The Influence of Research Based Learning Model on Independent Learning and Creative Thinking Skills in Graph Theory

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Abstract. This study aimed to reveal influence of the research-based learning model on independent learning and creative thinking skills of students on graph theory. This research was conducted at the students of Mathematics Education Program IKIP PGRI Bojonegoro for 8 weeks. The data used to measure influence student learning independence was gathered through a questionnaire; and the students' creative thinking skills and learning outcomes of Research Based Learning Model were measured through a test. It used quantitative method using multiple regression test. Data were analyzed using SPSS 22.00 for windows. The results of the study showed: (1) there was influence between learning independence on learning outcomes Reseach Based Learning model (2) there was influence between creative thinking skill on learning outcomes Reseach Based Learning model, and (3) there was influence between learning independent and creative thinking skill on learning outcomes Reseach Based Learning model which is 72.6%.

Key words: reseach based learning; independent learning; creative thinking skill.

How to Cite: Suriyah, P., Waluya, S. T. B., Dwijanto, D., Rosyida, I. (2021). The Influence of Research Based Learning Model on Independent Learning and Creative Thinking Skills in Graph Theory. *ISET: International Conference on Science, Education and Technology*, *7*(1), 453-456.

INTRODUCTION

Human quality is one component in the development of a nation. A nation will develop rapidly, if it is supported by adequate human resources, but on the contrary if the quality of its human resources is low, then the development of the nation will be hampered. Therefore, it is necessary to improve the quality of human resources in line with the times. Improving the quality of human resources can be done in various ways, including through education.

One of the goals of national education is to develop students' potential to become creative individuals. Creative personal formation is done through the development of creative thinking skills. Creative thinking is a basic ability that must be possessed by students, so that it becomes one of the thinking patterns that must be included in the educational curriculum (Özdas & Batdi, 2017: 13). Creative thinking skills in mathematics are needed to create (formulate), complete, and complete a model or problem-solving plan. The series of creative thinking activities in mathematics are intended to equip students in dealing with various problems.

The ability to think creatively needs to be developed as the main provision to face life. Shute & Becker (2010: 10) explain that in dealing with the development of knowledge, humans are required to have the ability to think critically, think creatively and collaboratively and be able to communicate effectively in order to be a solution and be able to survive. This is a challenge for education today in preparing the nation's generation.

Education today is not enough to only provide access to information for students, but is required to form a generation that is able to act effectively and creatively in the face of the rapid and complex development of the world of work (Heppell, Chapman, Millwood, Constable, & Furness, 2004). Students must have the ability to think creatively as a provision to face the rapidly changing world. The development of the world is marked by several things, including advances in information technology. Advances in information technology are accompanied by advances in the world of education because all innovations in education between countries can be accessed through information technology. Education must provide a new experience, unique and creative ideas and develop a collaborative attitude as a provision for students to face life in the world of work, society and everyday life. The Partnership for 21st Century Skills (P21) explains that learning must focus on developing the 4C's as competencies possessed in dealing with today's environment, namely creativity, critical thinking,

communication, and collaboration. This is a reason that students should have the ability to think creatively as a provision to face life today.

In the idea-building stage, you will see novelty, fluency and individual flexibility in completing tasks in the creative thinking process, individuals or students having different levels of ability, economic and socio-cultural backgrounds, learning styles, independence will certainly have different qualities of the creative process. Because the differences are generally tiered/tiered, it can be said that there are levels or levels of ability in creative thinking as described above.

The importance of independent learning in schema thinking helps build components of a schema that are connected in a network of creative thinking abilities. Based on research (Huda, Mulyono, & Rosyida, 2019) mathematical creative thinking skills affect the learning independence of students if they use the selection of the right learning model in the learning process. As described by Sagala (2006) and Maulana (2016), that learning must be defined as a process of interaction between students, educators, teaching materials, and their environment, in order to develop creative thinking skills, which can improve their ability to construct knowledge. new independently. Formally constitutional, the curriculum in Indonesia has always mandated mathematical creative thinking skills as one of the higher-order thinking skills that must be developed through learning in schools, given that creative thinking is a person's self-actualization, through the ability to solve problems in a unique way, full of benefits, and of course enhance self-quality (Munandar, 1999). Meanwhile, the learning independence of students also inevitably has to be a part that must be developed by a teacher. Because students who have independent learning, of course, will try to continue to learn so that they get satisfaction in the learning process.

