International Journal of Instruction *January 2021 ● Vol.14, No.1*
e-ISSN: 1308-1470 ● www.e-iji.net *p-ISSN: 1694-609X*
pp. 475-488

Article submission code: 20191115133015
Received: 15/11/2019
Revision: 04/07/2020
Accepted: 25/07/2020
OnlineFirst: 25/10/2020

Effects of SSCS Teaching Model on Students' Mathematical Problem-solving Ability and Self-efficacy

Zulkarnain
Mathematics Education Study Program, Faculty of Teacher Training and Education, University of Riau, Indonesia, *zulkarnainfkip@lecturer.unri.ac.id*

Hutkemri Zulnaidi
Department of Mathematics and Science Education, Faculty of Education, University of Malaya, Malaysia, *hutkemri@um.edu.my*

Susda Heleni
Mathematics Education Study Program, Faculty of Teacher Training and Education, University of Riau, Indonesia, *susda.heleni@lecturer.unri.ac.id*

Muhammad Syafri
Pondok Pesantren Assalam Nagaberalih, Indonesia, *syafri267@gmail.com*

The common problems faced by most students in learning mathematics include their inability to answer problem-solving questions and low mathematical self-efficacy. Search, Solve, Create and Share (SSCS) is a teaching model that provides opportunities for students to enhance their problem-solving skills and self-efficacy. This quasi-experimental study was conducted to determine the effects of the SSCS teaching model on high school students' ability and self-efficacy in solving mathematical problems. A total of 129 high school students were involved in this study and categorised into two groups: 69 and 60 students in the treatment and control groups, respectively. The one-way analysis of covariance test was used with the SPSS 25.0 software to answer the research questions. Results show a significant difference in mathematical problem-solving ability and self-efficacy between students who experienced the SSCS teaching models and students who were taught by using conventional methods. The former has a better problem-solving ability and self-efficacy than the latter. This study supports the adoption of the SSCS teaching model by teachers as an alternative teaching method for improving students' problem-solving ability and self-efficacy. In addition, this study can serve as an impetus in the efforts of encouraging the use of the SSCS teaching model at various levels of education.

Keywords: mathematical problem-solving, self-efficacy, SSCS teaching model, student, quasi-experimental

Citation: Zulkarnain., Zulnaidi, H., Heleni, S., & Syafri, M. (2021). Effects of SSCS Teaching Model on Students' Mathematical Problem-solving Ability and Self-efficacy. *International Journal of Instruction*, *14*(1), 475-488. https://doi.org/10.29333/iji.2021.14128a

INTRODUCTION

Teaching and learning involve three main components: teacher, student and content. Students must be equipped with knowledge and skills, and teachers must be well informed and professional (Yuanita et al., 2018). According to Rahman and Ahmar (2016), problem-solving through the mathematics learning process can enable understudies to build their capacities in application, analysis, synthesis and evaluation. The process of teaching and learning in the classroom is an area of constant research. A prospective educator should understand and learn how to teach effectively (Nagler, 2016). A teacher who understands how to teach effectively can teach according to the topics to be taught and the goals to be achieved.

Teachers and students in Indonesia have realised that mathematics teaching and learning activities in schools need comprehensive improvement. Since 1970, Indonesia has been teaching modern mathematics and encountered problematic situations in many schools. Research has shown that the problem of mathematics teaching in schools lies in students' difficulty in understanding math concepts. Students have difficulty developing and solving story (contextual) concept questions (Zulnaidi et al., 2020). Teaching style contributes to the difficulty of learning and understanding math. Students also fear mathematics (Yuanita et al., 2018). The results of the study by applying modern mathematics show that mathematical learning is a low-value learning process (Zulnaidi et al., 2020, Lili & Zulnaidi, 2019, Yuanita et al., 2018).

According to Hidayah et al. (2016), teachers in Indonesia are generally not completely able to encourage students to ask questions when implementing a scientific approach to mathematics. Even when extra grades are used to motivate students to ask, they only respond with low-level questions. In the end, questioning is done by teachers, and the discussion process generally comes from questions in the textbook. In problem-solving, students do not have a full understanding of the concepts they have learned but rely solely on intuition or memorisation. Many problems in everyday life involve math; thus, using contextual problems as a starting point in learning allow students to develop their own understanding of mathematical concepts, principles and procedures. In line with the goal of mathematics learning to prepare students to apply mathematics and mathematical thinking in everyday life.

