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Experimenting CORE learning model on the students' problem-solving skills based on their emotional intelligence

Sutopo*, Janika Salma Yumna, Yemi Kuswardi
Department of Mathematics Education, Universitas Sebelas Maret, Jl. Ir. Sutami No. 36, Surakarta 57126 Indonesia
*Corresponding e-mail: sutopo72@staff.uns.ac.id

Abstract

In this study, we aim: (1) to find out which learning model resulted in the better problem-solving skills—the CORE learning model with *putar bawah* game and labyrinth board game or the direct teaching; (2) to find out which levels of emotional intelligence resulted in better problem-solving skills—high, intermediate, or low emotional intelligence; (3) to find out the interaction between the learning models and the students' emotional intelligence. This research was a quasi-experimental research which involved the VIII-grade students of SMP Negeri 5 Surakarta in the 2022/2023 academic year. The samples used were two classes taken by cluster random sampling. The data collection techniques used were documentation, tests, and questionaires. The data analysis technique used two-way analysis of variance with unequal sample sizes. Based on the results of the analysis, we conclude that: (1) the CORE model with *putar bawah* game and labyrinth board game media resulted in the better problem-solving skills than the direct teaching; (2) students with higher emotional intelligence had better problem-solving skills than lower emotional intelligence; (3) there is no interaction between the learning model and the students' emotional intelligence.

Keywords: CORE learning model, emotional intelligence, labyrinth board game, *putar bawah* game, problem-solving skills

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INTRODUCTION

Education is one of the keys to advancing a nation. According to the Indonesian law number 20 of 2003 regarding the national education system, education is a conscious effort that is planned to build an atmosphere in learning and the learning process so that students can develop the various potentials that exist within them (MONE, 2003). Students are required to actively and independently develop 4C skills, namely critical thinking, communication, collaboration, and creativity (Indarta et al., 2021).

Mathematics as a science that underlies the development of science because it can develop a person's ability to think critically, logically and systematically in solving a problem so that it has an important role in education. There are five mathematics standards that students must have as presented by the National Council of Teachers of Mathematics (NCTM, 2000), namely problem-solving skills, communication skills, connection skills, reasoning skills (reasoning), as well as representation skills (illustration). However, in reality, students' problem-solving skills in mathematics in Indonesia are still relatively low. This is shown by the results of the Program for International Student

Assessment (PISA) survey in 2018. Indonesia is ranked 75 out of 81 countries with a score of 379.

Problem solving ability is the ability to find a solution to a problem by using a solving strategy. Krulik and Rudnick (cited in Kudsiyah et al., 2019) describe the five stages that must be carried out in problem solving, namely reading and thinking (Read and Think), exploring and planning solutions (Explore and Plan), choosing strategies to solve problems. problems (Select a Strategy), computing to find answers (Find and Answer), and reflection and development (Reflect and Extend). The stages of problem solving by Krulik and Rudnick can be used to measure the level of students' problem-solving skills.

Based on the results of an interview with one of the class VIII math teachers at SMP Negeri 5 Surakarta, information was obtained that students' problem-solving skills were still low. This is indicated by the low average student achievement, especially in the matter of opportunities. The data were obtained from the mathematics test scores on the opportunity material where more than 50% of students did not pass the Minimum Completeness Criteria (KKM). Learning is still carried out in one direction where the teacher becomes the center of learning (teacher centered). Students are not given the freedom to explore information to build their own knowledge and students are not given enough space to interact with other students to convey the ideas they have. These things can have an impact on students' problem-solving abilities. On the other hand, the use of media as a support in teaching and learning activities is still not optimal.

One alternative to these problems requires an appropriate learning model so that it can improve students' problem-solving skills. One model that can be applied is the CORE (Connecting, Organizing, Reflecting, Extending) learning model. Syaimar (2019) conveys the steps of the CORE learning model, namely first the teacher reminds students of concepts that have been taught before then connects them with new concepts (Connecting), guidance by the teacher in combining student ideas to understand the material (Organizing), dividing students heterogeneously into groups to explore and develop the information that has been obtained (Reflecting), working on individual assignments to apply and develop their knowledge (Extending).

