations faced in society (Bastos et al., 2021); (Wang, 2020).

The ISBD learning model applied to college students in tertiary institutions is assessed using a pretest to measure college students ' student's mastery in solving problems in ISBD learning in community life, which is integrated into social simulations. College students' learning activities in class were evaluated with a posttest to compare the validity of problem-solving in ISDB learning in social life in this research (Coyne et al., 2018).

Through this research, college students being able to participate in learning using a simulation model integrated with problem-solving in ISBD learning is better than not integrating a social simulation model in learning. This assumption is based on the simulation model seen as a conceptual form that facilitates building practice based on theory obtained from lecturers. In addition, social simulation models play a role in constructing knowledge abstractly and being practiced in situations that are not real (Cubbit, 2001).

## METHODS

The research took samples from 300 college students from five private and state universities in the West Sumatra region. All samples have social knowledge obtained from ISBD learning. These 300 college students took ISBD learning as a mandatory university course. The assessment of the level of college students' knowledge in ISBD learning integrated with social simulation models to improve problem-solving skills and tests were carried out to develop this research. The knowledge gained is high, as seen

by the level of success of college students in solving questions in simulation-based ISBD learning. The simulation model in this research was designed using the ADDIE model, which was developed and integrated into each learning material (Yousif et al., 2018).

During the learning process, college students are faced with the implications of social life in concept and practice. They are given case studies to solve problems in each material provided—development of materials developed and integrated with social simulation models. The results of material development are integrated through a simulation model using standard variance deviation, variability which is described empirically (Sierra, 2019). The simulation model integrated into the research aims to involve college students in problem-solving and data analysis. Learning materials identified as problems are used to evaluate solutions with simulation models. In the treatment, college students solve real-world problems in the form of case studies by reviewing various learning materials based on statistical data, such as mean and standard deviation. Social simulations explain to college students the situations in which they pretend to be in social life. In practice, these college students are faced with case studies in the form of social conflicts. This conflict helps college students solve problems when interacting with other college students in class.

The dependent variable of this research is problem-solving in ISBD learning (Jhon & Weil, 2016), as well as the practice time used during 16 meetings to apply the social simulation model. The simulation model was integrated into ISBD learning to develop and design teaching and assessment materials in this research. Skills are given, trained and assessed during the learning process with a simulation model, and each data is coded accordingly to obtain validity in using the social simulation model. The assessment instrument consists of 15 items developed to test college students' problem-solving skills who integrate social simulation models and are able to find solutions to problems given based on learning material.

In practice, five universities were divided into a control class and an experimental class. They were given a pretest to evaluate the level of college students' knowledge before integrating the social simulation model. The experimental class was given a posttest to evaluate college students ' students level of knowledge in understanding the learning material. The control class was not given treatment by applying a social simulation model by applying 15 items of assessment instruments. However, it was still given a posttest to compare the posttest results with the experimental class.

These two classes are assessed on each case study given to solve the problems found. Figure I presents the results of the pretest to assess the level of knowledge. Fifteen instruments have internal consistency, which is categorized as moderate (0.83). To collect data in the learning process, college students complete 16 case studies at each meeting, and then they are asked to solve the problems in the case studies according to Likert scale criteria from 5 (strongly agree) to 1 (disagree) with a correlation coefficient (9.8).

## Procedure

College students are selected randomly and then given assignments in groups to solve problems in case studies, which are given 40 minutes for problem-solving. College students are instructed to spend as much time as allotted to find solutions to conflicts or case studies given by the lecturer—simulation with in-class instruction designed to teach the concept of standard deviation. Then, college students completed a 10-

minute pretest. After selecting the essay, the exercise then carries out a post-test to evaluate the college student's level of knowledge and understanding of the learning material for 10 minutes. The following is an explanation of the procedures for implementing the social simulation learning model below (Saputra & Couch, 2018).

a) Simulation preparation is carried out by (1) determining the topic and problems to be achieved by the simulation; (2) lecturers providing descriptions of problems in situations where simulation is applied; (3) the lecturer determining the college student's role in involvement in the simulation process, the role is played according to the availability of time given; (4) lecturers provide opportunities for college students to ask questions, according to college students involvement in the role of the simulation process.

b) The simulation was carried out: (1) a group of college students carried out the simulation; (2) college students participated in the simulation process; (3) lecturers are expected to provide support for college students who experience difficulties. (4) simulations are expected to stop at peak times. This simulation is done to motivate college students to think about solving problems while the simulation process is in progress (Mukama & Byukusenge, 2023)

c) Closing is done through (1) providing a good discussion of the simulated lecture material. Lecturers should motivate college students to provide criticism and responses in the simulation process; (2) formulating conclusions in the simulation method, lecturers should provide preparatory steps so that they can achieve the results obtained—simulation in progress. College students are expected to take notes and make conclusions about the money given by their friends. Lecturers are responsible for accompanying college students during the simulation process and providing evaluations after the simulation process is complete.

