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The potential of ERCoRe learning model on students' creative thinking skills

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ABSTRACT

21st Century provides many challenges, especially for the world of education. Students are expected to acquire several skills that can support their lives in order to compete in the future. One important skill is creative thinking skills. Creative thinking skills are a way of thinking based on information to find solutions to a problem that is emphasized on the quantity, appropriateness and diversity of answers. Some observations show the low creative thinking skills of students because the empowerment of creative thinking skills is still lacking in learning in Indonesia. One solution that can be done in improving creative thinking skills is to choose the right learning model in this case the researcher uses the ERCoRe learning model. This study aims to look at the effect of the ERCoRe learning model on students' critical thinking skills. This type of research is quasi-experimental. Analysis of the data used is covariance analysis. Conclusions based on the results of the analysis there is an effect of 52,006 on the ERCoRe learning model while the conventional learning model is only 43,515 on students' critical thinking skills compared to conventional strategies.

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INTRODUCTION

The 21st century comes with many challenges for the education world, especially in science, where students are prepared to compete in today's developing society. (Osborne, Erduran & Simon, 2004). The National Education Association (2002) states that there are 4 important skills to be developed to improve the students' quality in facing the challenges of the 21st century, one of which is creative thinking skills.

Creative thinking is a thinking skill based on available information, to find possible answers to problems and focus on quantity, appropriateness and diversity of answers (Greenstein, 2012). The students equipped with good creative thinking skills are problem-solvers. They provide brand-

new original ideas, develop them, and make the right decisions based on these ideas (Sarwinda, 2012). Those who have creative thinking skills are not the same as the other students. They are curious, have broad interests, and love new challenges and creative activities. They think outside the box, free from ordinary people's mindsets. (Langrehr). , 2006; Moma, 2014).

Previous observations made by several researchers showed that students' creative thinking skills in schools were still relatively low (Purnamaningrum, 2012; Listiana, Susilo, Suwono & Suarsini, 2014; Putra, 2016). This result is supported by Corebima (1999) who stated that the empowerment of thinking skills, including creative thinking, is still uncultivated in the learning methods used in Indonesia. The learning method in question is based on "No Name Learning" or "Anonymous Learning" where the process of learning is centred on the teacher (Corebima, 2016). The teacher-centred learning methods do not provide opportunities for the students to participate actively and independently. Eventually, it will not be able to develop the students' thinking skills as expected (Trianto, 2008).

Creative thinking skills can be developed by selecting appropriate learning strategies (Paul & Elder, 2006). The teachers must place the students at the centre of the learning process to further empower the students' potential in creative thinking (Duron, 2006). Another study conducted by Al-Jarf (2009) states that there is a method that can help students improve their ability to visualize and organize their ideas. This method is known as the Mind Mapping method. The Mind Mapping method makes learning more fun, and interesting and motivates students to learn. Through the choice of colours, symbols, keywords and designs, students are trained to be creative (Goodnough and Woods, 2002).

Based on the previous explanation, I apply a learning model, namely the ERCoRe (Eliciting, Restructuring, Confirming and Reflecting) in the learning process in the class. This model has a particular advantage, it employs a mind-mapping method in the learning process which will develop the students' divergent and creative thinking. However, in practice, this model requires the teacher's ability to accompany and manage the students in the making of the correct mind map. The ERCoRe learning model is still in its infancy and as far as I know, no study discusses its effect on the student's creative thinking skills. A study has measured the students' metacognitive abilities, learning outcomes and retention with the conclusion that the ERCoRe Model can empower the variables (Ismirawati, 2018). This condition compels me to study the potential and the possibility of employing the ERCoRe learning model in improving the students' creative thinking skills in the classroom.

RESEARCH METHODS

Research Design

This research belongs to the type of quasi-experimental research using the Pretest-Postest Nonequivalent Control Group Design, as shown in Table 1.

Table 1. The Design of Class Treatment Based on Variables

Pretest	Treatment	*Posttest*
O1	S1	O2
O3	S2	O4

Information:
S1 = class with ERCoRe Learning Model
S2 = class with the conventional learning method
O1, O3 = pretest score
O2, O4 = posttest score

I started by giving a test of creative thinking at the first meeting as a pre-test. Two classes participated as the sample classes. One class had been taught using the ERCoRe method as an experimental class, while the other class used the conventional learning method and was positioned as a control class. In the end, another test was given as a post-test.