In addition to learning models, the use of media is also important in learning. In this study, researchers used putar bawah game and labyrinth board game media to support the CORE learning model. Putar bawah games as a medium to help students build perceptions of concepts that have been taught before. Students make observations on the amount of rubber that has successfully entered the pole and if the rubber has a different color that can train students to understand a problem. The labyrinth board game is a board game with the maze concept in which there are questions that must be worked on by students. The questions on the labyrinth board game are questions related to problem solving that must be completed by students based on the stages of problem solving. The labyrinth board game media can train communication skills because students are given the opportunity to discuss with other students to convey their knowledge to determine the appropriate strategy for playing and to train cooperation between students in solving each given problem. The learning steps for the CORE model with the putar bawah game and the labyrinth board game used in this study are as follows:

(1) Teacher starts the lesson with activities that interest students.
(2) Teacher asks the students to connect the previous material and the material to be learned by demonstrating the *putar bawah* game.

(3) Teacher gives students the opportunity to ask questions and direct students' ideas about the material.
(4) Teacher divides students into heterogeneous groups consisting of 4-5 people and gives worksheet containing problems to be solved within the group.
(5) Teacher distributes labyrinth board game media and provides instructions to use the media.
(6) Teacher guides students during the implementation of learning with the labyrinth board game media.
(7) Teacher gives practice questions to work on individually to develop knowledge.
(8) Teacher gives awards to the winning team.

In addition to external factors, there are also internal factors which are factors that arise from within the student. One of the internal factors that influence students' mathematical problem-solving skills is emotional intelligence. Emotional intelligence is a person's ability to regulate emotions, self-control, empathy, self-motivation, and social skills (Goleman, 2017). Students who have high emotional intelligence are able to control themselves well, have high motivation, and always try to find a way out of every problem. These students also have good social skills so it is easy to communicate with friends and teachers. Each student has a different emotional intelligence and gives the possibility that there are differences in mathematical problem-solving skills between one student and another.

RESEARCH METHOD

This research is quasi experimental research using quantitative methods. It controls all the output variables that can affect the dependent variable.

Research design

This research used a simple 2×3 factorial design as shown in Table 1.

Table 1. Research design

Learning Model (A)	Emotional Intelligence (B)		
	High (B_1)	Medium (B_2)	Low (B_3)
The CORE learning model with putar bawah game and labyrinth board game media (A_1)	A_1B_1	A_1B_2	A_1B_3
Direct learning model (A_2)	A_2B_1	A_2B_2	A_2B_3

Population, sample, and sampling technique

In this study, the sampling technique used was cluster random sampling. Cluster random sampling is simple random sampling applied successively to units or sub-populations (Budiyono, 2017). In this study, each class VIII SMP Negeri 5 Surakarta was considered as a sub-population which had uniform conditions. Two classes were taken randomly by drawing lots, resulting in class VIII G as the control class and class VIII H as the experimental class.

Research instrument, data collection, and analysis

This study used three methods in collecting data, namely the documentation method, the test method, and the questionnaire method. The documentation method is a way of collecting data by taking it from existing documents. In this

study, the documentation method was carried out to collect data on the results of the Even Mid Semester Assessment in mathematics to test the balance between the experimental class and the control class before conducting experiments with the t test. The test method was carried out to collect data regarding student problem solving abilities. The test is in the form of a description of four questions. The questionnaire method was used to collect data regarding students' emotional intelligence. The questionnaire in this study was in the form of a questionnaire with a Likert scale with four answer choices for each item.