Mathematics is a basic knowledge for all levels of education and an important subject in the primary level up to higher education. The process of teaching and learning mathematics requires school children to use their intellect; it provides experience through a series of planned activities for students to be competent in mastering mathematical materials. Enhancing students' ability in solving mathematical problems is fundamental to promoting their ways of thinking. Students who solve mathematical problems on their own will gain a meaningful experience. This activity is also a concrete problem-solving experience for them. According to Kannan et al. (2016), the process of solving problems is the heart of mathematics. The skill is not only learning the subject, but also puts emphasis on developing thinking skills and methods. Hence, a teacher must equip his/her students with mathematical problem-solving skills. Purbaningrum (2017) stated that the ability to solve mathematical problems depends on one's self-thinking ability. When one has a free rein in solving his/her own problems, he/she would have a concrete experience in solving similar problems in the future.

Statement of Problems

A common problem faced by most students in learning mathematics is the inability to answer questions through problem-solving. The common mistakes committed by students when solving mathematical questions are mostly due to impatience, ignorance or inaccuracy, misinformation, insufficient processing skills and misunderstandings (Sumartini, 2016). The two-variable linear equation system in mathematics requires several systematic solutions. Solutions must be presented clearly, systematically and thoroughly tested. The topic is relevant in daily life because it is one of the advanced topics on one-variable linear equation systems. Thus, students must grasp the basic concepts first before learning complex topics. Pangaribuan (2018) found that most students do not focus when studying a two-variable linear equation system. In addition, teachers and students rarely interact during lessons, and students have difficulties in understanding mathematics, causing them to respond poorly. The same problems are experienced by school students in other parts of Indonesia. Widiyani (2016) found a low student achievement in a two-variable linear equation system topic due to insufficiency and difficulties in understanding the concepts of the system. Studies conducted by Ferdianto and Yesinoa (2019), Purnamasari and Setiawan (2019) and Sutrisno and Razak (2018) are among the previous studies on the two-variable linear equation system in mathematical problem-solving. Their findings vary. Hence, further research is required to obtain the latest information on the problem-solving ability of high school students.

The diversity of results from previous studies on mathematical self-efficacy among students indicates the necessity of conducting further studies. Hindun et al. (2019) found no difference in self-efficacy between students who were taught by using a problem-based learning approach and those taught conventionally. Both groups were identified to have low mathematical self-efficacy. Adni, Nurfauziah and Rohaeti (2018) also determined a significantly low level of mathematical self-efficacy among high school students. By contrast, Indahsari et al. (2019) found that the level of mathematical self-efficacy among high school students is high. Sunaryo (2017) suggested that mathematical self-efficacy among high school students is at a moderate level. Given the diverse results, further studies on this matter should be conducted. Improving the self-efficacy of students and its relevancy in solving mathematical problems is an effort.

Mathematical problem-solving

Rahman and Ahmar (2016) indicated that problem-solving is a complex mental process that includes the visualisation, imagination, abstraction and association of information. This approach will serve the purpose of gaining cognitive ability and efficacy in solving mathematical problems through analysis, problem-solving steps and the use of some procedures to achieve expected results. Possessing a great ability to solve mathematical problems will provide students with enhanced learning experience. Mathematical problem-solving skills can help them answer questions in other subjects or in everyday life. The process of teaching and learning mathematics will be meaningless and fruitless if students lack the skills required to solve problems (Yarmayani, 2016). According to Yuanita et al. (2018), teaching through problem-solving contributes to the practical use of mathematics by helping an individual develop the facility to adapt. Teaching problem-solving not only provides a model and real problems to students, but also guidance (Lili & Zulnaidi, 2019). The problem-solving process provides students with opportunities to develop their abilities to adapt and change methods to fit new situations. Problem-solving involves the construction of sequential procedures that build strategies in addition to the application of the structure (Hesse et al., 2015). According to Mairing (2017), students' ways of thinking, habits of persistence and curiosity will be improved by solving mathematical problems. Therefore, the use of various effective teaching approaches and styles is recommended to encourage adaptability in the teaching and learning process of problem-solving (Umugiraneza et al., 2018).

