

# ERCoRe Learning Model in Improving Students' Critical Thinking Skills

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**Abstract:** Critical thinking skill is a skill in organizing and generating ideas, interpreting, analyzing, evaluating, and knowledge inference based on evidence, concept, criteria, methodology, or contextual consideration. Students' critical thinking skill are still low and need to be improved. Critical thinking skill can be developed through student-centered learning. One of the learning models that can be used is ERCoRe learning model. This research aims to know the influence of ERCoRe learning model toward students' critical thinking skill. The design of this research was quasi-experimental, conducted on senior high school students class. The data analysis that used was covariant. The conclusion based on the result's of the analysis showed that there is the influence of ERCoRe learning model toward students' critical thinking skill compared to conventional strategy.

**Key Words:** critical thinking skills, ERCoRe learning model

**Abstrak:** Keterampilan berpikir kritis merupakan keterampilan seseorang dalam mengatur dan menghasilkan ide, menginterpretasi, menganalisis, mengevaluasi, dan menginferensi pengetahuan berdasarkan bukti, konsep, kriteria, metodologi, atau pertimbangan kontekstual yang sudah ada. Keterampilan berpikir kritis siswa pada umumnya masih rendah dan perlu ditingkatkan, di antaranya melalui penerapan kegiatan pembelajaran dimana siswa berperan aktif. Salah satunya model pembelajaran yang dapat digunakan adalah model pembelajaran ERCoRe. Penelitian bertujuan untuk melihat pengaruh model pembelajaran ERCoRe terhadap keterampilan berpikir kritis siswa. Jenis penelitian adalah kuasi eksperimen, yang dilakukan pada sampel kelas siswa SMA. Analisis data menggunakan analisis kovarian dengan simpulan bahwa terdapat pengaruh model pembelajaran ERCoRe terhadap keterampilan berpikir kritis pada siswa dibandingkan dengan pembelajaran konvensional.

**Kata kunci:** keterampilan berpikir kritis, model pembelajaran ERCoRe

## INTRODUCTION

Critical thinking skills are one's ability to organize and produce, interpret, analyze, evaluate, and reference knowledge based on existing evidence, concepts, criteria, methodologies or contextual considerations (Facione, 2011) as well as skills in utilizing information creatively and dare to accept risk (Yildirim & Özkahraman, 2011). Critical thinking is a high-level skill that can be learned through science learning (Zubaidah, 2010). Individual who has critical thinking skills tends to be more skilled in thinking to make decisions and conclusions from an information (Facione, 1990). The characteristics of people who have critical thinking skills are 1) having ambition in

seeing things thoroughly and in detail, 2) seeking explanations by analyzing ideas thoroughly and in detail, 3) always looking for a more accurate explanation, 4) having open-minded and broad thinking (Fisher, 1998).

Several previous studies stated that students' critical thinking skills were still low and needed to be improved (Novitasari, 2012; Kurniawati, Zubaidah, & Mahanal, 2015; Nuryanti, Zubaidah, & Diantoro, 2018, Fuad, Zubaidah, Mahanal, & Suarsini, 2015). One reason is due to conventional learning used by teacher which do not empower students' thinking skills (Bahri & Corebima, 2015). It supports the statement of Corebima (1999) that students' thinking is still lacking within the learning process in Indonesia. Generally, the learn-

ing process in school keeps using teacher-centered approach which only focuses on teacher instead of student's participation (Trianto, 2008).

Critical thinking skills can be empowered by choosing appropriate strategies or learning models (Paul & Elder, 2019). Learning strategies or models that are deemed appropriate for empowering critical thinking skills are learning that positions students as centers of learning thus students practice their ability to think (Duron, 2006). Student-centered learning trains conceptualization, application, analysis, synthesis, and evaluation of information through observation, experience, reflection, communication and reflection in action (Scriven & Paul, 2004).

One learning model that can be used in developing critical thinking skills and making learning more student-centered, one of which is ERCoRe (Eliciting, Restructuring, Confirming and Reflecting) developed by Ismirawati, Corebima, Zubaidah, and Syamsuri (2018). The ERCoRe model is a learning model based on a constructivist approach. Some of the researchers 'findings found that constructivist approaches can empower students' critical thinking skills (Maypole & Davies, 2001). ERCoRe has four stages: Eliciting, Restructuring, Confirming, and Reflecting, which includes mind mapping and other cooperative activities. The benefits of this ERCoRe learning syntax are 1) empowering students' thinking skills; 2) make students more independent in learning; 3) students can further construct their own knowledge through cooperative learning activities where students will be directed to create mind maps in reconstructing the knowledge they have acquired (Ismirawati, 2015).

