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The Influence of the Collaborative Inquiry PBL Learning Model on Students' Critical Thinking Ability

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Abstract: The ability to think critically is one of the skills that are very important and needed in the 21st century. The aim of this research is to determine the influence of the collaborative inquiry PBL model on the critical thinking ability of Indonesian Language and Literature Education Study Program students. This research is a quasi-experimental type of quantitative research, and the design used is post-test-only control. The population of this research is all 3rd semester students taking the Language Research Methodology course. The sample in this research is class IIIA as an experimental class using the problem-based learning collaborative inquiry learning model and class IIIB as a control class using a conventional learning model. Class random sampling technique. The data collection used was a critical thinking ability test and a self-efficacy questionnaire. The analytical test used is a two-way analysis of variance with unequal cells, with a significance level of 5%.

Keywords: learning Model, PBL and Inquiry Collaboration, Critical Thinking, Language Research Methodology

1. Introduction

Currently, an interesting and widely discussed issue in the international world is regarding 21st century skills in various fields, including in the world of education (Trilling & Fadel, 2009; Arsad et al., 2011; Osman et al., 2013; Kivunja, 2014; Griffin & Care, 2015; Egan et al., 2017). This issue is also interesting and widely discussed in Indonesia, especially in the world of education (Zubaidah et. al., 2016; Ahsin, et. al 2020; Angelia, et. al 2020; Arukah, et. al 2020). Prepare a more innovative learning system and increase the competency of graduates who have 21st century skills (learning and innovation skills). Because trends in the 21st century focus more on certain specializations, the goals of Indonesian national education must be directed at efforts to shape the skills and attitudes of 21st century individuals.

Critical thinking skills are important skills in solving problems (Lang, 2000: 21; Arukah, et. al 2020; Dewanti, et. al 2020; Endiawan, et. al 2020). This skill is important for students to have in finding the source of the problem and how to search for and find the right solution to the problem they are facing. Critical thinking skills can be embedded in various scientific disciplines.

The learning process in Indonesia has many shortcomings (including learning language methodology courses); one of the weaknesses is the lack of students' thinking abilities. (Sugiono, 2018) states that the language methodology learning process is considered quality if the learning is challenging, fun, encourages exploration, provides successful experiences, and develops thinking skills. This is in accordance with the opinion of (Dermawan 2018; Fathurohman, et. al 2020; Fathurohman, et. al 2020; Kara, et. al 2020), who states that the learning process, especially language methodology learning, must prepare quality students, namely students who are aware of literacy, have ethics, attitudes, and higher-order thinking skills, so that they will emerge as students who can think critically, think creatively, make decisions, and solve problems.

One of the thinking skills that is expected to emerge in learning the Language Methodology course is the ability to think critically. Critical thinking is an individual's skill in using his thinking process to analyze arguments and provide interpretations based on correct and rational perception, analysis of assumptions and biases from arguments, and logical interpretation. Critical thinking is able to stimulate students to solve problems related to the material being studied (Ewie,

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2010; Fathurohman, et. al 2019; Fathurohman, 2020; Kara, et. al 2020). Critical thinking ability is thinking that is always curious about existing information to achieve a deep understanding. Critical thinking skills, according to (Beyer, 1995), include interpretation, analysis, inference, evaluation, explanation, and self-regulation. In the interpretation aspect, students are able to group the problems they receive so that they have clear meaning and significance. In the analysis aspect, students are able to test ideas and recognize reasons and statements. In the inference aspect, students are able to draw conclusions when solving problems. The evaluation aspect is that students are able to assess statements or opinions received from both themselves and others. The explanation aspect is that students are able to explain statements or opinions that have been expressed to form a strong opinion. The self-regulation aspect of students can regulate their existence in dealing with problem solving. Developing critical thinking skills is an integration of several parts of ability development, such as observation, analysis, reasoning, assessment, and decision-making. The better we develop these abilities, the more we will be able to overcome problems with satisfactory results.

(Ennis, 2011) states that critical thinking has two components, namely: 1) the ability to generate and process information and beliefs; and 2) the habit of using skills to guide behavior based on intellectual commitment. Critical thinking includes aspects of self-guided, self-disciplined, self-directed, self-monitored, and self-corrective thinking, which is an effort at high-level thinking. If all of these aspects are fulfilled, it will encourage people who think critically to be consistent, try to live rationally, and be empathetic enough.

Language methodology learning aims to make students able to understand scientific thinking concepts, able to apply the concepts learned, able to relate one concept to another concept, and able to solve problems in everyday life. (Munzier, 2020; Mujiwanto, et. al 2019; Purnaningtyas, et. al 2020; Purnaningtyas, et. al 2020) stated that learning language methodology is not just an effort to gather knowledge but also an effort to empower thinking abilities, scientific process skills, and internalize scientific attitudes in students. The current view of language methodology lecturers is only limited to the product aspect; as a result, language methodology learning has not yet activated students to the fullest. The goal of language methodology learning has changed to how much students can master theories or concepts of scientific thinking. Critical thinking aspects are rarely trained by lecturers; as a result, students' critical thinking abilities are not optimal. Knowledge can be optimally constructed by lecturers who train students to think critically when analyzing and solving problems. Critical thinking skills will train students to identify, evaluate, construct arguments, and solve problems accurately and quickly.