Self-efficacy

In addition to the ability to solve mathematical problems, students' attitude, that is, their self-efficacy towards learning mathematics, is important. According to Bandura (1997), self-efficacy is an individual's belief that he or she can do something successfully in certain situations. Self-efficacy can be referred to as a student's belief in determining how he or she feels, thinks, motivates, behaves, and believes in his or her own ability for self-improvement (Harahap, 2016). Self-efficacy is a form of cognitive self-persuasion that consists of four main components, namely, personal experience, observation of the experience of others, social or verbal media and physical and emotional conditions. Bandura (1997) defined personal experience as an influential source of a student's self-efficacy. Experiences of success or failure can increase or decrease one's self-efficacy towards similar situations (Mukhid, 2009). That is, a student will gain new knowledge when he has the opportunity to engage directly in a quest for new knowledge. Self-efficacy can be similarly defined as self-confidence, which is the belief in one's own ability (Bandura, 1997). However, self-efficacy is specifically related to one's belief in his ability in a particular field or concept. Being confident is essential to compete in the globalisation age and the education sector.

Teachers are entities of the education sector and finding solutions for their students' problems is innate. Mathematics is a subject that should be able to develop students' self-confidence. Various studies have been conducted on self-efficacy. Pajares and Miler (1994) found that self-efficacy influences students' performance in mathematics. Jatisunda (2017) determined a significant relationship between students' self-efficacy and problem-solving skills. This finding was further extended on the cause and effect relationship between self-efficacy in mathematics and teaching and learning mathematics. According to Bandura (1997), self-efficacy is not something that one is born with nor is it a fixed quality. However, it is a result of cognitive processes, indicating that one's self-efficacy can be nurtured and developed. Cognitive processes are involved during teaching and learning. Thus, the development of one's self-efficacy can be enhanced through teaching and learning activities. On the basis of the definitions above, self-efficacy in the present study is defined as an individual's confidence or belief in his/her ability to perform and complete assigned tasks which can lead to overcoming challenges and achieving his or her goals.

Search, solve, create and share (SSCS) teaching model

Considering the issues discussed, the teaching and learning process requires improvement and innovation. At present, many mathematical teaching models for enhancing students' active engagement and self-efficacy in problem-solving are available. SSCS is a teaching model that provides opportunities for students to think, brainstorm, analyse and gain knowledge in solving problems whilst enhancing their problem-solving skills and self-efficacy. This teaching model involves students at every level (Pizzini, 1991). At the initial phase, students will experience the *search* phase at which they are involved in the process of collecting ideas and inquiring about and formulating the problems assigned to them. In the *solve* phase, students are involved in the problem-solving process. At the *create* level, students are involved in concluding the answers to the problems. The last phase is the *share* stage at which students are required to present the results of their responses interactively to the audience. Implementing the SSCS teaching model empowers students with a role that encourages them to think critically, creatively and independently.

Applying the SSCS teaching model can develop students' inquisitive nature on certain concepts (Pizzini, 1991). Students are initially given the opportunity to express their ideas individually and develop their potential. Then, students work collaboratively in a group to increase their participation in the teaching and learning process. Students are responsible for finding answers whilst interacting and communicating effectively with other students. Through discussion and brainstorming, students are expected to collaborate and help one another in times of difficulties, exchange information and generalise their findings. Thus, these activities enhance their mastery of the topic and increase their problem-solving ability and self-efficacy.

The SSCS learning model provides a framework that is especially designed to expand the relevant skills needed to apply knowledge. This model helps teachers think creatively to produce students who can think critically. In the SSCS teaching model, the teacher provides the experience for students to enhance their knowledge. The SSCS teaching model is implemented in the teaching process through small groups. The members of the small learning groups are students with various abilities, namely, high-, medium- and low-performing students. This approach is intended to facilitate the discussion process to enable high-achieving students to help low-performing students and ensure active collaboration or interaction among them. On the basis of these descriptions, this study was conducted to determine the effects of using the SSCS teaching model on students' problem-solving skills and self-efficacy.

Aim of the study

This study aims to determine the differences in problem-solving ability and self-efficacy between the treatment and control groups.