Population and Samples

The research population was all students of class XI IPA in two different schools, namely SMA Negeri 5 Malang and SMA Negeri 7 Malang, totalling 210 students. The sample was then selected using a random sampling technique. Considering the homogeneity of the population of each class, 4 classes were chosen as the sample classes: IPA 4 and IPA 5 at SMAN 5 Malang, IPA 3 and IPA 5 at SMAN 7 Malang with a total of 141 students.

Instruments

The data were taken using an essay test consisting of 8 questions, developed based on Torrance's indicators of creative thinking (1998) which consisted of several indicators: fluency, flexibility, elaboration, and originality. The questions of the essay test were assessed by the experts who stated that the questions were valid and feasible. An analysis of creating thinking-related questions was also conducted with the result r table = df = 0.288.

Procedures

A test was given at the beginning of the lesson as a pre-test to determine the student's initial creative thinking skills, after which each class was given a different treatment. Two classes were treated with the ERCoRe learning model while the other two were treated with the conventional learning method. Each treatment took one session. At the end of the session, each student was given the same Essay test as the pre-test to determine the development of the student's creative thinking.

Data Analysis

The data were first analyzed descriptively. Then the Kolmogorov-Smirnov test was applied to test the prerequisites and Levene's Test to check the homogeneity. After that, the data were tested using Anacova to observe the effect of the ERCoRe model on the student's creative thinking skills. The SPSS 23.0 program for Windows was used for the analysis.

RESULTS

The summary of the analysis of covariance or Anacova of the effect of the ERCoRe learning model on the student's creative thinking skills can be seen in Table 2.

Table 2. Anacova results of the effect of the ERCoRe Learning Model on Creative Thinking Skills

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8331,630[a]	4	2082,907	37,159	,000
Intercept	6988,442	1	6988,442	124,673	,000
XBCreative	4124,162	1	4124,162	73,574	,000
Strategy	2510,618	1	2510,618	44,789	,000
Error	7623,391	136	56,054		
Total	337504,001	141			
Corrected Total	15955,021	140			

Based on Table 5 above, the significant level value is 0.000. It was smaller than 0.05. This shows that the strategy or learning model used during the learning process affects the students' creative thinking skills. The data are then re-analyzed to find out which learning strategies/models have a greater influence on developing students' creative thinking skills. The results of these statistical tests can be seen in Table 6.

Table 6. Corrected Average Score of Creative Thinking Skills in the ERCoRe Learning Model and Conventional Learning Method

No	Strategy	XCreative	YCreative	Difference	CreativeCor
1	ERCoRe	26,2913	51,35	25,0587	52,006
2	Conventional	27,8569	44,1076	16,2507	43,515

Based on Table 6 above, it can be seen that the corrected average score for the ERCoRe learning model is 52,006 while the corrected average for conventional learning is 43,515. We may safely conclude that the ERCoRe learning model is more effective in developing students' creative thinking skills than the conventional learning method.

DISCUSSION

Based on the analysis conducted using the covariance analysis test, we can conclude that the development of the students' creative thinking skills is strictly related to the choice of learning strategy/method. In this case, choosing the ERCoRe learning model over the conventional one has proven to be more influential.

The process of learning using the ERCoRe model urges the students to develop their creative thinking skills further because in this model the students will be asked to construct their knowledge in the form of a mind map (Ismirawati, Corebima, Zubaidah, Syamsuri. 2018). In addition, ERCoRe learning also has several syntaxes that contribute to developing students' creative thinking skills.

The first syntax is Eliciting or looking for information related to the learning topics. At this stage, the students are required to search for information through various media, including textbooks, the internet and so on. Reading is related to creative thinking (Wang, 2011) and helps to improve it (Zubaidah, 2014). Reading requires the students to understand the reading text and create a mind map according to the rhythm, potential and the students' characteristics of thinking which will then be used to construct the information so that new knowledge is born (Karim, 2014). The students will conduct the process of assembling words, concepts, ideas, and information so that they gain new knowledge that will relate to the knowledge possessed by the previous students (Farris, 1993). Reading trains the diverge students' thinking skills such as understanding, analyzing, evaluating and concluding which is the same as creative thinking patterns (Wang, 2011).

The second syntax is Restructuring or rearranging the obtained information. The information obtained in the Eliciting process will be rearranged into new, simpler knowledge in the form of a mind map. Mind mapping trains the students' creative thinking skills with an emphasis on improving the visualization in organizing their ideas (Al-Jarf, 2009). In addition, mind mapping has proven to be fun, and interesting and motivates students to learn because, during the making of the Mind Maps, the students are offered many choices of colours, symbols, keywords and designs which indirectly improve their creativity (Goodnough and Woods, 2002).

