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Empowering Problem-Solving Skills Through RICOSRE Learning Model

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Abstract: This study aims to determine the influence of RICOSRE (Reading, Identfying problem, Constructing Solution, Solving Problem, Reviewing Problem Solving, and Extending Problem Solving) learning model toward X grade students' Biology problem solving in two high school. This type of research is quasi experiment research. The sample used is the students in three classes each schools that is determined by cluster random sampling. The research data collected by pretest and posttest score. Data analysis using two way ancova and then continued with LSD 5%. The research result indicate RICOSRE learning model significantly influenced the X grade students' problem solving with a corrected average of problem solving achievement is 87,83%.

Key Words: RICOSRE; different academic; problem-solving

Abstrak: Penelitian ini bertujuan untuk mengetahui pengaruh model pembelajaran RICOSRE (*Reading, Identfying problem, Constructing Solution, Solving Problem,Reviewing Problem Solving, and Extending Problem Solving*) terhadap keterampilan memecahkan masalah siswa Kelas X MIPA di dua SMA. Jenis penelitian adalah penelitian kuasi eksperimen. Sampel yang digunakan ialah siswa pada masing-masing tiga kelas di setiap sekolah yang ditentukan secara *cluster random sampling.* Pengumpulan data penelitian menggunakan *pretest* dan *posttest*. Analisis data dilakukan dengan uji *two way ancova* kemudian dilanjutkan dengan uji lanjut LSD 5%. Hasil penelitian menunjukkan terdapat pengaruh model pembelajaran RICOSRE terhadap keterampilan memecahkan masalah siswa. Siswa mengalami peningkatan keterampilan memecahkan masalah sebesar 87,83%.

Kata kunci: RICOSRE; akademik berbeda; memecahkan masalah

INTRODUCTION

Education in the 21st century is defined by the presence of several other skills that are essential for learners to become individuals who can succeed in the future (Boholano, 2017). During the 21st century , different forms of skills are decision-making skills, organizational skills, problem-solving skills and different other skills (Zubaidah, 2016). The skills that need to be developed include problem-solving skills (Ceberio, Almudí, & Franco, 2016). Problem-solving skills involve thinking about finding problems and then finding solutions based on valid data and information, thus the conclusions are made properly (Iñiguez-Berrozpe & Boeren, 2019).

The results of preliminary studies that have been conducted in SMA Negeri 1 Malang and SMA Negeri 7 Malang show that the students' problem-solving skills are still low. The average score obtained by students after being given problem-solving based questions at SMA Negeri 1 Malang ranged from 37.45 to 52.88. In contrast, the scores obtained by students at SMA Negeri 7 Malang were around 47.24 - 51.12. This shows that the problem-solving skills of students in both schools fall into the low to moderate category.

The low students' problem-solving skills are due to the students' low reading interest which makes it difficult for them to identify problems and find solutions (Endah, Effendi, & Asri, 2018). Siringoringo, Yaumi, Santhalia, and Kusairi (2018) stated that problem solving skills in students are still difficult. Students still have difficulty analyzing problems in a topic related to problem identification and exploration to determine solutions. The solution to overcome the problems that have been described is by applying a learning model that can train students' problem-solving skills. One of the problem-based learning models that can be applied is RICOSRE.

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RICOSRE is a learning model which is focused on problems. It was developed Mahanal and Zubaidah (2017). Because of the syntax of reading and expanding problem solution, the RICOSRE learning model has advantages over other problem-based learning models.

METHOD

This study used a quasi-experimental method. This research was conducted in the odd semester of the 2019/2020 academic year in two schools: SMAN 1 and SMAN 7 Malang. The research sample consisted of three classes X MIPA for the 2019/2020 academic year in each school which were determined by *cluster random sampling*. The data collection used *pre* and *post test questions* which consisted of seven essay questions. Before being given to students, all questions have been validated by experts and tried out in class XI. The normality and homogeneity test of the data were carried out first, then if it is normally distributed, it will be followed by a hypothesis test using *two-way ancova* and followed by a further 5% LSD test.

RESULTS

The results of the pre-requisite test in the form of normality and homogeneity tests of data can be seen in Table 1 and Table 2. The summary of the results of the anacova test for hypothesis testing of student problem-solving skills is shown in Table 3. The results of LSD test of the learning model used in Table 4.

The results of the hypothesis testing skills solving student problems in Table 1 shows F count 40,118 with a significance level obtained of 0.000 < 0.050. Based on the results of the analysis, students' problem-solving skills are influenced by the learning model. Students' problem-solving skills in classes that were taught with the RICOSRE learning model were significantly different from those taught by guided inquiry models as a positive control treatment and conventional learning as a negative control treatment. The corrected mean of the classes that were taught using the RICOSRE model was 80.495 with an increase in the MM level of 87.83%.