## FINDINGS

The analysis is carried out ANOVA was carried out to test the validity of the research variables. This analysis treatment is based on a social simulation model with pretest scores. The following additional analysis uses simple regression analysis to determine whether or not social simulation models influence students' problem-solving abilities. Table 1 shows that there is a significant difference between the pretest and posttest results of the integration of the social simulation model. The effect of the social simulation model on college students' learning: action was taken using multivariate analysis to obtain significant results on learning. It was able to improve college students' problem-solving skills with a value of 0.71. This effect means that there is a significant increase seen from the results of the pretest and posttest.

**Table 1: Results Of The Pretest Normality Test In The Control Class And Experimental Class On College Students' Solving Skills**

| Class | Pretest | ANOVA |
|---|---|---|
| Control Class | 0.81 | 0.01 |
| Experimental Class | 0.84 | 0.02 |

Table 1 shows the difference in uni normality results between the pretest and posttest, which can be seen from the significance value of the control class and experimental class. The control class that did not receive social simulation learning model treatment obtained a pretest significance value of 0.81 with Anova 0.01. while the experimental

class received treatment, getting a pretest significance value of 0.84 with an ANOVA of 0.02. The two pretest results above show that there is no significant effect of using the social simulation model in improving college students' problem-solving skills, even though the ANOVA value in the experimental class is higher than the ANOVA value in the control class.

**Table 2: Posttest Normality Test Results In The Control And Experimental Classes Of The Social Simulation Learning Model In Improving College Students' Solving Skills**

| Class | Posttest | ANOVA |
|---|---|---|
| Control Class | 0.83 | 0.01 |
| Experimental Class | 0.89 | 0.02 |

Table 2 shows the differences in the results of the posttest normality test seen from the significance values of the control class and the experimental class. The control class did not receive the social simulation learning model treatment, achieving a significance value of 0.83 with an ANOVA of 0.01. Meanwhile, the experimental class received social simulation learning model treatment, getting a significance value of 0.89 with an ANOVA of 0.02. These two posttest results showed a significant difference because the control class that did not receive treatment received a score of 0.83, so there was no visible improvement in college students ' student's ability to solve problems in the case studies given by the lecturer. Meanwhile, the experimental class that received treatment obtained a score of 0.89, higher than the control class that did not receive treatment. The results of the posttest normality test for this experimental class showed that it had a significant effect and increased problem-solving skills in college students through the application of the social simulation model. Apart from that, this is also reinforced by the results of the ANOVA value for the control class of 0.01 and the experimental class of 0.02.

**Table 3: Homogeneity Test Results In The Control Class And Experimental Class On The Social Simulation Learning Model In Improving College Students' Solving Skills**

| Class | Significance Value | ANOVA |
|---|---|---|
| Control Class | 0.58 | 0.01 |
| Experimental Class | 0.71 | 0.02 |

Table 3 shows the differences in the results of the homogeneity test in the control class and the experimental class showing different significant values, namely, in the control class, a significant value of 0.58 with an ANOVA value of 0.01. Meanwhile, the experimental class got a significant value of 0.71 with an ANOVA value of 0.02. The two homogeneity test results show differences; there is a significant value for the experimental class, which has a higher significance value than the control class, while the ANOVA value for the experimental class also gets a higher value than the control class. It can be interpreted that the results of the experimental class homogeneity test affect college students' problem-solving skills through the application of the simulation learning model so that college students' problem-solving skills also increase.

**Table 4: Reliability Test Results In The Control Class And Experimental Class On The Social Simulation Learning Model In Improving College Students' Solving Skills**

| Items | Significance Value | Cronbach's Alpha |
|---|---|---|
| 4 | 0.10 | 0.83 |

Table 4 shows the results of the reliability test in this study with a significance value of 0.10 and a Cronbach's Alpha value of 0.83. Based on the classification of Cronbach's Alpha values in Nunally (1994), it is said that a variable is considered reliable if it gives a Cronbach's alpha value > 0.70, then the research is reliable. In Table 4, the Cronbach's Alpha value in the reliability test results was 0.83 with a significance value of 0.10. It can be stated that the results of this test are reliable because 0.83 > 0.70.

