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# The Effect of Simulation-Based Experiential Learning Applications on Problem Solving Skills in Social Studies Education

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# The Effect of Simulation-Based Experiential Learning Applications on Problem Solving Skills in Social Studies Education*

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## Abstract

The study aims to reveal the effect of simulation-based experiential learning applications on gaining problem-solving skills in the Social Studies curriculum. The research was carried out in an experimental model, and the data were obtained according to the controlled pre-test and post-test approach. Social process simulation, as a type of social simulation, was preferred during the application process.Three new and originally developed social process simulations were used in the context of the simulation-based experiential learning applications for the learning theme of "Power, Management and Society" in the 7th grade social studies curriculum. According to the time prescribed in the program, the course implementation continued for 4 weeks (12 lessons) in total. The research was carried out in Usak's Karahallı District Cumhuriyet Secondary School. The research study group composed of 42 students; 21 students in the experimental group and 21 students in the control group participated in the research. The "Problem Solving Skills Scale" consisting of 4 dimensions was used as the research data collection tool. Mann Whitney U Test and Wilcoxon Signed Ranks Test as non-parametric tests were used to analyze the data obtained in the study. According to research results, the post-test results of the experimental group students who were educated in the simulation-based experiential learning model were significantly higher than the control group students who were educated with the methods prescribed in the programme. In conclusion, in this context, it has been reached that simulation-based experiential learning applications enhance students' problem-solving skills.

**Keywords:** Experiential learning, Simulation-based learning, Social studies education, Problem-solving skills

## Introduction

Many methods have been tried and applied in Social Studies Education. Due to the nature of Social Studies, many techniques can be applied and tested. According to the research conducted by Akçay, Akçay, and Kurt (2016), Social Studies teachers stated that they used the direct expression technique with 83%, the question-answer technique with 57%, and the homework technique with 54%. However, according to the personal qualifications required by the new era, such as lifelong learning skills, knowledge transfer to real cases, open-minded thinking skills are not possible to be acquired by using traditional learning methods (Çelikkaya & Kuş, 2009). Koç (2013) stated that teaching with traditional methods in Social Studies education is insufficient to gain skills such as creative thinking and problem-solving, which are included in general social studies. He states that new learning approaches that bring different perspectives to the learning and teaching process should be utilized to acquire such recent and important skills. For effective learning, the knowledge should be structured by the learner themselves learning by doing via problem analyzing and generating creative solutions to problems (Çiftçi, 2006). There are two domains in social studies education: teacher and knowledge transfer based teaching and the second is student and learning inquiry based teaching. Usually, such methods like discussion, role-playing, problem-based learning, etc. have been used in the student-centred domain (Wanzek, Kent, Vaughn, Swanson, Roberts & Haynes, 2015; Beck & Eno, 2012).

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Kan (2006), recommends using new-age recent methods in social studies education. In Social Studies education, when students actively participate in the lessons, they will observe the world, discover more, gain new experiences and transfer their knowledge to their daily life (Çelikkaya, 2014). Kumar and Lightner (2007) state that non-traditional methods such as games, simulations, interactive activities, and teaching based on digital learning are more valuable. However, Ruben (1999) also states that experiential learning and simulation-based education create more complex and diverse learning outcomes and encourage active learning, collaboration, and interaction. Tomlinson and Masuhara (2009) state that using games in education gives rapid real-time feedback and increases learning effectiveness regardless of discipline. Göncüoğlu (2010: 16) classified the methods commonly used in Social Studies education as teacher-oriented, interaction-oriented, individual-oriented, and life-oriented.

Experiential learning model focuses directly on experience much more than other life-oriented learning models. Experiential learning theory was developed according to the ideas of educators such as Jean Piaget, John Dewey, Lev Vygotski, Paulo Freire, Carl Jung, Kurt Lewin, Carl Rogers, and William James, who were among the pioneers of the movement that shaped the 20th century and focused on human development and learning. The theory has the following six principles (Passarelli & Kolb, 2011: 4-5):

1. Learning is not an outcome; it is a process.
2. All learning is re-learning of the existing.
3. Learning requires resolving the contrasts in the adaptation process to the world.
4. Learning is a holistic adaptation process.
5. Learning occurs as a result of synergetic interaction between the environment and humans.
6. Learning is the process of creating and revealing knowledge and experience.