According to Nanang (2016), in order to develop the two goals, namely the ability to think creatively mathematically and independent learning, it is necessary to pursue a learning activity that further explores the ability of students to solve problems creatively, and in the process helps to develop independent learning. One of the learning approaches that can develop mathematical creative thinking skills and learning independence of students is learning that accommodates student learning goals in higher education. According to Mukaromah's research (2020), education at the tertiary level should provide benefits including: 1) incorporating students into the values, practices, and ethics of their chosen discipline, 2) ensuring the content of lessons includes the latest research findings, 3) improving students' understanding of how their chosen discipline makes a positive contribution to society, 4) develop and improve skills, namely generic (critical and analytical thinking, information seeking and evaluation of problem solving) and skills in conducting and evaluating research that is beneficial to the personal and professional lives of participants students, and 5) provide opportunities to improve learning methods that have been associated with positive student learning outcomes.

According to Mukaromah (2020), the learning model that leads to these benefits is Research Based Learning. According to Poonpan & Suwanmankha (2005) and Dafik (2015: 6) explain that Research Based Learning is a learning system that uses authentic-learning (learning using real examples), problem solving (problem solving), cooperative learning (cooperative learning), contextual learning (hand on and mind on) and inquiry approach (determining something) which is based on the philosophy of constructivism. Linguistically, the term Research Based Learning uses English which means research-based learning or research. Research Based Learning is one of the learning models developed by constructivism. Research Based Learning is a learning model that leads to activities of analysis, synthesis, and evaluation as well as improving the ability of students and lecturers in terms of assimilation and application of knowledge (Widyawati, 2010). Basically, according to Mukaromah (2020), the application of RBL has the main target of encouraging the creation of higher-order thinking skills and encouraging students to be creating. This theory is very suitable that at the level of creating thinking there is a creative thinking process in it.

While the formulation of the problems in this study is as follows.; (a) Is there an influence between independent learning on learning outcomes of Research Based Learning?, (b) Is there an influence between creative thinking skill on learning outcomes of Research Based Learning, (c) Are there an influence between independent learning and creative thinking skill on learning outcomes of Research Based Learning?.

METHOD

The method used in this study is quantitative using multiple regression test. This research was conducted for 8 weeks. It used with one saturated sample group (Sugiyono, 2015) of 26 students. Every week, the students were given independent assignments. The research variables are two independent variables = x and one dependent variable = y. Independent learning is $x1$ variable; creative thinking skill is $x2$ variable, and learning outcome of Research Based Learning Model is y variable.

The research instrument used was a questionnaire. It was used to measure independent learning using favourable questions and unfavourable questions using a Likert scale. The instrument to measure creative thinking skill was using the questions as a weekly task. The questions in the assignment were arranged based on indicators of ability to recognize the creative thinking and are equipped with rubrics and indicator predictions on the questions about creative thinking. All questions were validated by experts and tested on students who had taken

graph theory.

RESULTS AND DISCUSSION

The following is the result of data analysis using statistical test using SPSS 22 by searching the influence of Research Based Learning Model on Independent Learning and Creative Thinking Skills in Graph Theory. The results of the analysis are presented in the *Figure 1, Figure 2, and Figure 3. Figure 1* is describing about coefficients , *Figure 2* is describing about ANOVA, and *Figure 3* is describing about Model Summary.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-56.644	17.085		-3.315	.003
	Independent Learning (X1)	1.052	.456	.398	2.306	.030
	Creative Thinking Skills (X2)	.789	.270	.506	2.927	.008

a. Dependent Variable: Research Based Learning (Y)

Figure 1.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5948.240	2	2974.120	30.543	.000[b]
	Residual	2239.606	23	97.374		
	Total	8187.846	25			

a. Dependent Variable: Research Based Learning (Y)
b. Predictors: (Constant), Creative Thinking Skills (X2), Independent Learning (X1)

Figure 2.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.852[a]	.726	.703	9.86784

a. Predictors: (Constant), Creative Thinking Skills (X2), Independent Learning (X1)

Figure 3.

The results of the SPSS based on *Figure 1, Figure 2, and Figure 3* showed: (1) there was an influence between learning independence on learning outcomes Research Based Learning model (2) there was influence between creative thinking skill on learning outcomes Reseach Based Learning model, and (3) there was influence between learning independent and creative thinking skill on learning outcomes Reseach Based Learning model which is 72.6%.

In this study, learning independence was studied and traced through learning models that encourage student growth to think creatively. The importance of independent learning in schemes of thinking helps build components of a schema that are connected in a network of creative thinking skills. Sugandi (2013) also emphasized that the existence of learning independence also determines success in implementing problem-based learning. RBL learning also contains problem-based learning in it (Dafik, 2015).

