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Critical Thinking and Problem Solving Ability of Students in the Merdeka Curriculum

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ABSTRACT: The purpose of this study is to compare the project-based learning model in the "Merdeka Belajar" curriculum and the inquiry learning model in terms of students' critical thinking and problem-solving abilities. The research question is whether there is a difference between these two learning models in terms of students' critical thinking and problem-solving abilities. The independent variable (X) is the project-based learning model (X1), while the dependent variables (Y) are critical thinking ability (Y1) and problem-solving ability (Y2). The research sample was taken from 10th-grade students at SMA Muhammadiyah 4 Surabaya, consisting of 4 classes with a total of 120 students. The research sample was selected from students who have a normal distribution, possess similar characteristics (homogeneous), and have the same average scores. Then, two groups (classes) of students were selected as samples, named as the experimental group and the control group. The analysis technique used was Multivariate Analysis of Variance (MANOVA). Based on Pillai's trace, Wilks' lambda, Hotelling's trace, and Roy's largest root, the value obtained was 0.000. As 0.000 < 0.05, the null hypothesis (H0) is rejected and the alternative hypothesis (H1) is accepted. This indicates that there is a difference in critical thinking and problem-solving abilities between the project-based learning model and the inquiry learning model.

KEYWORDS: Critical Thinking, Merdeka Curriculum, Learning Model, Problem Solving Ability, Project-Based Learning,

I. INTRODUCTION

The policy of Independent Learning Curriculum (ILC) or "Kurikulum Merdeka Belajar" established by the Ministry of Education's is a strategic effort to guarantee the learners to receive a valuable and high-quality instruction. This curriculum serves as a springboard for educational institutions to implement student-centered improvements in the classroom.

The ILC is conceived as a learning plan that gives the student the opportunity to study in a relaxed and calm manner while keeping in mind the natural talents of the learners. Educators are the main subjects who have a role as drivers to take action in giving positive things to learners (Ainia, 2020). Educators have a responsibility to implement the curriculum in accordance with the needs of the student at the time of the learning process. The ILC involves independent conditions in terms of meeting the goals, methods, materials, and evaluation of learning (student's center learning).

The development of ILC is a sensible step in the 21st century when it comes to competing globally for human resources. One of the tenets of 21st-century learning is that education ought to be learner-centered. Critical and inventive learning skills—that is, creativity, invention, communication and teamwork, and critical thinking and problem-solving are the main focus of 21st-century skills according to Trilling and Fadel (2009).

Critical thinking skills are the ability to evaluate, criticize, and make conclusions based on inference and excellent judgment. According to Fisher (2008), critical thinking is the active and skillful analysis and assessment of communications, arguments, and observations. In the meanwhile, the capacity to solve problems involves thinking through issues and coming up with solutions based on data gathered from multiple sources so that relevant conclusions can be made (Hamalik, 2014).

Individual experiences acquired throughout problem-solving processes are what constitute critical thinking skills. Ennis (2011) asserts that a person with critical thinking abilities is inherently capable of problem-solving. On the other hand, Peter (2012) asserts that critical thinking is a skill that must be learned and developed. It is possible to acquire critical thinking abilities even though one is not born with them. Interpretation, analysis, appraisal, inference, explanation, and self-regulation are examples of critical thinking skills.

A person's ability to identify or recognize problems, usually solves problems in different ways. According to Polya (2014), problem-solving is an attempt to find a way out of all difficulties aimed at achieving a goal so difficult that it can be achieved as soon as possible. In line with Hudojo's statement (2015), solving a problem is a process of accepting a challenge to

solve a problem. With problem-solving skills, learners will be able to make decisions. Indicators of problem-solving capabilities include understanding problems, planning resolutions, implementing resolving plans, reviewing resolutions. (Polya, 2014)

The student is actively engaged in the learning process as a subject. The learners are required not only to memorize the learning material, but they must also acquire knowledge that is appropriate for their current level of cognitive growth. In addition to having the capacity to develop and communicate, analyze, and solve problems, students must apply their talents to address the difficulties they encounter on their own.

SMAM 4 Surabaya has implemented an independent curriculum in an effort to enhance students' critical thinking abilities and problem-solving skills; however, there are still issues with the learning process, as educators continue to hold a dominant position and frequently employ the lecture method when imparting knowledge. According to Puspitarini (2022), educators need to be able to adapt their lesson plans, models, and methods to meet the specific demands of learners in the twenty-first century. Educators employ more than just the conventional teaching techniques.