Experiential learning theory defines learning as the process of transforming experiences into knowledge; however, it defines knowledge as the combination of understanding and transforming experience (Kolb, 2015: 49-51). Experiential learning is schematized with a cycle with 4 phases. These 4 phases are respectively;

Concrete Experience > Reflective Observation > Abstract Conceptualisation > Active Experimentation

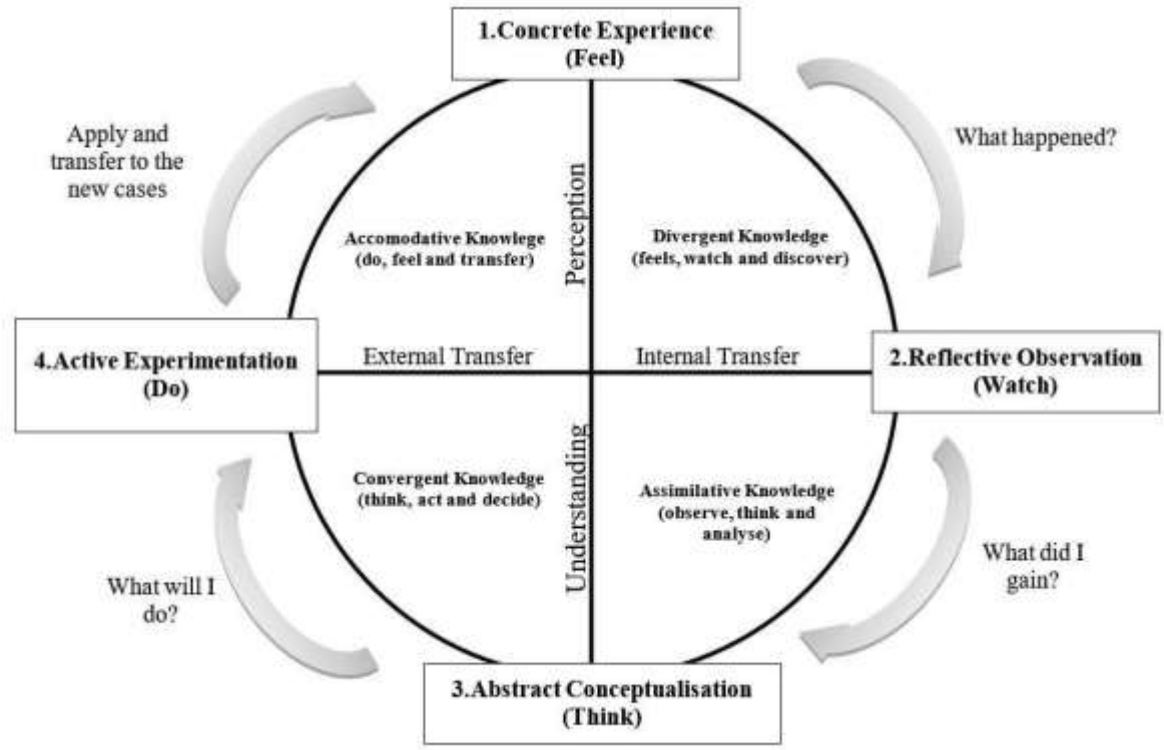



Figure 1. David Kolb’s Learning Styles Model and Experiential Learning Theory

Many methods and techniques are used while designing learning experiences in the experiential learning model. One of the essential methods is educational simulations in the experiential learning theory. Simulations are not excellent theoric and non-practical methods; conversely, it accommodates the practicality to the centre of learning; hence this situation transforms simulations into a learning tool that practically integrates complex skills required in real life (Hofstede, Caluwe & Peters, 2010). Simulated experiential environments are learning environments in which life-like fiction are created to reveal real-world-like reactions of participants in simulations (Keys & Wolfe, 1990). In addition, simulations are an educational method-technique that offers opportunities to experience a range of skill sets in dealing with future situations (Fowler & Pusch, 2010). Simulations are basically divided into three categories, and a detailed classification is presented below:

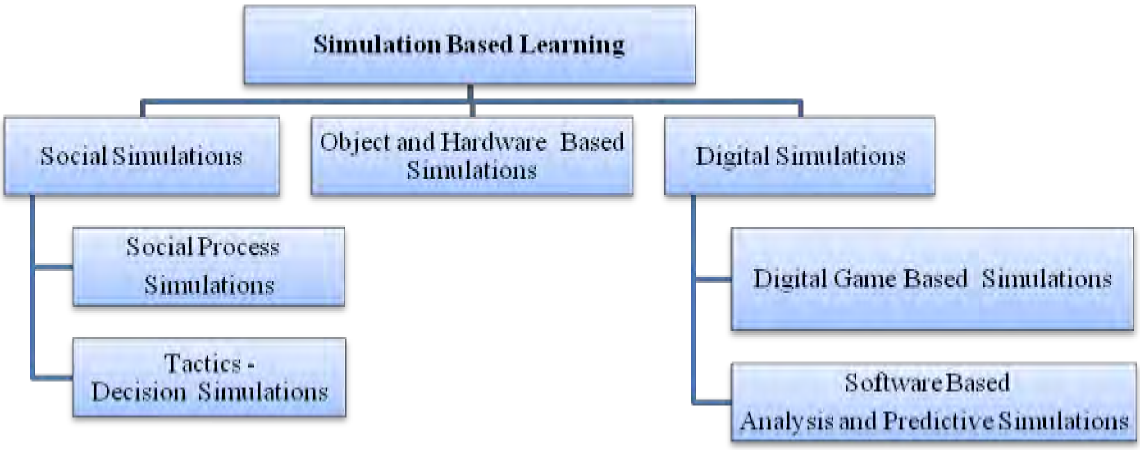



Figure 2. Simulation-Based Learning and Its Classification

Simulation-based education is a very proper method and technique for Social Studies education. Nemerow (1996) stated that playing social games in the classroom does not solve all the education problems, but it is a very effective method to include students in their learning processes. The simulation type used and developed within this research scope falls into the type of social process simulations. Social process simulations focus on human interaction and communication in developing social skills (Raybourn, 2006). Besides, Shubik (2009) states that simulation-based learning has many application areas and performs the following functions and objectives:

1. Increasing the learning motivation
2. Strengthening and encouraging the use of other methods in education
3. Teaching the theories with why, how, and their relationship
4. Making sense and creating meaningful relations between dynamic situations and learning
5. Developing and teaching interpersonal relationships
6. Contributing to the acculturation process of children
7. Acquiring various skills (academic skills, vital skills, etc.).

Social Studies education prioritizes skill-based learning, directly impacting learners' social life and increasing individual competencies with real elements in life. In this context, a severe effect will be made by using simulation games to provide students with many complex skills and values in skill-based education under the Social Studies discipline. Occasionally, it will be possible to teach abstract social issues to students in a deeply applied manner via social simulations. On the other hand, problem-solving skills, one of the most essential skills in 21'st century, also stand on a crucial point in the Social Studies programme. With this study, a practical and concrete application was made on how to increase students' problem-solving skills with the method of social process simulations. The study aims to reveal the effect of simulation-based experiential learning applications on gaining problem-solving skills in the Social Studies curriculum.

## Method

### Research Design

The research was designed in an experimental model with a controlled Pretest and post-test design. The experimental model is data acquisition by considering cause-effect relationships under the researcher's control to obtain data on a research subject (Fraenkel, Wallen & Hyun 2011: 265-266). Experimental models, that is, the experimental group and the control group, have two sub-patterns: A) Controlled posttest pattern, B)

Controlled pretest and posttest pattern; in this context, the research was developed in the design "Controlled pretest and posttest"..
In scientific studies, the research should be carried out according to certain process steps to obtain the most reliable and accurate findings suitable for the research purposes (Katılmış, 2010: 154). In this context, after designing the simulation and learning activities in the research, a seminar was held for the students and school administrators to present the experimental work and its steps. In a part of the seminar, the scales to be pre-tested by the researcher were applied to the experimental and control groups. Later, after four weeks of application, the scale was applied again as Post-test to the groups.

The research was completed following the rules of publication ethics. Ethical approval was obtained from Usak University Scientific Research and Publication Ethics Committee. (2021/11)

### Sample

The study was implemented in Cumhuriyet Secondary School 7/A and 7/B classes in Usak Province, Karahallı District. Class 7/B is the experimental group, and Class 7/A forms the control group. The research study groupresearch study group consists of 42 students; 21 students in the experimental group and 21 students in the control group participated in the research.

### Data Collection Tools

The *Problem Skills Inventory* for primary school students used in the study was developed by Bulut, Bulut Serin and Saygılı (2010), and permission for usage was obtained. The scale consists of 24 items and 3 sub-dimensions, and it was formed as 5-point Likert-type answers. In an experimental study, the relationship between dependent and independent variables is examined systematically and empirically; the independent variables that affect or will affect the result are manipulated (controlled) by the researcher and the changes are determined (Akkoyun, 1986: 295). From this point of view, three original simulations and new experiential learning activities designed by the researcher related to the 7$^{th}$ grade "Power, Management and Society" learning area were applied to the experimental group. In the control group, the lesson was taught with the method prescribed in the program.

Implementation lasted 5 weeks and 13 classes . First week there was introduction session took 1 class which was about the work process and pre-test collected from participants. In the following four weeks and 12 lessons, the researcher implemented 3 simulations and experiential learning activities and post-test data collected at the end of the whole lessons. Experiential learning activities comprised warm-up games, energisers, ice-breakers, team building activities, group division games, exercises etc. According to the Kolb's Learning Cycle, simulations started with "Concrete Experience" phase and case&scenario given, roles distributed, main activity held. In the second phase "Reflective Observation" pax discussed what happened, their feelings, their emotions and de-brief their thoughts about the learning objective and its relation together; feedbacks delivered by the facilitator. In the third phase "Abstract Conceptualisation", the researcher (facilitator) mentioned the lesson notes delivered before the session and formal informations given about the main subject and learning experiences linked with concrete actions in the former episode. Within the fourth phase "Active Experimentation" the learning transfer sheet was distributed to the pax. They imagined how they transfer their whole learning journey and its outputs to real-life cases.