The third syntax is Confirming or reconfirming the compiled information. At this stage, the students will present the results of their mind mapping to assess whether the information they have

compiled is correct. This Confirming activity can develop the student's creative thinking skills because it develops the students' sensitivity to a problem, using it to find out their weaknesses to find a solution to the problem (Greenstein, 2012). To solve a problem, the students need to undergo the processes of understanding, drawing a hypothesis, testing, finding a solution, and evaluating and communicating the results to other people as a part of the creativity process (Torrance, 1969). Learning and Teaching Scotland (LTS, 2004) suggests that if creative thinking skills develop in a person, the person will generate new ideas easily, can correlate much information, has multiple perspectives on something, create and imagine, and care about the results.

The fourth syntax is Reflecting or correction based on the received inputs during the presentation. This activity improves the students' creative skills because in this process the students are requested to summarize the results of the mind maps presented by the previous group of students in front of the class into a new form of a mind map. Students with good creative thinking skills will be able to think synthetically, can correlate things that other people cannot see, analyse ideas, and evaluate his/her quality. They are also able to translate an abstract theory into a simpler and easily accepted form for the other.

CONCLUSION

Based on the results of this study, we can safely conclude that the ERCoRe learning model affects the students' creative thinking skills better compared to the conventional learning method. The increase in the students' creative thinking skills that occurred after the application of the ERCoRe model was caused by the syntaxes themselves. The ERCoRe learning syntaxes require the students to make the most attractive mind maps to train their creativity. The ERCoRe Learning Model can be employed as one of the learning strategies in improving the students' creative thinking skills, especially through the application of the Mind Mapping method in the learning process. I hope that another research on the ERCoRe Learning Model in the future will shed some light on the enormous potential of the ERCoRe Learning Model.

REFERENCES

Al-Jarf, R. (2009). *Enhancing Freshman Students' Writing Skills With A Mind Mapping Software*. Paper presented at the 5th International Scientific Conference, elearning and Software for Education, Bucharest.

Corebima, A. D. (1999). Proses dan Hasil Pembelajaran MIPA di SD, SLTP, dan SMU: Perkembangan Penalaran Siswa Tidak Dikelola Secara Terencan. *Proceeding Seminar on Quality Improvement of Mathemathics and Science Education in Indonesia*.

Corebima. A. D. (2016). *Pembelajaran biologi di indonesia bukan untuk hidup*. Proceeding Biology Education Conference, *13*(1), 8-22. Retrieved from https://jurnal.uns.ac.id/prosbi/article/view/5640

Duron, R.L.B. & Waugh, W. (2006). *Critical thinking framework for any discipline*. International Journal of Teaching and Learning in Higher Education, *17*(2), 160-166. Retrieved from https://www.isetl.org/ijtlhe/pdf/IJTLHE55.pdf

Evan, J.R. (1991). *Creative thinking in the decision and management sciences*. Amerika Serikat: South-Western Pub; First edition.

Farris, P.J. (1993). *Language arts aproces aproach.* Melbourne: Brown & Benchmark Publishing.

Goodnough, K & Woods, R. (2002). *Student and teacher perceptions of mind mapping: a middle school case study*. New Orleans. American Educational Research Association Annual Meeting.

Greenstein, L. (2012). *Assessing 21st century skills, a guide to evaluating mastery and authentic learning*. USA: Corwin.

Ismirawati, N. (2015). *Prototipe model pembelajaran ERCoRe (Elicitation, Restructuring, Confirmation, Reflection) untuk memberdayakan keterampilan metakognisi.* Dipublikasikan Pada Seminar Nasional Pendidikan Sains "Pengembangan Model Dan Perangkat Pembelajaran Untuk Meningkatkan Kemampuan Berpikir Tingkat Tinggi".

Ismirawati, N., Corebima, A.D., Zubaidah, S., Syamsuri, I. (2018). Ercore learning model potential for enhancing student retention among different academic ability. *Eurasian Journal of Educational Research, 18*(77), 19-34.