Based on the explanation given, the purpose of this study is to determine the effect of ERCoRe learning on critical thinking skills. The results of the research are intended to be used as a solution in learning by the teacher in an effort to develop students' critical thinking skills by applying the ERCoRe learning model thus students are able to compete in social life well.

## METHOD

This research was a quasi-experimental study with a research design with a Pre-test Post-test Non-equivalent Control Group Design. The study was conducted through the provision of critical thinking tests at the beginning of the meeting as a pre-test on the sample class applied to the ERCoRe learning model as an experimental class and conventional learning as

a control class, then a test was given at the end of the meeting as a post-test.

This research was conducted in the odd semester of the 2018/2019 academic year. The population in this study were all class XI Natural Sciences in State High Schools in Malang. The sample was selected by random sampling technique in the equivalent class at 2 schools, namely in SMA Negeri 5 Malang and SMA Negeri 7 Malang with a total of 13 classes and obtained two classes.

Data was collected by giving eight essays that were made based on indicators of critical thinking from Facione namely explanation, analysis, inference, evaluation, and self-regulation. Tests were given before and after learning the motion system, circulatory system and human digestive system. Previously, a trial test was done to see the validity and reliability of the questions.

The data obtained were tested first with the Kolmogorov Smirnov test to determine normality and the Levenes Test to determine homogeneity. If the data meets the requirements for normality and homogeneity, it is followed by anacova analysis to determine the contribution of students' critical thinking skills. Analysis was performed using statistical software assistance.

## RESULTS

### Cognitive Learning Outcomes Average Score

The results of the pretest and posttest scores of critical thinking skills in the ERCoRe learning model have increased by 15,650%, while in conventional learning has a smaller increase. The summary of the increase in the results of critical thinking skills scores can be observed in Table 1.

### Prerequisite Test on the Dependence Variables

The prerequisite tests conducted were normality test and homogeneity test. Normality test was done with the intention of knowing whether the data has a normal distribution, while the homogeneity test was done to identify whether the data had homogeneous diversity. The results of normality and homogeneity test data in sequence can be seen in Table 2 and 3.

Based on Table 2, the significance value obtained is greater than the alpha value (0.05) thus the critical thinking skills data were normally distributed. Based on Table 3 and 4, the significance value obtained is

**Table 1. Pretest and Posttest Results of Cognitive Learning Outcomes with Different Learning Model**

Learning Model	Avd	Std Deviation	95% Level of confidence	
			Lower limit	Upper limit
ERCoRe	54,815 <sup>a</sup>	1,115	52,610	57,020
Conventional	43,651 <sup>a</sup>	1,122	41,432	45,871

**Table 2. Normality Test Results**

		XBCritical	YBCritical
N		141	141
Parameter Normal <sup>b</sup>	Av	25,2955	49,2317
	Std. Deviation	9,00072	11,83339
The most extreme difference	Absolute	,130	,105
	Positive	,130	,105
	Negative	-,076	-,082
Test Statistic		,130	,105
Asymp. Sig. (2-tailed)		,000 <sup>c</sup>	,001 <sup>c</sup>

**Table 3. Pretest Data Homogeneity Test Results**

F	df1	df2	Sig.
2,169	3	137	,094

**Table 4. Homogeneity Test Results of Posttest Data**

F	df1	df2	Sig.
,131	3	137	,942

greater than the alpha value (0.05) thus the critical thinking skills data was homogeneous.

**Hypothesis Testing of Learning Outcomes**

The analysis results with ANAKOVA obtained Fcount = 20.306 with p-value = 0.046, where p-value <  $\alpha$  ( $\alpha = 0.05$ ), thus an influence of learning models on critical thinking skills is accepted. It can be seen that the ERCoRe model has a greater influence in empowering critical thinking skills compared to conventional learning. The summary of anacova test can be seen in Table 5.

Based on Table 5, a significant level value of 0,000 is obtained. Based on the statistical test the anacova results can be known to be smaller than the alpha used which is 0.05. Therefore, it can be concluded that the learning model influences students' critical thinking skills. The data is then analyzed statistically to find out the mean score corrected to find out which learning has the most influence on improving critical thinking skills. The statistical test results of corrected critical thinking more clearly can be seen in Table 6.