**Table 5: Reliability Test Results Of Practicality Instruments According To College Students Regarding The Social Simulation Learning Model In Improving Problem-Solving Skills**

| Items | Significance Value | Cronbach's Alpha |
|---|---|---|
| 4 | 0.6 | 0.87 |

Table 5 shows the results of the uniform reliability of practicality instruments according to college students regarding the social simulation learning model in improving problem-solving skills with a significance value of 0.6 and a Cronbach's Alpha value of 0.87. Based on the classification of Cronbach's Alpha values in Nunally (1994), it is said that a variable is considered reliable if it gives a Cronbach's alpha value > 0.70, then the research is reliable. In Table 5, the Cronbach's Alpha value in the reliability test results was 0.87 with a significance value of 0.6. It can be stated that the results of this test are reliable because 0.87 > 0.70.

**Table 6: Reliability Test Results Of Practicality Instruments According To Lecturers On The Social Simulation Learning Model In Improving Problem-Solving Skills**

| Items | Significance Value | Cronbach's Alpha |
|---|---|---|
| 4 | 0.4 | 0.76 |

Table 6 shows the results of the uniform reliability of practicality instruments according to lecturers regarding the social simulation learning model in improving problem-solving skills with a significance value of 0.4 and a Cronbach's Alpha value of 0.76. Based on the classification of Cronbach's Alpha values in Nunally (1994), it is said that a variable is considered reliable if it gives a Cronbach's alpha value > 0.70, then the research is reliable. In Table 6, the Cronbach's Alpha value in the reliability test results is 0.76 with a significance value of 0.4. It can be stated that the results of this test are reliable because 0.76 > 0.70.

**Table 7: Results Of A Simple Regression Test To Improve The Problem-Solving Ability Of Control Class Students**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Significant |
|---|---|---|---|---|---|
| | B | Standar Error | Beta | | |
| Contant | 24092.50 | 8618.582 | 299 | 6.257 | 0,005 |
| | 2.93287 | 316 | 861 | 6.222 | 0,005 |

Table 7 shows the results of a simple regression test on increasing students' problem-solving ability with a constant value of 24092.50 without applying a simulation model (X) equal to zero (0). The level of student problem-solving ability (Y) value is 24092.50.

The value of the regression coefficient is 2.93287 (X); if the student's solving ability has increased by 2.93287, then the student's problem-solving ability has increased against the application of the social simulation model by 2.93287. Conversely, if it decreases by 2.93287, then the application of social simulation models decreases by 2.93287.

The results of the interpretation of the t-test based on Table 7 obtained a t-test value of 6,257 with a significance value of 0.005, which can be interpreted that the results of the application of social simulation models have a significant effect on students' problem-solving abilities because 0.005 < 0.05 (a = 5%). The significance value of 0.005 means that the application of social simulation is 6,257. The results of this t-test stated that there was a significant influence between the application of social simulation and problem-solving abilities. The application of social simulation affects improving students' problem-solving abilities.

**Table 8: Results Of A Simple Regression Test To Improve The Problem-Solving Ability Of Experimental Class Students**

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Significant |
|---|---|---|---|---|---|
| | B | Standar Error | Beta | | |
| Contant | 30994.06 | 89776.291 | 300 | 8.768 | 0,71 |
| | 2.87264 | 396 | 908 | 9.282 | 00 |

Table 8 shows the results of a simple regression test on increasing students' problem-solving ability with a constant value of 30994.06 without applying a simulation model (X) equal to zero (0). The level of student problem-solving ability (Y) is 30994.06. The value of the regression coefficient is 2.87264 (X); if the student's solving ability has increased by 2.87264, then the student's problem-solving ability has increased against the application of the social simulation model by 2.87264. Conversely, if it decreases by 2.87264, then the application of social simulation models decreases by 2.87264.

The results of the interpretation of the t-test based on Table 7 obtained a t-test value of 8,768 with a significance value of 0.71, which can be interpreted that the results of the application of social simulation models have a significant effect on students' problem-solving abilities because 0.71 > 0.05 (a = 5%). The significance value of 0.005 means that the application of social simulation is 8,768. The results of this t-test stated that there was a significant influence between the application of social simulation and problem-solving abilities. The application of social simulation affects improving students' problem-solving abilities.

## Comparison Of Learning Based On The Social Simulation Model With Other Learning

To determine the increase in problem-solving skills through the application of the social simulation model. College students are asked to compare the social simulation learning model with other learning, such as conducting face-to-face lectures, reading textbooks, working on course assignments or group study in the form of discussions in class. This learning activity has been carried out frequently when compared with the social simulation learning model to understand better the content of the learning material with other learning activities. In particular, college students who did not receive social simulation model treatment in learning in the control class and college students who received social simulation model treatment in learning had different results, which were carried out using ANOVA analysis. Tables 1, 2, and 3 show that

the test scores in each table have experienced a significant increase, as shown in the following table.