In developing the instrument, validation of problem-solving skills tests and emotional intelligence questionnaires was carried out. Based on the content validity test conducted, the problem-solving skills test was declared to be in accordance with content validity and feasible to be tested. After the try out, a different power test was carried out using the Karl Pearson formula with the results of four items having a good discriminating power index of ≥ 0.3. Based on the difficulty level test, it was found that four items had an index of $0.3 \leq P \leq 0.7$ included in the category of medium difficulty level so that all questions had a good level of difficulty. Continuing the calculation of the reliability of the instrument, the results obtained were 0.7203. The problem-solving ability test was declared reliable. Validation of the contents of the emotional intelligence questionnaire was carried out by psychologists and then tested for internal consistency using the Karl Pearson formula. Based on the internal consistency test conducted, out of 40 questionnaire items, 34 questionnaire items were obtained that were consistent. Based on reliability calculations using the Cronbach alpha formula, a reliability coefficient of 0.88 is obtained. The emotional intelligence questionnaire instrument is feasible to use for research.

The data analysis technique used was a statistical technique with two-way analysis of variance 2×3 with different cells as described in Table 1. Before being analyzed with the two- way ANOVA, it was first tested whether the data met the prerequisites for analysis. The analysis prerequisite test includes the normality test using the Liliefors test and the homogeneity test using the Barlett test. The normality test is used to test whether the data obtained is normally distributed or not, while the homogeneity test is carried out to test whether the data comes from a homogeneous population.

RESULTS AND DISCUSSION

Based on the research that has been done, some research data were obtained which included data on the mid-even semester assessment scores for class VIII mathematics for the 2022/2023 school year and score data on the research sample, each of which consisted of emotional intelligence questionnaire score data and student problem-solving ability test data.

Data on mid semester assessment results for mathematics subject

The class selected for the study was class VIII G as the control class and class VIII H as the experimental class. Class VIII G consists of 30 students and has an average score of 65.2069, while class VIII H consists of 29 students and has an average score of 64.4.

Student emotional intelligence data

Based on emotional intelligence questionnaire data, the average is obtained $\bar{X}$=102.7966 and standard deviation s=8.6295. The emotional intelligence grouping is based on the mean and standard deviation of all samples. Based on

the data collected, the following data is obtained. The CORE model class with putar bawah games and labyrinth board game media (VIII H) consisted of 29 students where 5 students had high emotional intelligence, 10 students had medium emotional intelligence, and 8 students had low emotional intelligence. The direct model class (VIII G) consists of 30 students who are divided into three categories of emotional intelligence, namely 12 students have high emotional intelligence, 10 students have medium emotional intelligence, and 8 students have low emotional intelligence.

Student problem-solving skills data

Problem solving ability data is divided into two, namely problem-solving skills data based on learning models and problem-solving skills data based on students' emotional intelligence. Data on students' problem-solving skills based on the learning model showed that classes using the CORE model with putar bawah games and labyrinth board game media had an average of 24.4483 and classes using the direct learning mod el had an average of 21.7667. Data on problem solving abilities based on students' em otional intelligence showed that students with high emotional intelligence had an average of 26.1765, students with medium emotional intelligence had an average of 22.85, and low emotional intelligence had an average of 21.0909.

Based on the data obtained, an experimental prerequisite test was carried out with a balance test, then continued with an analytical prerequisite test which included a normality test using the Liliefors test and a homogeneity test using the Barlett method.