Project-based learning (PjBL) is one of the recommended study model for the ILC. Since the project-based learning model incorporates critical thinking principles and related issues. It is a perfect fit for achieving 21st century education goals. Students took part in project-based learning where they designed, made, and displayed products that addressed real-world issues.

The PjBL model is designed to guide learners through collaborative project that incorporate a variety of learning tools so that learners can examine course contents in a variety of insightful ways. PjBL according to Sumarni (2015), is a type of learning that combines projects with research assignments, real-world issues, and well-thought-out outcomes to help students acquire knowledge and skills. These projects are built around difficult questions and give students a major part in problem-solving and decision-making processes so they may work on their own.

Muis and Dewi (2021) found that the implementation of the project-based learning model trains students to construct an opinion and criticism so that students are open to receiving input from their colleagues. In addition, the activities in the PjBL model are able to develop collaborative abilities to support each other and learners will practice in presenting the work that they have completed as best they can. Learners will be able to attain the 4C skills; creative thinking, communication, critical thinking and problem solving, and collaboration by following the processes in the PjBL paradigm.

The benefits of the project-based learning approach include assisting learners in creating the procedure to arrive at a conclusion, preparing them to handle information responsibly during a project, and enabling them to generate a final product and deliver their work. In order for the PjBL approach to be successful, educators must design and facilitate learning by conditioning learners to acquire the related knowledge, motivation, and insight to complete the project.

This study compares the effects of inquiry learning models and PjBL models on learners' critical thinking and problem-solving abilities in an ILC.

II. RESEARCH METHOD

This study employs a quantitative methodology and thus falls within the experimental research category according to the classification system. This study uses quasi-experimental research methodology. This type of research divides group of research into non-randomly. Sugiyono (2017) claims that although quasi-experiment research has a control group, it is unable to completely control outside factors that could influence how the experiment is carried out.

The conceptual relationship between variables in this study is shown in the following figure:

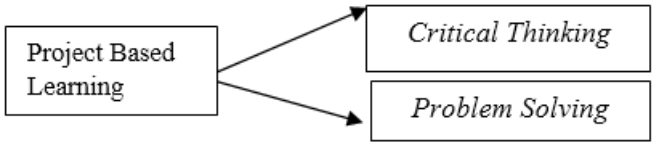

Figure 1. Variable Interface Relations in Research

The project-based learning model (X1) is the independent variable (X) in this investigation. While the ability to solve problems and think critically (Y1) and Y2 are the dependent variables (Y).

A total of 120 students from 4 classrooms in class X at SMA Muhammadiyah 4 Surabaya made up the research sample. The study sample consisted of students that were randomly selected, possessed the same traits (homogeneous) and a similar mean score. Next, two classes were selected as samples and given the names experimental and control groups.

The data analysis technique used to ascertain the impact of the project-based learning model on students' critical thinking and problem-solving abilities was Multivariate analysis of variance (MANOVA) statistical analysis which includes multivariate tests, tests of between-subject effects, and interaction graphs between independent and dependent variables. MANOVA is employed when there are many dependent variables. The way in which variables interact is also explained by means of statistical analysis.

A MANOVA is a statistical method that can be applied in parallel to investigate the association between two or more dependent variables and multiple categories of independent variables. Dencik et al. (2019) state that Hotelling's T^2 is the multivariate analysis tool used when there are two groups of independent variables and two or more dependent variables, and MANOVA is the analysis tool used when there are two or more conditions, both independent variables and dependent variables. The criteria for making decisions on the existence and absence of influence between the independent variable and the dependent variable are based on a significance threshold of 5% or $\alpha = 0.05$.

RESULTS AND DISCUSSION

The results gained will be explained in the next subchapter, which is based on the outcomes of statistical tests. Differential homogeneity test observed from the Levene test results, as displayed in the subsequent section.

Table 1. Varian Homogenity Test

Levene's Test of Equality of Error Variances[a]				
	F	df1	df2	Sig.
Critical Thinking (Y1)	0.04	1	58	0.85
Problem Solving (Y2)	0.01	1	58	0.91

The results of the Levene test show that the significance of the results of the variable "Critical thinking (Y1)" shows that 0.848 is greater than 0.05, while the figure for the variable "Problem solving (Y2)" 0.913 is also greater than 0.05. Thus H0 is rejected and H1 is accepted. That is, both Y1 and Y2 have homogeneous variants.