Karim, A. (2014). Mengembangkan berfikir kreatif melalui membaca dengan model mind map. *Kudus: Jurnal perpustakaan Libraria, 2*(1). Retrieved from http://dx.doi.org/10.21043/libraria.v2i1.1188

Langrehr, J. (2006). *Thinking skills* (Edisi Pertama). Jakarta: PT.Gramedia

Listiana, L., Herawati, S., Suwono, H., Suarsini, E. (2016). Empowering Students Metacognitive Skills Through New Teaching Strategy (Group Investigation Integrated With Think Talk Write) in Biology Classroom. *Journal of Baltic Science Education, 15*(3), 395. Retrieved from http://oaji.net/articles/2016/987-1482422861.pdf

LTS (Learning and Teaching Scotland). (2004). Sustainable Developments Education in England Wales, Nothern Ireland and Scotland (Dundee: Learning & Teaching Scotland).

Moma, La. (2014). *Peningkatan kemampuan berpikir kreatif matematis, self-efficacy, dan soft skills siswa SMP melalui pembelajaran generatif.* Bandung: Universitas Pendidikan Indonesia.

Mustaqim. (2019). Pengaruh Model Pembelajaran *ERCoRe* (*Eliciting, Restructuring, Confirming, Reflecting*) Pada Kemampuan Akademik Berbeda terhadap Keterampilan Berpikir Kritis, Keterampilan Berpikir Kreatif, Hasil Belajar Kognitif dan Retensi Siswa Kelas XI SMAN Malang. Malang: Pascasarjana Universitas Negeri Malang.

National Education Association. (2002). *Preparing 21st Century Students for a Global Society: An Educator's Guide to the "Four Cs".* 215.

Osborne, J., Erduran, S., & Simon, S. (2004). Enhancing the quality of argumentation in school science. *Journal of Research in Science Teaching, 41*(10), 994-1020. Retrieved from https://doi.org/10.1002/tea.20035

Paul, R., & Elder, L. (2006). Critical Thinking Concepts and Tools. Retrieved from http://www.criticalthinking.org

Priantini, A. & Marhaeni. (2013). *Pengaruh metode mind mapping terhadap keterampilan berpikir kreatif dan prestasi belajar IPS.* E-Journal Program Pascasarjana Universitas Pendidikan Ganesha Jurusan Pendidikan Dasar 3(2013). Universitas Pendidikan Ganesha. Retrieved from https://doi.org/10.46650/wa.6.2.300.%25p

Purnamaningrum, A. (2012). *Peningkatan kemampuan berpikir kreatif melalui Problem Based Learning (PBL) pada pembelajaran biologi siswa kelas X-10 SMA Negeri 3 100 Surakarta tahun pelajaran 2011/2012.* Surakarta: Universitas Nusa Cendana.

Putra, R.D. (2016). *Peningkatan kemampuan berpikir kreatif siswa melalui model pembelajaran inkuiri terbimbing pada siswa kelas XI MIA 1 SMA Negeri Colomadu Karanganyar tahun pelajaran 2015/2016. Surakarta:* Universitas Sebelas Maret.

Santoso. (2012). *Keterampilan berpikir kreatif matematis dalam Pembelajaran Berbasis Masalah (PBM) pada Siswa SMP.* Unika Widya Mandala.

Sarwinda, Wiratamasari. (2012). Pemberdayaan Keterampilan Berpikir Kreatif Siswa Melalui Strategi *Reciprocal Teaching* Pada Pembelajaran Biologi SMA. Seminar Nasional X Pendidikan Biologi FKIP UNS.

Suyati, W. (2017). *Pengaruh pendekatan pembelajaran konturktivisme terhadap keterampilan berpikir kreatif siswa pada mata pelajaran matematika di SMP Nurul Iman Palembang*. Palembang; Universitas Islam Negeri Raden Fatah.

Torrance, E.P. (1969). *Creativity: What research says to the teacher*. Washington, DC: National Education Association.

Torrance, E.P. (1998). *The Torrance tests of creative thinking norms—technical manual figural (streamlined) forms A & B*. Bensenville, IL: Scholastic Testing Service, Inc.

Trianto. (2008). *Mendesain Pembelajaran Kontekstual (Contextual Teaching and Learning) di Kelas*. Surabaya: Cerdas Pustaka.

Wang, A.Y. (2011). Contexts of creative thinking: a comparison on creative performance of student teachers in taiwan and the united states. *Journal International of Cross-Cultural Studies, 22*, 1-14. Retrieved from https://www.yumpu.com/en/document/read/26129145/1-contexts-of-creative-thinking-a-comparison-on-creative-

Zubaidah, S. (2014). *Pemberdayaan keterampilan penemuan dalam scientific approach melalui pembelajaran berbasis ReMap couple.* Makalah Disajikan Pada Seminar Nasional XI Bertema Biologi, Sains, Lingkungan dan Pembealajarannya di Universitas Sebelas.