Experiment prerequisites test

Test the experimental requirements using a balance test. The data for this balance test were taken from the mid-even semester assessment scores of Grade VIII students. The balance test was carried out to find out whether the populations had the same initial conditions. Before being tested for balance, each sample was first tested whether it was normally distributed or not. The normality test uses the Liliefors method with a significant level of 0.05. Based on the results of the normality test, the L_{obs} in the experimental class were 0.1478 and the control class was 0.1383. Because $L_{obs} < 0.161$ then $L_{obs} \notin$ DK. Thus, the conclusion that can be drawn is that H0 is not rejected, meaning that each sample comes from a normally distributed population. then a homogeneity test was carried out using the Bartlet method with a significance level of 0.05. Based on the results of the homogeneity test for the experimental and control classes, $\chi^2 = 0.0040 < 3.841 = \chi^2_{0.05,1}$ so that $\chi^2 \notin$ DK. so that the decision taken is H0 not rejected. This means that both classes come from a homogeneous population. Based on the results of the normality test and homogeneity test it is evident that both are normal and homogeneous. Then do the balance test using the t test. Based on the results of the t test, it was obtained that tobs = 0.4662 with a critical area DK = t < -2.002 or t > 2.002. Because t ∉ DK, then H0 is not rejected, meaning that both populations have the same initial ability.

Prerequisite analysis test

Test the experimental requirements using a balance test. The data for this balance test were taken from the odd midterm test scores of Grade VIII students.

Normality test

In each model and emotional intelligence, reject H0 if $L_{obs} < L_{\alpha;n}$. It can be concluded that the data come from a normally distributed population.

Homogeneity test

Homogeneity test using the Bartlett method with the chi square test statistic with a significance level of 0.05. The homogeneity test results for each model were 3.841 and emotional intelligence was 0.8209 where $\chi^2 \notin$ DK. Thus, it means that H0 is not rejected. Therefore, it can be concluded that in each model and emotional intelligence comes from a homogeneous population.

After fulfilling the requirements for the analytical test, a two-way analysis of variance with unequal sample sizes. The results of hypothesis testing are as follows. Based on the summary of the results of the multiple comparison test concluded that:

Since $F_{(1-2)} = 49.4467 > 6.34 = F_{0.05;2;53}$, then H0 is rejected. It shows that there are differences in problem-solving skills between students who have high emotional intelligence and students who have medium emotional intelligence. The marginal average of students with high emotional intelligence is 26.1765 and medium emotional intelligence is 22.85. It can be concluded that students who have high emotional intelligence have better problem-solving skills compared to students who have medium emotional intelligence on probability material.

Since $F_{(1-3)} = 26.8416 > 6.34 = F_{0.05;2;53}$, then H0 is rejected. It shows that there are differences in problem-solving skills between students who have high emotional intelligence and students who have low emotional intelligence. The marginal average of students with high emotional intelligence is 26.1765 and low emotional intelligence is 20.0909. It can be concluded that students who have high emotional intelligence have better problem-solving skills compared to students who have low emotional intelligence on probability material.

Since $F_{(2-3)} = 76.2765 > 6.34 = F_{0.05;2;53}$, then H0 is rejected. It shows that there are differences in problem-solving skills between students who have medium emotional intelligence and students who have low emotional intelligence. The marginal average of students with medium emotional intelligence is 22.85 and low emotional intelligence is 21.0909. It can be concluded that students who have medium emotional intelligence have better problem-solving skills than low emotional intelligence.

Based on the initial data and data analysis that has been done, the following results can be obtained. First, based on the results of the mean comparison between lines, it was found that the CORE learning model with putar bawah games and labyrinth board game media resulted in better problem-solving skills than the direct learning model. The use of the CORE learning model with putar bawah game at the Connecting and Organizing stages can independently build students' knowledge about opportunities so as to train students' abilities to understand problems. In addition, the Reflecting stage by providing labyrinth board game media can train communication and collaboration between students in uniting students' ideas so that they can solve the problems given.

Based on the results of the average comparison between the columns, it is obtained that students with high emotional intelligence produce better problem-solving abilities than students who have medium and low emotional intelligence, and students with medium emotional intelligence produce better problem-solving abilities than students with low emotional intelligence. Emotional intelligence is the ability to manage emotions which include self-awareness, self-regulation, motivation, empathy, and social skills. Students who have high

emotional intelligence are able to control themselves well, have high motivation, and always try to find a way out of every problem. These students also have good social skills so it is easy to communicate with friends and teachers. This is in line with research conducted by Ashari et al. (2020) which concluded that the higher a student's emotional intelligence, the higher their mathematical problem-solving skills and vice versa.