The homogeneity test of the variance or covariance matrix is seen from the box test results. MANOVA requires that the variance or covariance matrix of the dependent variable is the same.

Table 2. Varian/Covarian Matrix Homogenity Test

Box's M	0.435
F	0.138
df1	3
df2	605520
Sig.	0.938

Based on the table above, the calculated significance number shows that 0.938 > 0.05 so H0 is accepted. This means that the variance/covariance matrix of the dependent variable is the same, so the MANOVA analysis can be continued.

After both tests the hypothesis requirements are met, proceed with the MANOVA hypothesis test. The MANOVA test is used to test whether there are differences in several dependent variables between several different groups. In this study, the distinction between critical thinking skills and problem-solving skills for students taught with project-based learning models and inquiry learning models. MANOVA test results are as follows:

Table 3. Multivariate Tests

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	0.998	11074.025[b]	2	57	0
	Wilks' Lambda	0.004	11074.025[b]	2	57	0
	Hotelling's Trace	388.563	11074.025[b]	2	57	0
	Roy's Largest Root	388.563	11074.025[b]	2	57	0
Learning_Model_X	Pillai's Trace	0.504	28.885[b]	2	57	0
	Wilks' Lambda	0.498	28.885[b]	2	57	0
	Hotelling's Trace	1.015	28.885[b]	2	57	0
	Roy's Largest Root	1.015	28.885[b]	2	57	0

When the independent variable "learning model" is checked in the first row, the significant values for the test findings based on Pillai's trace, Wilks' lambda, Hotelling's trace, and Roy's greatest root indicate 0.000. H0 is rejected because 0.000 < 0.05, however H1 is accepted. This suggests that the approaches to critical thinking and problem solving used by the project-based learning approach and the inquiry learning approach are different.

The next step is to examine the between-subjects effects using a MANOVA analysis of differences for each dependent variable, such as "critical thinking ability" and "problem solving ability," alone or collectively.

Table 4. Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Critical thinking (Y1)	.017[a]	1	0.017	0.014	0.005
	Problem solving (Y2)	64.067[b]	1	64.067	58.672	0
Intercept	Critical thinking (Y1)	7020.017	1	7020.017	6080.054	0
	Problem solving (Y2)	19224.6	1	19224.6	17605.686	0
Learning_Model_X	Critical thinking (Y1)	0.017	1	0.017	0.014	0.005
	Problem solving (Y2)	64.067	1	64.067	58.672	0
Error	Critical thinking (Y1)	66.967	58	1.155		
	Problem solving (Y2)	63.333	58	1.092		
Total	Critical thinking (Y1)	7087	60			
	Problem solving (Y2)	19352	60			
Corrected Total	Critical thinking (Y1)	66.983	59			
	Problem solving (Y2)	127.4	59			

Based on the test of Between-Subjects Effects table, it shows that the relationship between the learning model (X) and critical thinking skills (Y1) has a significance level (sig. Y1) of 0.005 < 0.05. This shows that there are differences in critical thinking abilities caused by differences in learning models, then the relationship between learning models (X) and problem solving abilities (Y2) has a significance level (sig. Y2) of 0.000 < 0.05. This shows that there are differences in problem solving abilities caused by differences in learning models.

DISCUSSION

Based on the results of hypothesis testing, there are significant differences in critical thinking abilities and problem-solving abilities between the experimental class taught using the project-based learning model and the control class taught using the inquiry learning model. The project-based learning model is a constructivist learning strategy that provides students with the opportunity to actively participate in solving problems.

In the project-based learning model, students work collaboratively with their colleagues and reflect on what they have learned. Apart from that, students are active in the process of searching and making decisions by improving their thinking skills. Through research by Guo et al. (2020), the project-based learning model involves students in constructing knowledge by completing meaningful projects and developing a product. There are six typical characteristics in this model: creating basic questions, focusing on learning objectives, actively participating in learning activities, collaborating between students, using technology, and creating real products. Apart from that, research by Syawaludin et al. (2022) shows that project-based learning models and online learning settings each influence students' analytical skills in DL, ID, and IL, but after the learning model interacts with different settings, online learning results do not affect the results of analytical tests on DL, ID, and IL models.