Student learning independence is also influenced by learning creativity and learning motivation, this is evident from the results of Isnawati and Samian's research (2015) that student learning creativity has a positive effect on student learning independence, and student learning motivation has a positive effect on student learning independence. Tureni (2017) also explains that the lack of student motivation will affect less than optimal learning outcomes. Therefore it is necessary to do research related to how student learning independence through Research Based Learning can familiarize the process of creative thinking in graph theory learning, as well as the effect of independent learning and Research Based Learning models on students' creative thinking abilities in learning graph theory.

A person's creative thinking ability can be improved by understanding his creative thinking process and the various influencing factors, in this case learning independence through Research Based Learning. This understanding shows that a person's creative abilities are tiered (tiered) and can be increased from one level to a higher level.

The way to improve that is by understanding the creative thinking process and the factors mentioned above.

CONCLUSION

In this study, there was an influence between learning independence on learning outcomes Reseach Based Learning model (2) there was influence between creative thinking skill on learning outcomes Reseach Based Learning model, and (3) there was influence between learning independent and creative thinking skill on learning outcomes Reseach Based Learning model which is 72.6%. The impact on learning is very important for recommendations for learning in tertiary institutions, especially for mathematics education department.

REFERENCES

Dafik. (2015). Handbook for the implementation of RBL in the Courses. Jember: Universitas Jember.

Heppell, S., Chapman, C., Millwood, R., Constable, M., & Furness, J. (2004). Building Learning Futures, Retrieved from http:// rubble.heppell.net/cabe/final_report.pdf.

Huda, M.N., Mulyono, & Rosyida, I. (2019). Mathematical Creative Thinking Ability in Term of Learning Independence in Creative ProblemSolving Assisted Learning with Mobile Learning. Unnes Journal of Mathematics Education Research, 121-127.

Isnawati, N., & Samian, S. (2015). Kemandirian belajar ditinjau dari kreativitas belajar dan motivasi belajar mahasiswa. Jurnal pendidikan ilmu sosial, 25(1), 128-144.

Maulana. (2016). Meningkatkan kemampuan dan disposisi berpikir kritis, kreatif, dan investigatif matematis mahasiswa PGSD melalui pembelajaran berbasis masalah berstrategi "MURDER". (Disertasi). Sekolah Pascasarjana Universitas Pendidikan Indonesia. Bandung: Tidak dipublikasikan.

Mukaromah, M.H. (2020). Pengembangan Perangkat Pembelajaran Matematika Berdasarkan Research Based Learning dan Pengaruhnya terhadap Keterampilan Berpikir Metakognisi Mahasiswa Memecahkan Masalah H-Irregularity pada Graf Khusus.

Munandar, S. C. U. (1999). Pengembangan Kreativitas Anak Berbakat. Jakarta: PT Rineka Cipta.

Nanang, A. (2016). Berpikir Kreatif Matematis dan Kemandirian Belajar dalam Pembelajaran Berbasis Masalah. Mimbar Sekolah Dasar, vol 3 no 2, 171-182, DOI: 10.17509/mimbar-sd.v3i2.4283.

Özdas, F., & Batdi, V. (2017). A Thematic-based Meta Analytic Study Regarding the Effect of Creativity on Academic Success and Learning Retention, 5(3), 53–61. https:// doi.org/10.11114/jets.v5i3.2043.

Poonpan, S., Suwanmankha, S. (2005). Indicators of research-based learning instructional process: a case study of best practice in a primary school. Proceeding at the Australian Association for Research in Education (AARE) Annual Conference 2005 (pp. 1–7). NSW: AARE Inc.

Sagala, S. (2006). Konsep dan makna pembelajaran. Bandung: Alfabeta.

Shute, V. J., & Becker, B. J. (2010). Innovative Assessment for the 21st Century. Florida: Springer Science. https://doi.org/10.1007/ 978-1-4419-6530-1.

Sugandi, A.I. (2013). "Pengaruh Pembelajaran Berbasis Masalah dengan Setting Kooperatif Jigsaw Terhadap Kemandirian Belajar Siswa SMA". Infinity Jurnal Ilmiah Program Studi Matematika STKIP Siliwangi Bandung. Vol 2(2).

Sugiyono. (2015). Statistika untuk Penelitian [Statistics for Research]. Bandung: Alfabeta

Tureni, D. (2017). "Penerapan Pendekatan Saintifik Berbasis Peta Pikiran (Mind Mapping) dalam Meningkatkan Motivasi Mahasiswa pada Mata Kuliah Perkembangan Hewan di Universitas Tadulako". Jurnal Penelitian Pendidikan Matematika dan Sains, 1(1): 21-25. http://journal.unesa.ac.id/index.php/jppms/

Widyawati, T. D. (2010). Pembelajaran Berbasis Riset. Yogyakarta: Universitas Gadjah Mada.