METHOD

Research design

This study adopted a quasi-experimental design with pre- and post-test design types (Creswell, 2012). According to Christensen (2001), a quasi-experimental design can be used when the influence of extraneous variables cannot be controlled. In this study, the characteristics of the treatment and control groups are dissimilar, and the subjects were not selected randomly because existing classes were used (Sugiyono, 2013). A pre-test was conducted to determine the initial differences between the treatment and control groups prior to the actual study. Table 1 shows the research framework.

Table 1
Non-Equivalent control group design

	Pre-test	Behaviours	*Post-test*
Treatment	O_1	X_1	O_3
Control	O_2	X_2	O_4

Notes:

X_1: SSCS Model was applied

X_2: Conventional methods were used

0_1: *Pre-test* on Treatment class

0_2: *Pre-test* on Control class

0_3: *Post-test* on Treatment class

0_4: *Post-test* on Control class

The treatment and control groups were given the same pre- and post-tests. Students in the treatment group were taught by using the SSCS teaching model, whereas students in the control group were taught by using the conventional method. A post-test was conducted one month after the treatment, as suggested by Campbell and Stanley (1963) who stated that the ideal periods for post-tests are one month, six months, and one year after the pre-test. The instruments used for the pre- and post-tests were problem-solving tests and self-efficacy questionnaires. Prior to the study, the form teachers were trained by the researchers to comprehend the SSCS model. The teachers underwent training for one month with eight meetings.

Population and Sample

A total of 129 students from two schools in Kampar, Riau, Indonesia were involved in this study. The treatment and control groups consisted of 69 and 60 students, respectively. Students in both groups were selected on the basis of the convenience sampling method and from the existing group (intact group) as proposed by Campbell and Stanley (1963) and Christensen (2001). The convenience sampling method was used because students in Indonesia are placed in fixed classrooms.

Research Instruments

Problem-solving ability

Students' problem-solving ability was tested through a series of essay questions related to the two-variable linear equation system. The pre- and post-tests consisted of questions on topics previously learned by students. Five questions were used in the pre- and post-tests to measure students' problem-solving ability. The scoring criteria for the questions were adapted from Yuanita et al. (2018).

Table 2
Scoring criteria for determining problem-solving ability

Score	Understanding problems	Solving method	Problem-solving	Cross-checking
0	Wrong interpretation of the question/wrong answers	No method	No solution	No justification
1	Incorrect interpretation of questions/did not refer to the requirement of the tasks (questions)	Irrelevant method	Using correct solving procedures but wrong solution (unable to obtain the correct results)	Rechecking answers only
2	Understanding the questions	Irrelevant problem-solving strategies, resulting in unsuccessful attempts	Correct procedures, obtaining correct answers/results	Rechecking all procedures
3		Relevant/correct problem-solving method but incomplete answer		
4		Relevant/correct problem-solving method, leading to the correct answer		
	Max score = 2	Max score = 4	Max score = 2	Max score = 2

Self-efficacy

The questionnaire for determining self-efficacy was adopted from Defi (2015). Students' self-efficacy levels in mathematics were reflected by their responses on the statements of the questionnaire. The questionnaire included 40 mandatory questions, which were divided into 25 positive and 15 negative statements. Diverse questions were made compulsory for students to answer all questions seriously and think critically. In addition, the positive and negative statements required students to read statements carefully to obtain accurate data from the mathematical disposition scale. Erman (2003) stated that the scores for each positive statement (favourable) are 1 (never), 2 (rarely), 3 (sometimes), 4 (often) and 5 (always). Conversely, the scores for the negative statements (unfavourable) are 5 (never), 4 (rarely), 3 (sometimes), 2 (often) and 1 (always). Among the indicators of the self-efficacy questionnaire was self-confidence when dealing with uncertain, blurred, unpredictable and challenging situations. Self-confidence is the ability to overcome problems or challenges to achieve set targets and the ability to enhance self-motivation, cognitive skills, and necessary actions in obtaining an outcome.

Three experts evaluated the validity of the research instrument. The experts evaluated and agreed that the instrument is fit for use in this study. A pilot study involving 30 students was conducted to test the reliability of the research instrument. The results of the pilot study indicate that the test instrument is reliable for testing students' ability to solve mathematical problems with a Cronbach's alpha value of 0.81. In addition, the discriminant and difficulty indexes of the instrument which were used to measure mathematical problem-solving were analysed using the ANATES4 software, with a range of 36%–68%, indicating that it is acceptable (To, 1996). The Cronbach's alpha value of the self-efficacy instrument was 0.84.