### Data Analysis

In analyzing the data, the necessity of applying non-parametric tests arose since each experimental group and the control group was under 30 people. In cases where the data cannot meet the assumptions and conditions in parametric tests and in the absence of normal distribution, it is necessary to use non-parametric tests (Karagöz, 2010: 18-19). As a parametric domain, the dependent samples t-test helps measure the attitude scores, anxiety levels, etc., of a group before and after the implementation. Non-parametric equivalent of dependent samples t-test is Wilcoxon Signed Ranks Test (Büyüköztürk, Çokluk & Köklü, 2013: 154-211). In the study, the non-parametric tests Wilcoxon t-test (Wilcoxon Signed Ranks Test) analysis was conducted to evaluate the change within the groups and among the groups before and after the application.

Within this research scope, the pre-test - post-test results of the study group were examined; whether there was a significant difference within the group and between groups was statistically analyzed. Differences between two independent groups (experimental and control group) were analyzed using the Mann Whitney U Test (U). The differences between the two dependent variables (problem-solving skills pre-test and post-test scale scores) before and after the application were controlled by Wilcoxon Signed Ranks Test (Z) analysis. Analyzes were completed at 0.05 significance and 95% confidence level.

## Findings

There are 2 main problems in the research:

P1: Is there a significant difference between the experimental group where the simulation-based experiential learning approach was applied and the control group's problem-solving skills pre-test and post-test mean scores?

Table 1. Examination of the problem-solving skills between groups scores in simulation-based learning

| Scale | Test | Group | X̄ | ss | Median (Min.-Max.) | U | *p* |
|---|---|---|---|---|---|---|---|
| Confidence dimension in problem solving skills | Pretest | Experiment | 37,43 | 9,24 | 37(17-57) | -3,400 | 0,001* |
| | | Control | 46,29 | 5,45 | 46(36-57) | | |
| | Posttest | Experiment | 44,48 | 9,48 | 47(25-57) | -0,315 | 0,753 |
| | | Control | 45,67 | 9,11 | 47(32-60) | | |
| Self-control dimension in problem solving skills | Pretest | Experiment | 21,95 | 6,14 | 24(14-32) | -1,653 | 0,098 |
| | | Control | 25,24 | 5,66 | 26(14-34) | | |
| | Posttest | Experiment | 23,05 | 5,91 | 25(12-32) | -1,172 | 0,241 |
| | | Control | 25,19 | 6,31 | 26(11-34) | | |
| Avoidance dimension in problem solving skills | Pretest | Experiment | 17,62 | 4,54 | 18(9-24) | -2,203 | 0,028* |
| | | Control | 20,71 | 2,72 | 21(15-25) | | |
| | Posttest | Experiment | 18,86 | 4,32 | 20(10-25) | -0,101 | 0,919 |
| | | Control | 18,9 | 4,67 | 19(8-25) | | |
| Problem solving skills overall total | Pretest | Experiment | 77,0 | 13,45 | 74(58-108) | -0,629 | 0,529 |
| | | Control | 92,24 | 10,92 | 94(74-114) | | |
| | Posttest | Experiment | 86,38 | 13,41 | 85(63-111) | -3,588 | 0,000* |
| | | Control | 89,76 | 15,44 | 87(66-118) | | |

U: Mann Whitney U Test (Intergroup comparisons)
*: $p<0,05$ (Statistically significant)

Examining Table 1, the result of the Mann Whitney between-groups U analysis is a statistically significant difference between the control and experimental groups' scores on the pretest of the "confidence in problem-solving skills" dimension, the pretest of the "avoidance" dimension, and the posttest of the "problem-solving skills" totality [U= -3.400, U= -2.203, U= -3.588; p < 0.05].Accordingly, the pre-test scores of *"Confidence in Problem Solving Skills"* dimension, the pre-test of *"Avoidance"* dimension, and the post-test of *"Problem Solving Skills"* scale of the control group were significantly higher than the experimental group. As a result of the Mann Whitney U analysis applied, there is no statistically significant difference between the control and experimental groups post-test of *"Confidence in Problem Solving Skills*" dimension, the pre-test and post-test of *"Self Control"* dimension, the post-test of *"Avoidance"* dimension and the pre-test *"Problem Solving Skills"* scale general scores [U= -0.315, U= -1.653, U= -1.172, U= -0.101, U= -0.629; *p*> 0.05].

Also, when Table 1 is examined, the result of the Mann Whitney U analysis applied is that there is no statistically significant difference between the experimental group, in which the simulation-based experiential learning approach was used, and the control group, in which the instruction provided in the programme was used, in terms of overall pretest problem-solving skills mean scores [U= -0.629; p > 0.05].There is a statistically significant difference between the experimental group, in which the simulation-based experiential learning approach was used, and the control group, in which the instruction provided in the programme was used, in terms of the mean score of the post-test problem-solving skills [U= -3.588; p < 0.05].From this point of view, it was found that simulation-based experiential learning applications improve students' problem-solving skills.
P2: Is there a significant difference between the in-group problem-solving skills pre-test and post-test mean scores of the experimental group. The simulation-based experiential learning approach was applied and the control group?