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The project-based learning model in implementing the independent learning curriculum can develop the potential of students, of course, with the help and guidance of educators in developing critical thinking and problem-solving skills.

CONCLUSION

Based on the data analysis findings, it can be deduced that variations in project-based learning models and control classes taught using inquiry learning models lead to variations in critical thinking abilities. Variations in project-based learning models and control classes taught with inquiry-based learning models lead to variations in problem-solving abilities.

REFERENCES

1) Ainia, D. (2020). Merdeka belajar dalam pandangan Ki Hadjar Dewantara dan relevansinya bagi pengembangan pendidikan karakter. Jurnal Filsafat Indonesia, 3(3), 95-101.
2) Chiu, C. (2020). Facilitating k-12 teachers in creating apps by visual programming, and project-based learning. International Journal of Emerging Technologies in Learning (iJET), 103-118.
3) Dencik, A., Yahya, F., Yoesoef, M., & Salim, M. (2019). Statistik multivariat: Analisis ANOVA, MANOVA, ANCOVA, MANCOVA, repeated measures dengan aplikasi excel dan SPSS. Depok: Rajawali Pers.
4) Ennis, R. (2011). The nature of critical thinking: An outline of critical thinking dispositions and abilities. Illinois: University Illinois.
5) Facione, P. (2013). Critical thinking: What it is and why it counts . Millbrae, CA: Measured Reasons and The California Academic Press.
6) Fisher, A. (2008). Critical thinking: An introduction. Cambridge: Cambridge University Press.
7) Guo, P., Saab, N., Post, L., & Admiraal, W. (2020). A review of project-based learning in higher education: student outcomes and measures. International Journal of Educational Research, 1-13.
8) Hamalik, O. (2014). Psikologi belajar dan mengajar. Bandung: Sinar Baru Algensindo.
9) Hudojo, H. (2015). Pengembangan kurikulum dan pembelajaran matematika. Surabaya: UM Press.
10) Jannah, M. (2016). Psikologi eksperimen sebuah pengantar. Surabaya: UNESA University Press.
11) Jogiyanto. (2006). Pembelajaran metode kasus untuk dosen dan mahasiswa. Yogyakarta: Penerbit Andi.
12) Mahendra, I. (2017). Project-based learning bermuatan etnomatematika dalam pembelajar matematika. JPI (Jurnal Pendidikan Indonesia), 106-114.
13) Muis, A., & Dewi, L. (2021). Day care management course design based on OBE and PjBL fot teacher education of early childhood education program. Jurnal inovasi Kurikulum, 128-140.
14) Peter, E. (2012). Critical thinking: Essence for teaching mathematics and matematics problem solving skills. African journal of Mathematics and Computer Science Research, 39-43.
15) Polya. (2014). How to solve it: A new aspect of mathematical method. Jersey: Princeton University Press.
16) Puspitarini, D. (2022). Blended learning sebagai model pembelajaran abad 21. Ide guru: Jurnal Karya Ilmiah Guru, 1-6.
17) Sugiyono. (2017). Metode penelitian kuantitatif, kualitatif, dan R&D. Bandung: Alfabeta.
18) Sumarni, W. (2015). The strengths and weaknesses of the implementation of Project-based Learning: A Review . International Journal of Science and Research, 478-484.
19) Suttrisno, Yulia, N., & Fithriyah, D. (2022). Mengembangkan kompetensi guru dalam melaksanakan evaluasi pembelajaran di era merdeka belajar. Zahra: Research and Tought Elementary School Of Islam Journal, 52-60.
20) Syawaludin, A., Prasetyo, Z., Jabar, C., & Retnawati, H. (2022). The effect of project-based learning model and online learning settings on analytical skills of discovery learning, interactive demonstrations and inquiry lessons. Journal of Turkish Science Education, 608-621.
21) Trilling, B., & Fadel, C. (2009). 21 Century skills learning for life in our times. USA: HB Printing.
22) Turmudi, & Hartini, S. (2008). Metode statistika: Pendekatan teoritis dan aplikatif. Malang: UIN Malang Press.
23) Wajdi, F. (2017). Implementasi project-based learning dan penilaian autentik dalam pembelajaran drama indonesia. Jurnal Pendidikan Bahasa dan Sastra UPI, 86-101.
24) Yildirim, B., & Ozkahraman, S. (2015). Critical thinking in nursing process and education. International Journal of Humanities and Social Science, 176-185.