Data analysis

The analysis of covariance (ANCOVA) test was used to identify the differences in problem-solving ability and self-efficacy between students who experienced the SSCS teaching model and those taught using conventional methods. ANCOVA was applied to test the research hypotheses (Field, 2011). According to Christensen (2001), the ANCOVA test is the most appropriate analysis for a quasi-experimental study of a non-randomised control group with a pre-test/post-test design. In this quasi-experimental study, respondents in the treatment and control groups were not randomly selected. Hence, homogeneity testing was conducted to predetermine the intelligence profiles and levels of thinking ability among samples. Field (2011) stated that for a study with the same population, Levene's test should be conducted to evaluate the hypotheses on the variance of the dependent variables across each set of independent variables. Therefore, a pre-test was conducted in the beginning of this study to determine the similarity of the two sample groups.

FINDINGS

Differences in problem-solving ability between the treatment and control groups

The ANCOVA test was conducted to identify the differences in problem-solving ability between the treatment and control groups. The pre-conditions for using the one-way ANOVA test were satisfied before it was performed. Skewness and kurtosis tests were conducted for the pre-test of the problem-solving ability of students in the treatment (0.94, −0.07) and control (0.63, −0.40) groups. The post-test was performed to determine students' ability to solve problems in the treatment (−0.52, −0.77) and control (0.30, −1.26) groups. The finding indicates that the data for the problem-solving ability of students in the treatment and control groups are normal (Pallant, 2005). The pre-test results show differences in problem-solving ability between the treatment and control groups before the teaching model was applied. Furthermore, the results of Levene's test reveal the similarities of variance between the compared variables ($F = 1.116$, $sig = 0.293$). Therefore, the prerequisites for conducting the ANCOVA tests were fulfilled. Table 3 shows a significant difference in problem-solving ability between the treatment and control groups after the SSCS teaching model was applied. The pre-test covariate was ($F = 15.878$, $sig = 0.001$ [$p < 0.05$]). The difference effect was moderate (0.112). Students in the SSCS learning model group (mean = 70.68) had a higher problem-solving ability than those in the conventional method group (mean = 55.04).

Table 3
ANCOVA tests on the differences in problem-solving ability between the treatment and control groups

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	16546.879[a]	2	8273.440	16.780	0.001	0.210
Intercept	59639.549	1	59639.549	120.957	0.001	0.490
Pre-test	7788.052	1	7788.052	15.795	0.001	0.111
Group	7828.763	1	7828.763	15.878	0.001	0.112
Error	62126.159	126	493.065			
Total	597247.000	129				
Corrected Total	78673.039	128				

a. R Squared = 0.210 (Adjusted R Squared = 0.198)

Differences of self-efficacy between the treatment and control groups

The ANCOVA test was conducted to identify the differences in self-efficacy between the treatment and control groups. The one-way ANCOVA test was initially performed as a pre-condition for using the one-way ANCOVA test. Skewness and kurtosis tests were conducted for students in the treatment (0.14, −0.19) and control (0.99, −0.94) groups on the self-efficacy pre-test and in the treatment (0.99, −0.94) and control (0.99, 0.94) groups on the self-efficacy post-test. This result reveals that the data on the self-efficacy of students in the treatment and control groups are normal (Pallant, 2005). The results of the pre-test show the differences in self-efficacy between the treatment and control groups before the teaching model was applied. The results of Levene's test also reveal the similarities of variance between the compared variables ($F = 2.587$, sig = 0.110). Table 4 shows a significant difference in self-efficacy between the treatment and control groups after the SSCS learning model was applied. The pre-test covariate was ($F = 10.200$, sig = 0.001 [$p < 0.05$]). The effect was small (0.075). The mean indicates that students in the SSCS learning model group (mean = 68.06) had a higher self-efficacy than those in the conventional method group (mean = 67.68).