Table 2. Examination of problem-solving skills in group pret-est and post-test mean scores in simulation-based learning

| Scale | Group | Test | X̄ | ss | Median (Min.-Max.) | Z | p |
|---|---|---|---|---|---|---|---|
| Confidence in problem solving skills | Experiment | Pretest | 37,43 | 9,24 | 37(17-57) | -3,309 | 0,001* |
| | | Posttest | 44,48 | 9,48 | 47(25-57) | | |
| | Control | Pretest | 46,29 | 5,45 | 46(36-57) | -0,323 | 0,747 |
| | | Posttest | 45,67 | 9,11 | 47(32-60) | | |
| Self-control in problem solving skills | Experiment | Pretest | 21,95 | 6,14 | 24(14-32) | -0,829 | 0,407 |
| | | Posttest | 23,05 | 5,91 | 25(12-32) | | |
| | Control | Pretest | 25,24 | 5,66 | 26(14-34) | -0,061 | 0,951 |
| | | Posttest | 25,19 | 6,31 | 26(11-34) | | |
| Avoidance in problem solving skills | Experiment | Pretest | 17,62 | 4,54 | 18(9-24) | -1,267 | 0,205 |
| | | Posttest | 18,86 | 4,32 | 20(10-25) | | |
| | Control | Pretest | 20,71 | 2,72 | 21(15-25) | -1,935 | 0,053 |
| | | Posttest | 18,9 | 4,67 | 19(8-25) | | |
| Problem solving skills overall total | Experiment | Pretest | 77,0 | 13,45 | 74(58-108) | -4,017 | 0,000* |
| | | Posttest | 86,38 | 13,41 | 85(63-111) | | |
| | Control | Pretest | 92,24 | 10,92 | 94(74-114) | -1,159 | 0,246 |
| | | Posttest | 89,76 | 15,44 | 87(66-118) | | |

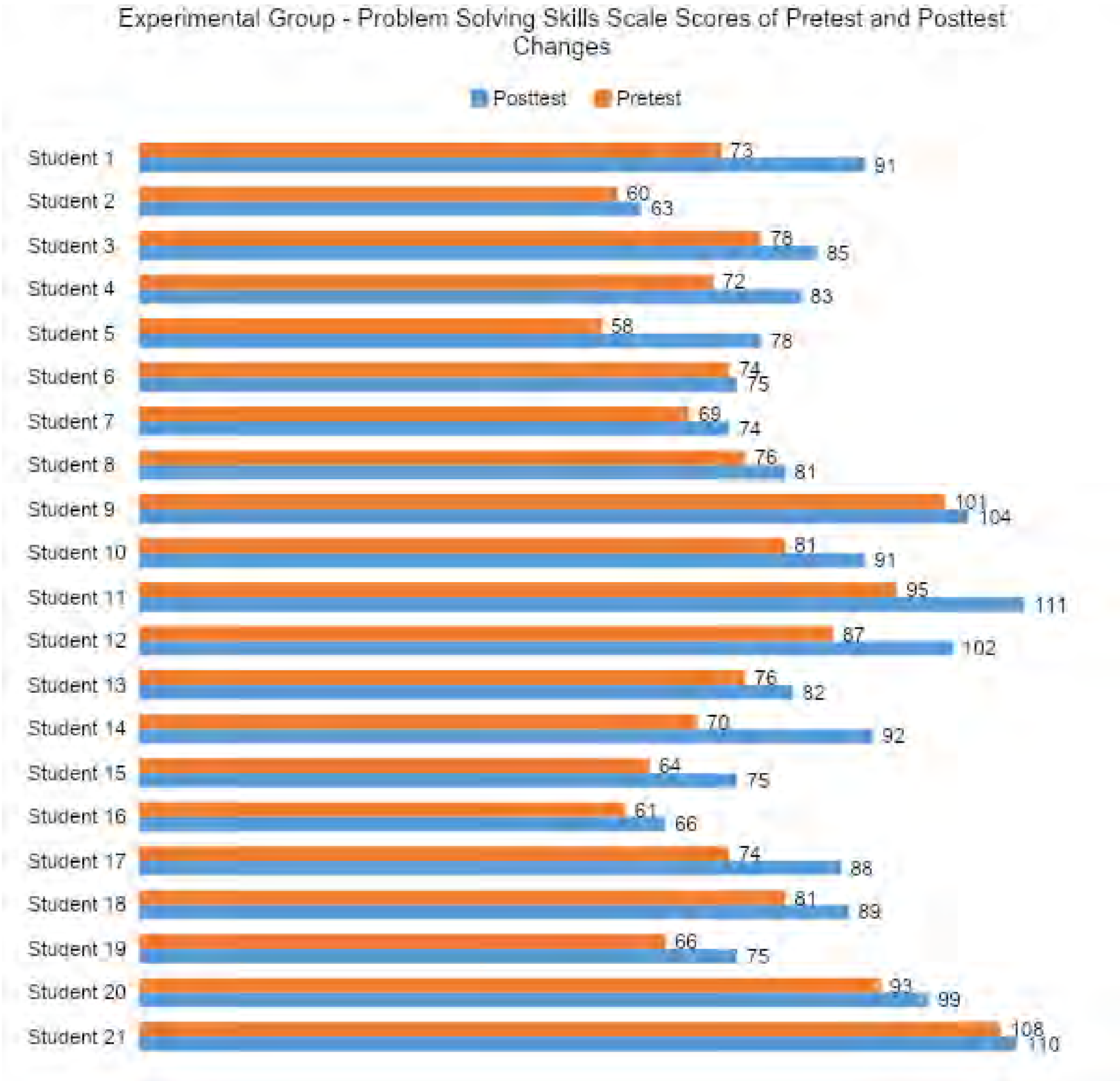
Z: Wilcoxon Test (Comparisons before and after training in-group)
*: $p<0{,}05$ (Statistically significant)