**Table 9: Recapitulation Of Test Results In The Control Class And Experimental Class**

| No | Class | Pretest | Anova | Posttest | Anova | Normality test | Anova |
|---|---|---|---|---|---|---|---|
| 1 | Control Class | 0.81 | 0.01 | 0.83 | 0.01 | 0.58 | 0.01 |
| 2 | Experimental Class | 0.84 | 0.02 | 0.89 | 0.02 | 0.71 | 0.02 |

Table 9 shows a comparison of the test results in tables 1, 2, and 3, showing the test scores on the pretest and posttest and the results of the normality test in the control class. The three test value results have different significant values in each test value result; namely, in the control class, it has values of 0.81, 0.83, and 0.58 with ANOVA values of 0.01, 0.01, and 0.01. The results of this test value are lower when compared with the test values in the experimental class, which were 0.84, 0.89, 0.71 with anova of 0.02, 0.02 and 0.02. The test scores in the experimental class were higher than those in the control class. This comparison can be interpreted as that the experimental class that received treatment with the social simulation model had the effect of increasing college students' solving skills. The following table also proves other results.

**Table 10: Recapitulation Of Reliability Test Results On The Social Simulation Learning Model In Improving College Students Solving Skills**

| Classification | Items | Significance Value | Cronbach's Alpha |
|---|---|---|---|
| Reliability Test for Control Class and Experimental Class | 5 | 0.10 | 0.83 |
| Practicality Instrument According to college students | 5 | 0.6 | 0.87 |
| Practicality Instrument According to Lecturers | 4 | 0.4 | 0.76 |

Table 10 shows the results of the reliability test for the control class and experimental class; the practicality instrument, according to lecturers and college students, has an effect with significance values of 0.10, 0.6 and 0.4. Meanwhile, Cronbach's Alpha values are 0.83, 0.87 and 0.76. Based on the classification of Cronbach's Alpha values in Nunally (1994), it is said that a variable is said to be reliable if it gives a Cronbach's alpha value > 0.70, then the research is reliable. In Table 8, the Cronbach's Alpha value for the three reliability test results is above 0.70. It can be stated that these three reliability test results have an effect and have increased college students' problem-solving through the application of the social simulation learning model.

**Table 11: Recapitulation of Simple Linear Regression Test Results on Social Simulation Learning Models in Improving Students' Problem-Solving Skills Control Class and Experimental Class**

| Simple Linear Regression Test | Significance value | T Test Value | Linear Regression Test Value |
|---|---|---|---|
| Control Class | 0,005 | 6.257 | 24092.50 |
| Experiment Class | 0,071 | 8.768 | 30994.06 |

Table 11 shows the results of simple linear regression tests in the control and experimental classes, showing that the control class has a significance value of 0.005, and the experimental class obtained a significant value of 0.071. The result of the significance value of the experimental class is higher than that of the control class. The results of other values showed that the experimental class t-test value was higher

than the control class, with experimental class t-test values (8.768) and control class (0.005). The results of the simple regression value were shown in the experimental class of 30994.06 and the control class with a simple linear regression value of 24092.50. Based on the simple linear regression test value results, it is significant if the significance value < 0.05 (a = 5%), then the results of the simple linear regression test do not have a significant effect. The experimental class's three signification test results, t-test values, and simple linear regression values have higher values than the control class. The results of these three test scores have a significant effect and have increased student problem-solving by applying social simulation learning models.

## FINDINGS

The results of the research showed that 8 test results of the application of the social simulation learning model had an effect and increased college students' solving skills. The instruments presented during learning use a social simulation model and require college students to have creativity and skills in certain situations based on case studies given at each meeting. It can be said that these results are promising that social subjects can also determine college students ' thinking power and creativity regarding problems based on case studies given by lecturers. Apart from that, these results also include not only the experimental group, which received treatment with the social simulation learning model but also the control class, which received no treatment at all.

Previous research provides empirical evidence and benefits of using social simulation learning models that do not use social simulation learning models. This result is the result of identifying a group of learning activities that can be applied to other, more prominent groups using the social simulation learning model. The research results in Table 8 show that gaining knowledge from lecturers using the social simulation learning model obtained significant results with a Cronbach's Alpha value above 0.70. The results of simple regression test values above 0.05 show other results.These findings are in line with previous research showing the positive effects of social simulations on cognitive development (Ben Zvi, 2010; Chen, 2009).

## CONCLUSION

The research results show that the social simulation learning model has the effect of increasing college students' solving skills. This result was proven by ANOVA analysis by giving treatment to the experimental class and no treatment at all to the control class. Other results are supported by Cronbach's Alpha value, which is above 0.70, which means that the results of this study are reliable. The following result was reinforced by the results of a simple regression test value, which showed a significance value above 0.05, which can be interpreted as the application of social simulation models having a significant effect on improving students' problem-solving abilities. The results of this study show long-term impacts, such as improved problem-solving skills carried out inside and outside the classroom, but learning process meetings can be done online, which is not limited by space and time.

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