Table 4
ANCOVA test on the different self-efficacy between the treatment and control groups

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7934.086[a]	2	3967.043	11578.565	0.001	0.995
Intercept	6.810	1	6.810	19.877	0.001	0.136
Pre-test	5695.703	1	5695.703	16623.987	0.001	0.992
Group	3.495	1	3.495	10.200	0.002	0.075
Error	43.170	126	0.343			
Total	602435.000	129				
Corrected Total	7977.256	128				

a. R Squared = 0.995 (Adjusted R Squared = 0.995)

DISCUSSION

The mathematical problem-solving ability of students who experienced the SSCS teaching model was higher than those who did not. This result is consistent with the study results of Rizki and Wijayanti (2013) and Rahmawati et al. (2013). They revealed that students' mathematical problem-solving skills improved after they experienced the SSCS teaching model compared with those who did not because students who learned using the SSCS teaching model were directly involved in every stage of the lesson. At the *search* phase, a challenging question about a story can be used effectively to introduce a lesson. Students are involved in collecting ideas before asking questions and formulating the problems assigned to them by starting a lesson with a question. In the *solve* phase, students are involved in solving problems by observing how students learn from their experiences whilst trying to find answers to the questions. At the *create* phase, students are tasked to conclude their answers derived from the problem-solving experience, which requires a high thinking order. This process is consistent with the statement of Ulya (2016) that the ability to solve problems results from the competency of applying acquired knowledge to new situations involving a high level of thinking. At this stage, students apply and develop their problem-solving skills.

At the *share* phase, students present the results of their responses which requires an interaction between the presenter and his audience. Dialogue and interaction reinforce students' thinking, consequently deepening their understanding of a problem. Discussion provides an opportunity for students to exchange ideas through which they gain further understanding and additional suggestions on solutions. Implementing the SSCS teaching model empowers students with an important role—that of encouraging them to think critically, creatively and independently. This notion supports Purbaningrum's (2017) opinion that the ability to solve mathematical problems is strongly influenced by students' thinking ability. Thus, the SSCS learning model helps students solve questions through a high level of thinking order. In conventional learning methods, students are relatively passive during teaching and learning. They simply wait for explanations from their teachers. Students do not have the initiative to engage in the discussion of a topic.

On the basis of the discussion above, students who were exposed to the SSCS teaching model exhibited improved abilities to solve mathematical problems compared with those who were not. Students who were taught by using the SSCS learning model also displayed better self-efficacy than those who were not. Hence, this study supports the statement of Sapto et al. (2015) that students who experienced the SSCS learning model have better self-efficacy than those who did not undergo the same experience. Problem-solving ability is closely related to a student's self-efficacy in solving problems because his confidence to solve a problem influences his learning outcomes. According to Sapto et al. (2015), the SSCS learning model provides students with the opportunity to formulate their ideas independently and requires students to find and write systematic solutions whilst actively engaging in the teaching and learning process and sharing their ideas with others.

Self-efficacy has a powerful effect on learning motivation and learning outcomes and is an inner force or self-belief that drives one to learn and work hard to succeed. This finding validates that of Liu and Koirala (2009) who concluded that self-efficacy has a positive correlation with performance in mathematics. Self-efficacy in mathematics can be interpreted as a student's belief in his ability to work on mathematical problems successfully. In the SSCS teaching model process, students are expected to participate actively in the teaching and learning process. They are provided with opportunities to share their ideas, which motivates them to come up with additional ideas, thereby increasing their self-confidence. On the contrary, this behaviour is not apparent in students in the conventional teaching process. In this process, students passively listen and receive lessons without the desire to ask their teacher actively. This case causes lack of self-confidence in solving questions that require higher thinking. The findings indicate that students who learn in the SSCS learning environment have better self-efficacy than those who learn conventionally.

The study results promote the use of the SSCS learning model by teachers in classrooms. The use of the SSCS learning and teaching model will improve students' problem-solving skills and self-efficacy. This model is also recommended for use by teachers of other subjects. However, further studies on the effects of the SSCS teaching model on other mathematical skills, such as critical, creative and reflective thinking skills, are required because the SSCS model allows students to think critically, creatively and reflectively in the process of discovering new ways of solving mathematical problems.

CONCLUSIONS

This study successfully demonstrates the effects of the SSCS learning model on students' mathematical problem-solving ability and self-efficacy. This work proposes the SSCS learning model as another method for improving the problem-solving ability and self-efficacy of high school students. The mathematical problem-solving ability of students who experienced the SSCS teaching model is higher than that of students who were taught by using conventional methods. Through this teaching model, teachers are encouraged to change their teaching methods or strategies in the teaching and learning process. Future researchers are expected to develop and be further engaged in improving the problem-solving ability and self-efficacy of students. In addition, this study is expected to serve as an avenue for efforts on improving students' ability in solving mathematical problems and on enhancing their self-efficacy whilst developing other means to do so.