When Table 2 is investigated, the average scores of the experimental group's pre-test *"Trust in Problem Solving Skills"* dimension is 37.43, while the average of the post-test scores from the same dimension is 44.48. The pre-test of *"Self-Control"* dimension scores of the experimental group was-21.95, while the post-test scores from the same dimension were at the level of 23.05. The experimental group's pre-test "Avoidance" dimension scores were 17.62, while the post-test scores from the same dimension were at the level of 18.86. While the general scores of the experimental group's pre-test "Problem Solving Skills" scale were 77, the post-test general scores from the same scale were at the level of 86.38. As a result of the applied Wilcoxon analysis, the pre-test and post-test *"Confidence in Problem Solving Skills"* dimension and the *"Problem Solving Skills"* scale pre-test and post-test general scores of the experimental group showed a statistically significant difference [Z= -3,309, Z= -4,017; $p<0.05$]. Accordingly, the post-test "*Confidence in Problem Solving Skills"* dimension and the post-test *"Problem Solving Skills"* scale general scores of the experimental group students were significantly higher than the pre-test. Pretest and posttest *"Self Control"* dimension and *"Avoidance"* dimension scores of the experimental group do not show a statistically significant difference [Z= -0,829, Z= -1,267; $p>0.05$].

While the mean scores of the control group's pre-test "Trust in Problem Solving Skills" dimension were 46.29, the average of the post-test scores from the same dimension was 45.67. The control group's pretest scores for the self-control dimension were 25.24, while the posttest scores for the same dimension were 25.19. The control group's pre-test scores for the Avoidance dimension were 20.71, while the post-test scores for the same dimension were 18.9. While the pre-test general score of the problem solving skills scale of the control group was 92.24, the post-test general score of the same scale was 89.76.As a result of the applied Wilcoxon analysis, the general scores of the pre-test and post-test *"Confidence in Problem Solving Skills"* dimension, *"Self-Control"* dimension, *"Avoidance"* dimension, and *"Problem Solving Skills"* scale within the control group did not show statistically significant difference [Z= -0.323, Z= -0.061, Z= -1.935, Z= -1.159; $p>0.05$].