Based on the results of H0AB, it means that there is no interaction between students' emotional intelligence and the learning model on students' problem-solving skills in the opportunity material. In each learning model, students with high emotional intelligence produce better problem-solving skills than students who have medium and low emotional intelligence, and students with medium emotional intelligence produce better problem-solving skills than students who have low emotional intelligence. According to Ilyas et al. (2014), emotional intelligence is the ability of a person to innovate in synergy with a work team to reach groups together, one of which is social skills as skills in managing work relationships and interactions. However, during the discussion, students with high emotional intelligence who had good social skills were more dominant than students with medium and low emotional intelligence.

Based on the results of H0AB, it means that there is no interaction between the learning model and students' emotional intelligence on students' problem-solving skills in the opportunity material. In each category of emotional intelligence, students who received the CORE learning model with putar bawah game and labyrinth board game media had better problem-solving abilities than students who received direct learning models. Luksiana and Purwaningrum (2018) stated that applying the CORE model the teacher explained the learning material a little, and developed student activity and trained students' memory of a concept in learning material.

CONCLUSION

Learning using the CORE learning model with putar bawah games and labyrinth board game media produces better problem-solving abilities than direct learning models on opportunity material. In the high, medium, and low emotional intelligence categories, students with higher emotional intelligence produce better problem-solving abilities than students who have lower emotional intelligence in the opportunity material. In each learning model, students with higher emotional intelligence produce better problem-solving abilities than students who have lower emotional intelligence in the opportunity material. In each category of emotional intelligence (high, medium, low), students who get the CORE learning model with *putar bawah* game and labyrinth board game media have better problem-solving skills than students who get direct learning models on probablity material.

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REFERENCES

Ashari, N. W., Muhammad, I., & Halim, R. F. (2020). Pengaruh kecerdasan emosional terhadap kemampuan pemecahan masalah matematis. *Proximal: Jurnal Penelitian Matematika dan Pendidikan Matematika, 3*(2), 16-23.

Budiyono. (2016). *Statistika untuk Penelitian*. UNS Press.

Goleman, D. (2017). *Emotional Intelegensi*. Gramedia.

Ilyas, M., Ma'rufi, & Fitriani, A. (2014). Pembelajaran matematika berbasis kooperatif dengan mempertimbangkan kecerdasan emosional siswa SMA. *Prosiding Seminar Nasional Universitas Cokroaminoto Palopo* (Vol. 4, pp. 28–36).

Indarta, Y., Jalinus, N., Abdullah, R., & Samala, A. D. (2021). 21st century skills: TVET dan tantangan abad 21. *Edukatif: Jurnal Ilmu Pendidikan, 3*(6), 4340–4348.

Kudsiyah, S. M., Novarina, E., & Lukman, H. S. (2017). Faktor-faktor yang mempengaruhi kemampuan pemecahan masalah matematika kelas X di SMA Negeri 2 Kota Sukabumi. *Seminar Nasional Pendidikan* (pp. 110-117). Universitas Muhammadiyah Sukabumi.

Luksiana, E., & Purwaningrum, J. P. (2018). Model pembelajaran CORE untuk meningkatkan kemampuan pemecahan masalah matematis berbantuan media batik. *ANARGYA: Jurnal Ilmiah Pendidikan Matematika, 1*(2), 98-102.

MONE. (2003). *Indonesian Law Number 3/2003 about the National Education System*. Ministry of National Education.

NCTM. (2000). *Curriculum and Evaluation Standars for School Mathematics*. National Council of Teachers of Mathematics.

Syaimar, C. P. (2019). Pengaruh penerapan model pembelajaran connecting, organizing, reflecting, extending (CORE) terhadap kemampuan pemecahan masalah matematika siswa Kelas VIII. *Epsilon, 1*(2), 21-31.