CONFLICTS OF INTEREST

The authors state they have no personal relationship(s) that may have inappropriately influenced them in writing the current paper.

REFERENCES

Adni, D. N., Nurfauziah, P., & Rohaeti, E. E. (2018). Mathematical connection capability analysis of junior students reviewed from student self-efficacy. *Journal of Innovative Mathematics Learning*, 1/5: 957–964.

Bandura, A. (1997). *Self-Efficacy: The Exercise of Control*. New York: W.H. Freman and Company.

Branca, N. A. (1980). *Problem Solving as A Goal, Process, and Basic Skills in Problem Solving Mathematics*: 1980 Yearbook edited by S. Krulik and R.E Reys. Reston, VA: NCTM

Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental design for research.* Boston, MA: Houghton Mifflin Company.

Christensen, L. B. (2001). *Experimental methodology (8th ed.)*. Needham Heights, MA: Allyn and Bacon

Creswell, J. W. (2012). *Educational research's: Planning, conducting, and evaluating, quantitative and qualitative research (4th ed.).* Boston, MA: Pearson.

Defi. (2015). Effect of implementation of problem-based instruction model and self-efficacy on the mathematical problems of tembilahan secondary school students. *Thesis of Mathematics Education Studies Program.* Faculty of Tarbiyah and Teacher Training State Islamic University Sultan Syarif Kasim.

Erman, S. (2003). *Contemporary Mathematics Learning Strategies*. Yogyakarta: PT. Remaja Rosdakarya.

Ferdianto, F., & Yesino, L. (2019). Student error analysis in solving questions on SPLDV materials reviewed from the mathematical ability indicators. *Supremum Journal of Mathematics Education*, 3/1: 32–36.

Field, A. (2011). *Discovering statistics using SPSS (4th ed.).* London: SAGE Publications Ltd.

Harahap, D. (2016). Analysis of the relationship between student self-efficacy and learning outcomes. *Digital Repository UNIMED*, 42–53

Helmiati, Sopamena, P., & Lasaia, I. (2013). The relationship of think pair's strategic share on learners' metacognition capabilities in SPLDV grade VIII junior high school of Al Hijrah Ambon. *Journal of Mathematics and Learning*, 1/1: 17–31.

Hesse, F., Care, E., Buder, J., Sassenberg, K., & Griffin, P. (2015). A framework for teachable collaborative problem-solving skills. In P. Griffin & E. Care (Eds.), Assessment and teaching of 21st century skills: Methods and approach. Dordrecht: Springer.

Hidayah, I., Sugiarto., & Dwijanto. (2016). The role of manipulatives usage in mathematics learning of primary education with scientific approach towards the students' thinking ability. *IJABER*, 14/10: 7215-7228.

Hindun, S., Sapitri, Y. E., & Roaeti, E. E. (2019). Increasement of mathematical connection ability and self-efficacy of students through problem-based learning approach with multimedia. *Journal of Innovative Mathematics Learning*, 2/2: 74–81.

Indahsari, I. N., Situmorang, J. Y., & Amelia, R. (2019). Analysis of mathematical problem-solving skills and self-efficacy of MAN students. *Journal on Education*, 1/2: 256–264.

Jatisunda, M. G. (2017). The relationship of junior students' self-efficacy to mathematical problem solving. *Journal Theorems (The Original Research of Mathematics)*, 1/2, 24–30.

Kannan, B.S., Sivapragasam, C., Senthilkumar, R. (2016). A study on problem solving ability in mathematics of IX standard students in dindigul district. *International Journal of Applied Research*, 2/1: 797-799.

Lili, H & Zulnaidi, H. (2020). Effects of the geometer's sketchpad on algebraic reasoning among junior private high school students. *Journal of Research on Mathematics Instruction*, 1/1: 1–10.

Liu, X., & Koirala, H. (2009). The effect of mathematics self-efficacy on mathematics achievement of high school students. *NERA Conference Proceedings 2009*, 30: 1–15.