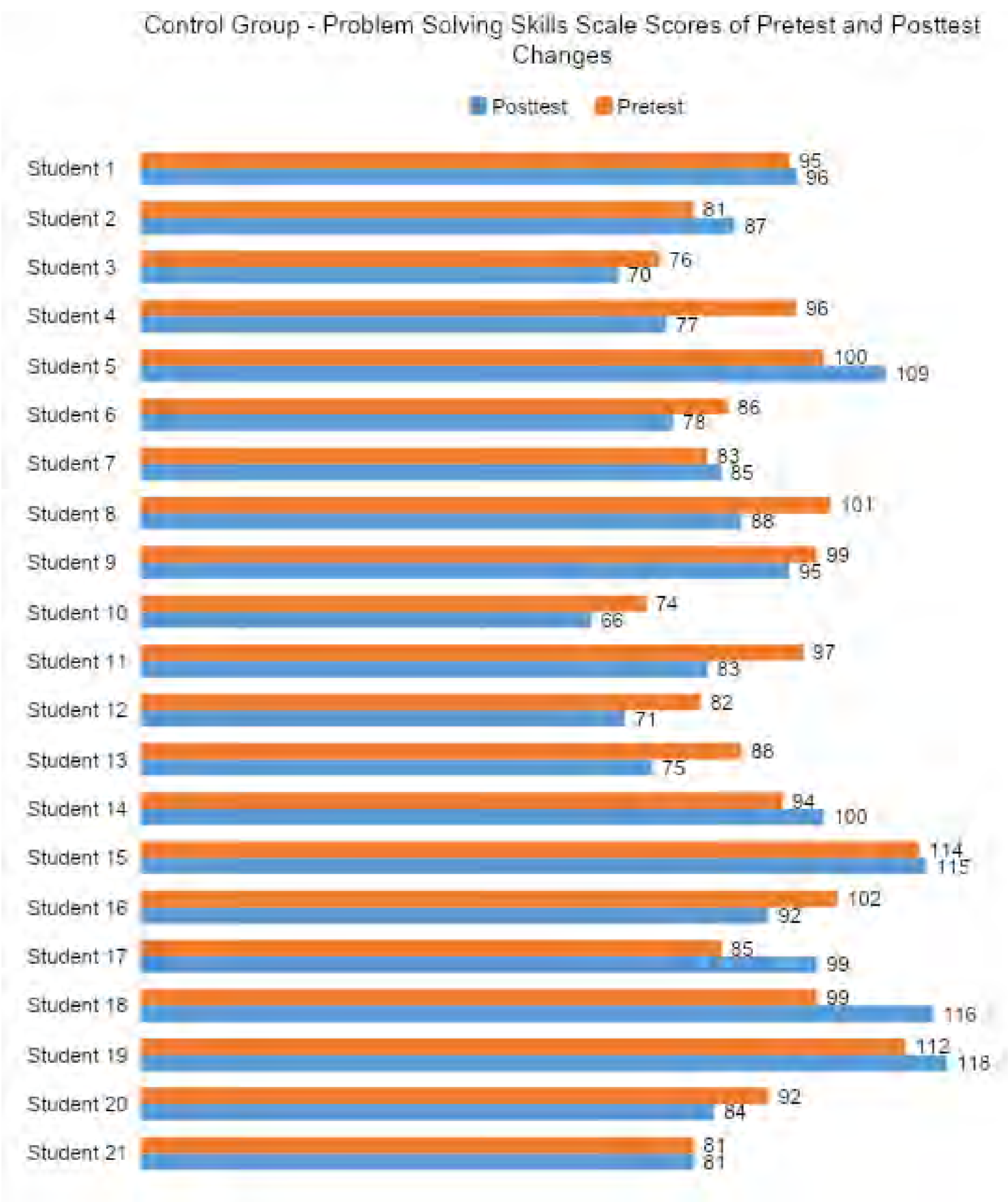
Also, when Table 2 is examined, the result of the Wilcoxon analysis applied is that there is a significant difference between the pre-test and post-test mean scores of problem solving skills in the experimental group in which the simulation-based experiential learning approach was used [p=0.000].For this reason, the second problem was accepted as there is a significant difference for the experimental group. There is no significant difference between the mean scores of pre-test problem-solving skills and post-test problem-solving skills of the control group. The instruction prescribed in the program was applied [$p>0.05$]; therefore, problem 2 was accepted as no significant difference for the control group.

Each student was assigned a nickname number during the data collection phase of the study. Pre- and posttests were conducted to ensure that these numbers matched the students.Thus, it was possible to observe the process of students between pre-test and post-test. These changes are graphed on student and group basis and presented below.



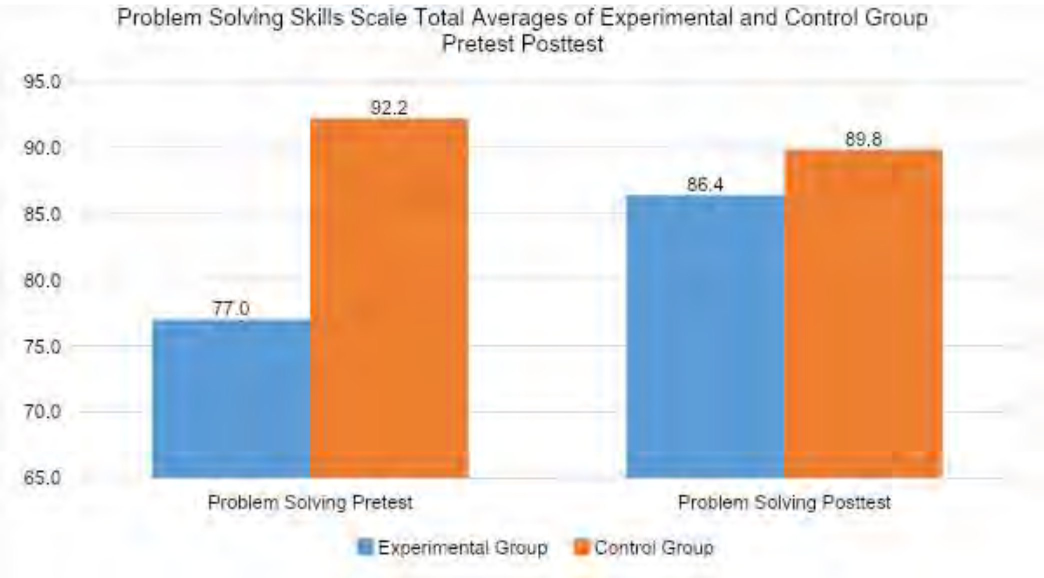

Graphic 1. Experimental group - problem solving skills scale scores of pretest and posttest changes

According to Graphic 1, the Problem-Solving Skills of the experimental group students after the simulation-based experiential learning application according to the change in the Pretest and Posttest averages, 1'st Student 18%, 2'nd Student 3%, 3'rd Student 7%, 4'th Student 11%, 5'th Student 20%, 6'th Student 1%, 7'th Student 5%, 8'th Student 5%, 9'th Student 3%, 10'th Student 10%, 11'th Student 16%, 12'th Student 15%, 13'th Student 6%, 14th student 22%, 15'th student 11%, 16'th student 5%, 17'th student 14%, 18'th student 8%, 19'th student 9%, 20'th student 6% and 21'st student 2% has achieved a positive increase in solving skills.