Based on Table 6, the corrected average for the ERCoRe learning model is 11,164% and it is higher compared with conventional learning. Therefore, the

**Table 5. Hypothesis Testing of Learning Model on Learning Outcomes**

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	7712,933 <sup>a</sup>	4	1928,233	22,053	,000
Intercept	15467,430	1	15467,430	176,902	,000
XBCritical	3238,087	1	3238,087	37,034	,000
Model	4314,103	1	4314,103	49,341	,000
Error	11891,132	136	87,435		
Total	361354,492	141			
Corrected Total	19604,065	140			

**Table 6. Summary of Further Test Results on the Effects of Learning on Critical Thinking**

No	Learning	X <sub>critical</sub>	Y <sub>critical</sub>	Difference	Corr.Crit
1	ERCoRe	24,2371	54,108	29,8709	54,815
2	Conventional	26,369	44,2857	17,9167	43,651

ERCoRe learning model has more influence to empower critical thinking skills when compared to conventional learning.

### DISCUSSION

The analysis shows that there is an influence of the learning model on critical thinking skills, where the ERCoRe learning model has a greater influence when compared to conventional learning strategies to empower students' critical thinking skills. Through ERCoRe learning, students will construct their knowledge in the form of individual or group mind maps. In addition there are several activities in the ERCoRe model that influence the improvement of critical thinking skills. The steps are contained in the fourth syntax or learning stage.

The first stage, Eliciting or searching for information. At this stage students are given the opportunity to find their own knowledge related to learning material from reading material in the form of UKBM, textbooks and the internet. Through eliciting, students practice the skills in concluding a reading into a simpler form related to learning topics (Tomasek, 2009). In concluding, students must self-assess relevant knowledge and identify, ask and replace, assess, detect, and accept or reject information, knowledge or opinions of others (Brookfield, 1987), the next critical thinking skills students can develop. There are two reasons why reading activities can improve critical thinking skills. First is the basic concept of the reader derived from the ideas that are expanded and deepened that comes from reading sources. Second, readers form their own operational thoughts in language primarily and build language specifically in developing vocabulary. Reading has advantages to develop students' thinking skills (Zubaidah, 2016).

The second stage, restructuring or rearranging. The knowledge gained in the first stage will then be reorganized in a simpler form in the form of a group mind map. Cooperative learning becomes a solution to improve critical thinking skills (Corebima, 2008). In this stage students exchange ideas about what they have gained from reading then poured in the form of mind maps. Mind map is a media that is made based on the way of thinking of someone who follows the workings of the human brain naturally so as to be able to utilize all its potential (Winduro, 2009). The mind mapping strategy makes students think actively by expressing opinions freely and in collaboration, there-

by empowering students to develop critical thinking skills in obtaining and applying information (Marvianasari, 2016). Buzan (2004) states that mind maps make students more active in expressing ideas or ideas through mind mapping during learning.

The third stage, Confirming or confirming knowledge. Confirmed knowledge is knowledge that they have poured in the form of mind maps and presented in front of the class and responded to by other students. Critical thinking can be developed by training students to find the truth about new information, systematic in thinking, both in the aspects of analyzing problems, have a great curiosity, mature and independent in thinking (Anderson, 2004). Students' critical thinking will develop through the application of reflective activities where students will make conclusions from the whole series of learning (Suprijono, 2010).

The fourth stage, Reflecting or reflection. Information that has been obtained from stages one, two and three will then be analyzed and re-evaluated to conclude into new knowledge. Reflection activities can activate students' critical thinking skills (Kagan & Kagan, 2009). Critical thinking is an activity of testing, connecting, and evaluating aspects of a problem (Krulik & Rudnik, 1993). Critical thinking is an activity to remember grouping, organizing, and analyzing and evaluating. Students with critical thinking skills can easily analyze and evaluate the information they find and then raise questions, gather and relate it to relevant information, and communicate it well (Duron, 2006).

The ERCoRe model was developed on the principle of constructivism, making it possible to develop a variety of skills, but this study only tested its application for critical thinking skills at the high school level at a small scope. It is still very possible to be tested against various other skills including 21st century skills, which are very much needed now.

### CONCLUSION

Based on the results of the study it can be concluded that the ERCoRe learning model has a positive effect on critical thinking skills in students. The ERCoRe learning model can be used by teachers as a means of learning in the classroom to empower students' critical thinking skills. The ERCoRe model also seems to still have the potential to empower the skills of other students, hence a deeper study of the ERCoRe model is needed.

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