Mairing, J. P. (2017). Thinking process of naive problem solvers to solve mathematical problems. *International Educational Studies*, 10/1: 1–10

Mukhid, A. (2009). Self-efficacy (perspectives on social cognitive theory and its implications for education). *Tadris Journal of Islamic Education*, 4: 106–122.

Nagler, K.S. (2016). Effective Classroom-Management & Positive Teaching. *English Language Teaching*, 9/1: 163–172.

Widiyani, N. (2016). Improvement of math learning outcomes in two-variable linear equation system (SPLDV) materials through cooperative learning type student team achievement division (STAD) model in Purwokejo. *Thesis Master of Management Education*. STIE Widya Wihawa Yogyakarta.

Pajares, F., & Miller, M. D. (1994). The role of self-efficacy and self-concept beliefs in mathematical solving: A path analysis. *Journal of Educational Psychology*, 86: 193–203.

Pallant, J. (2005) *SPSS Survival Guide A Step by Step Guide to Data Analysis Using SPSS for Windows*. 3rd Edition. New York: Open University Press.

Pangaribuan, F. (2018). Students' abstraction in solving system of linear equations with two variables. *Journal of Physics: Conference Series*, 6: 1–6.

Pizzini. (1991). *SSCS Implementation Handbook*. USA: University Lowa Publisher.

Purbaningrum, K. A. (2017). Students' high level of thinking ability in mathematical problem solving is reviewed through learning style. *Journal of Mathematical Research and Education*, 10/2: 40–49.

Purnamasari, I., & Setiawan, W. (2019). Mathematical problems of junior students in SPLDV materials reviewed from early mathematics (KAM). *Journal of Medives*, 3/2: 207–215.

Rahman, A., & Ahmar, A. (2016). Exploration of mathematics problem solving process based on the thinking level of students in junior high school. *International Journal of Environmental & Science Education*. 11/14: 7278–7285.

Rahmawati, N. T., Junaedi, I., & Kurniasih, A. W. (2013). The effectiveness of the SSCS learning model helps the problem cards on student problem solving. *Unnes Journal of Mathematics Education*, 2/3: 66–71.

Rizki, K. S. R., & Wijayanti, P. (2013). Implementation of problem learning model solving search, solve, create, and share. *Mathedunesa*, 2/1:1–8.

Sapto, A. D., Suyitno, H., & Susilo, B. E. (2015). Effectiveness of learning a REACT strategy with a SSCS model on mathematical communication and confidence in classroom students VIII. *Unnes Journal of Mathematics Education*, 4/3: 223–229.

Sumartini, T. S. (2016). Increasing students' mathematical problem-solving abilities through problem-based learning. *Mosharafa: Journal of Mathematics Education*, 5/2: 148-158.

Sunaryo, Y. (2017). Student self-efficacy measurement in mathematics learning among students' secondary schools. *Journal of Mathematical Theory and Research* (TEOREMA), 1/2: 39–44.

Sugiyono. (2013). *Educational Research Methods*. Bandung: Alfabeta

Sutrisno, A. B., & Razak, F. (2018). Descriptions of mathematical solving based on polio steps were reviewed from the personality of the phlegmatic student. *Journal of Mathematics Education,* 2/2: 120-131

To, K. (1996). *Identifying Test Analysis: Introduction to Computer Programs (ANATES).* Bandung: Education Psychology and Guidance FIP IKIP.

Ulya, H. (2016). Profile of problem-solving students' motivation to study high on ideal problem solving. *Journal of Gusjigang Counselling*, 2/1: 90–96.

Umugiraneza, O., Bansilal, S., & North, D. (2017). Exploring teachers' practices in teaching mathematics and statistics in KwaZulu-Natal schools. *South African Journal of Education*, 37/2: 1–13.

Yarmayani, A. (2016). Classroom student problem solving technique analysis of Jambi high school students. *Scientific Journal of Cheating*, 6/2, 12–19.

Yuanita, P., Zulnaidi, H., & Zakaria, E. (2018). The effectiveness of realistic mathematics education approach: The role of mathematical representation as mediator between mathematical belief and problem solving. PloS ONE, 13/9: 1–20.

Zulnaidi, H., Oktavika, E., & Hidayat, R. (2019). Effect of Use of GeoGebra on Achievement of High School Mathematics Students. *Education and Information Technologies*, 1: 1–22.