Graphic 2. Control group - problem-solving skills scale scores of pre-test and post-test changes

According to Graphic 2, the Problem Solving Skills of the control group students after the education envisaged by the Social Studies curriculum according to the change in the pretest and posttest averages, 1'st student 1%, 2'nd student 6%, 3'rd student -6%, 4'th student -19%, 5'th student 9%, 6'th student -8%, 7'th student 2%, 8'th student -13%, 9'th student -4%, 10'th student -8%, 11'th student -14%, 12'th student -11%, 13'th student -13%, 14'th student 6%, 15'th student 1%, 16'th student -10%, 17'th student 14%, 18'th student 17%, 19'th student 6%, 20'th student has achieved a -8% change in problem solving skills. 21'st student has no change.




Graphic 3. Problem solving skills scale total averages of experimental and control groups pretest posttest

Graph 3 shows the changes in the overall average of problem-solving skills within the group after pretest and posttest. While the average of problem-solving skills of the experimental group was 77 points in the pre-test, it was 86.4 points in the post-test, which is an increase of 12.2% and statistically significant (see Table 1 and Table 2).While the group average of problem-solving skills in the control group was 92.2 points in the pre-test, it was 89.8 points in the post-test with a decrease of 2.6%. According to the data although there is a decrease, this decrease is not statistically significant.

## Conclusion, Discussion and Suggestions

There is no specific study about the usage of simulation-based experiential learning and its relations to problem-solving skills encountered in the social studies discipline. In this manner, different kinds of disciplines and research results were discussed according to the theme.

Duygu (2018) concluded in her study that simulation-based education increased problem-solving skills; on the other hand, Altun and Emir (2008) conducted an experimental application on problem-solving methods in Social Studies education in their research and revealed that direct expression traditional approach did not increase problem-solving skills. Ünal, Sever and Yılmaz (2003) conducted an experimental study on problem-solving skills in Social Studies education and concluded that teaching problem-solving-oriented lessons increased student achievement according to the traditional method. Our research findings concluded that simulation-based experiential learning practices increased students' problem-solving skills compared to the teaching methods envisaged in the programme. In this context, the results are parallel. In a study on the development of simulations based on problem-solving, simulations aimed at the understanding economy and commercial life were designed. According to the research results, learners developed their self-directed learning skills and problem-solving skills in the learning process; however, they could bring realistic and multivariate solutions to problems (Maxwell, Mergendoller & Bellisimo, 2004).

When the simulation-based training method is examined, it is observed that many disciplines are used in skill-based training practice. Gülpınar (2018) conducted a simulation-based experimental study with the students of the pharmacy department with the theme of "Pharmacist-Patient Communication and Counseling Skills Training Program". According to the research results, the communication and consultancy skills of the students improved after the simulation-based education application. Chan (2011) made an application for business students to receive simulation-based training in recruitment and placement in his research. According to the research results, it has been revealed that students in simulation-based education provide many advantages in terms of empathy, experiencing an event most realistically, using skills against reality-like situations and developing permanent desired behaviors and attitudes. In another study conducted in management, it was revealed that simulations provide very realistic environments in learning and provide complex learning opportunities (Dieguez-Barreiro, González-Benito, Galende, & Kondo, 2011). Lateef (2010) stated in his research that simulation-based education in health would increase performance and prevent possible mistakes. Şahan & Dinç (2021) researched the simulation simulation-based training's effect on disaster education in middle school students' level. In their experimental study they used machine-based simulations about the earthquake on the experimental group, and they examined the student's preparedness for disaster in experimental and control groups. According to the research findings; it was determined that the students in the experimental group prepared a disaster plan, disaster and emergency bag and determined the meeting point better, but there was no significant change in the preparedness levels of the control group in this regard. In the study of Uygun & Uzun (2019), students stated that simulation-based experiential learning practices are fun and enjoyable methods. They indicated that they learned by doing and living in lessons made with simulations, that everyone is equal, and that there is a comfortable and democratic learning environment.

Based on the research results, new kind of simulation-based learning activities on different themes, competences, skills and values in the field of Social Studies may be prepared. In-depth and different designs can be conducted on the experiential learning theory and simulation-based education related to other fields of social studies education.

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## Author (s) Contribution Rate

The authors contributed equally to the article.

## Conflicts of Interest

The authors declared no potential conflicts of interest regarding the research, authorship or publication on this article.

## Ethical Approval

Ethical permission 30.12.2020 – E-89784354-050.99-3210 was obtained from Uşak University's Social and Humanities Sciences Scientific Research and Publication Ethics Committee for this research.

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