DISCUSSION

The results showed that the corrected mean of problem-solving skills of students who were taught with the RICOSRE learning model were significantly different from the corrected mean of students' problem-solving skills taught with the other two models, namely conventional and guided inquiry. This shows that the RICOSRE learning model is able to empower students' problem-solving skills. RICOSRE can empower students' problem-solving skills because of its characteristics as a problem-based learning model. (Mahanal & Zubaidah, 2017) stated, RICOSRE is a problem-based learning model. (Yu, Fan, & Lin, 2015) stated that the problem-based learning model can help students to improve problem-solving skills in real life.

The first syntax is *Reading.* Before proceeding to the next syntax, the first step students take is reading. Students are given the opportunity to read textbook, research articles, and valid and credible online popular articles. Students compose a *resume* related to the material being studied as a proof that they have performed reading activities. Cahyani and Setyawati (2016) stated

Table 1. Normality Testing Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		192
Norm	Mean	.0000000
	Std. Deviation	10.03029998
Mst Extrem Differencs	Absolute	.053
	Positive	.025
	Negative	-.053
K-S Z		.741
Asymp. Sg. (2-tail)		.643
a. Test distribution is Normal.		

Table 2. Homogeneity Testing Results

Levene's Test			
F	df1	df2	Sig.
1.069	8	183	.387

Table 3. ANAKOVA Test Results

Source	Type III SS	df	MS	F	Sig.
Crrctd Mdl	7972.906[a]	9	885.878	13.832	.000
Intercept	27819.938	1	27819.938	434.382	.000
Pre MM	1639.573	1	1639.573	25.600	.000
Model	5138.723	2	2569.362	40.118	.000
Error	11656.165	182			
Total	1051668.196	192			
Corrected Total	19629.070	191			

Table 4. LSD 5% Results on Problem-Solving Skills

Model	*Pretest* Avg	*Posttest* Avg	Margin	Increase (%)	Corrected Average	LSD Notation
Conventional	51.98	69.67	17.68	34.02	68.105	a
Guided Inquiry	46.40	70.28	23.88	51.47	70.333	b
RICOSRE	42.14	79.16	37.02	87.83	80.495	c

that the first step that students can do to solve problems is by reading. Hussain and Munshi (2011) stated that students' information and knowledge can be expanded by reading activities. The more information obtained, the students will be helped to solve problems. After reading, students will create a *resume.* This is of course very useful for students because it helps students to connect their initial knowledge and new knowledge when they encounter problems (Dewi & Asyiah, 2016).

The second syntax is *identifying the problem.* At this stage students are practicing to determine existing problems based on the phenomena that have been read. Students can find problems if students focus on analyzing problems thus students' problem-solving skills can be trained (King, Goodson, & Rohani, 2010). Problems allow students to collect and integrate new knowledge accordingly students are facilitated to learn with real and authentic real life context problems (Keziah, 2010). At this stage, students' problem-solving skills are empowered because students are focused on solving the problems they find (Widiantie & Lismaya, 2017). After identifying the problem, students will then make various solutions to solve the problems identified in the syntax *constructing the solution.* At this stage students' problem-solving skills can be trained because students are required to make assumptions about the cause and effect of the problems and solutions faced by an identified phenomenon (Mahanal & Zubaidah, 2017). In addition to students being able to understand concepts that are linear to existing problems, students also gain experience in using the scientific method (Malahayati, Corebima, & Zubaidah, 2015).

After various solutions are proposed, students proceed to the next stage, namely the stage of *solving the problem*. The stage of *problem-solving* is a cognitive challenging activity for students because it requires basic knowledge of the topic to activate their initial knowledge related to the problem (Shahat, Ohle, & Fischer, 2017). At this stage students do not only need information from various subject areas but also use the right method thus the problem can be solved. At this stage students are given the opportunity to improve their skills to use theoretical information in everyday life and solve problems they encounter (Aka, Güven, & Aydoðdu, 2010). This stage can also trigger a conceptual change process, directing students to develop declarative knowledge that is scientifically acceptable. Students can also improve and elaborate on their conceptual understanding by engaging in problem solving by articulating how students can apply concepts and principles, recognize conflicts between ideas and evidence that have been collected, and look for ways to resolve existing conflicts (Yerushalmi & Eylon, 2014).

The next stage is *reviewing the problem solution.* At this stage, students communicate the results of the trial in order to get *feedback* and expand information from the results of their investigations (Mahanal & Zubaidah, 2017). This of course is very beneficial for students since communication is a resource for creating, maintaining, and expanding knowledge (Nielsen, 2013). At this stage, students can also become better *problem solvers* and thinkers because students review the solutions made then consider and re-examine the solutions that have been made (Lee, 2016). After testing the effectiveness of the solutions that have been made, students are trained in problem solving skills at the last stage, namely *extending the problem solution.* At this stage, students will form a connection of new knowledge with other knowledge around them (Sumiati, Mahanal, & Zubaidah, 2018).

CONCLUSION

RICOSRE learning model is able to empower the problem solving skills of class X MIPA students in Malang. The future researchers can examine how the RICOSRE learning model influences other 21st century skills.

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