The learning designs developed in Indonesia so far do not require students' critical thinking skills in the process of teaching and learning activities. Learning that is generally carried out by lecturers places more emphasis on aspects of knowledge and understanding, while aspects of application, analysis, synthesis, and even evaluation (critical thinking) are only a small part of the learning carried out. Lecturers should be able to stimulate students to think critically about the language methodology concepts being studied. (Darmuki et al. 2019; Ramadhani, et. al 2020; Satria, et. al 2020; Septaningsih, et. al 2020) stated that teaching means participating with students in forming knowledge, making meaning, seeking clarity, being critical, and providing justification, so that it can be said that teaching is a form of learning itself. The research methodology learning process so far has mostly contained lectures and theory without understanding the concepts and applications in depth. The impact of such characteristics causes students to be less trained to develop their reasoning power in solving problems and applying the concepts they have learned. The root of the problem that causes students' critical thinking abilities to remain low is because learning does not develop students' reasoning abilities. The ability to think critically is not the main goal in implementing learning, even though the ability to think critically plays a big role in improving individual quality.

2. Structure of References

Collaborative inquiry PBL learning is problem-based learning by finding solutions that refer to the curriculum needed in the future. This learning improves critical, constructive, collaborative, creative, and systematic thinking skills. According to Giarti (2014), learning using the problem-based learning (PBL) model involves learning, authentic investigation, collaboration, and producing work and demonstrations, so that learning is not only about acquisition using authentic problems that are unstructured and open to developing skills. think critically and can build new knowledge. In line with the opinion above, Lidinilah (2016) states that the problem-based learning model is a learning approach that uses real-world problems as a context for students to learn about critical thinking and problem-solving skills, as well as to gain knowledge and concepts from the material. lesson being learned. According to Trianto (2009), the learning steps of problem-based learning consist of five stages: 1) orienting students to the problem; 2) organizing students to learn; 3) guiding investigations; 4) developing and presenting work results; and 5) analyzing and evaluating the problem-solving process. Learning using the problem-based learning model has been proven to be able to explore students' potential in using their critical thinking skills in solving problems given by the lecturer.

Utami and Giarti (2020) state that critical thinking is an intellectual activity that actively and intelligently constructs, implements, analyzes, synthesizes, and evaluates information produced through observation, experience, reflection, reasoning, or communication as a reference for beliefs and actions taken. Critical thinking skills, as expressed by Muskita et al. (2020) Setianti, et. al (2019); Sofia, et. al (2020); Tamarudin, et. al (2020); Widianto, et. al (2019), are a mental activity to carry out analysis or evaluation of information obtained based on the results of observation, experience,

common sense, or communication. This opinion is reinforced by Prasasti et al.'s (2019) revelation that critical thinking is a person's skill in using their thinking process to analyze problems and provide arguments based on appropriate and rational solutions, analysis of assumptions and biases from arguments, and logical interpretation.

Critical thinking is a thinking process with the aim of producing logical decisions about what we believe and what we do. Critical thinking is one of the stages of higher-level thinking. Hohmann & Grillo (2014) categorize high-level thinking into four groups, which include problem solving, decision-making, critical thinking, and creative thinking. Meanwhile, according to Styers et al. (2018), reasoning includes basic thinking, critical thinking, and creative thinking. Research that can be linked to critical thinking, namely testing, connecting, and evaluating all aspects of a situation or problem, focusing on parts of a situation or problem, collecting and organizing information, validating and analyzing information, remembering and analyzing information, determining plausibility whether or not an answer is given, drawing valid conclusions, and having an analytical and reflexive nature (Utami & Giarti, 2020),

According to Triana et al. (2020), abilities related to the concept of critical thinking include the ability to understand problems, select information that is important for solving problems, understand assumptions, formulate and select relevant hypotheses, draw valid conclusions, and determine the validity of the conclusions. Prime et al. (2020) find analogies and types of relationships between pieces of information, determine the relevance and validity of information that can be used to form and solve problems, and find and evaluate solutions or other ways of solving problems. Even though all the opinions of several experts are different, they essentially have similarities, including the aspects of collecting, evaluating, and using information effectively. Critical thinking skills are needed by students so that they do not make mistakes in making decisions in their lives.

Kleinig (2018) specifically states that critical thinking skills are abilities that include: 1) making observations; 2) curiosity; asking relevant questions and searching for needed sources; 3) testing and examining beliefs, assumptions, and opinions using facts; 4) recognizing and defining problems; 5) assessing the validity of statements and arguments; 6) making wise decisions and valid solutions; and 7) understanding logic and logical argumentation.

Critical thinking begins with a response to a problem in front of him and then looks for a solution so that the focus of the problem can be seen from the conclusion of the argument presented as a solution to the problem. Students will provide responses in the form of underlying and logical reasons but will not reach a conclusion. If the reasons given are correct and sufficient, a conclusion can be drawn. Match the actual situation. There must be clarity when there are terms used in arguments so that errors do not occur in drawing conclusions. Reviewing, checking, or re-examining what has been discovered, decided, observed, studied, and concluded.

Critical thinking abilities through tests can be assessed using indicators, according to (Perskym et al. 2019), namely assumptions, making inferences, deductions, interpretations, and evaluating arguments. This opinion is reinforced by (Liu, et al. 2018), who state that the construct of thinking ability is as follows: 1) Formulating problems that can be measured by students' ability to formulate questions that lead to investigations. 2) Arguing can be measured by the student's ability to formulate arguments according to their needs and be able to show differences and similarities between various aspects of the simulated task. 3) Making deductions can be measured by the student's ability to deduce logically and interpret data correctly. 4) Carrying out an induction can be measured by the student's ability to analyze data, make generalizations, and draw appropriate conclusions. 5) Evaluating can be measured by the student's ability to evaluate based on facts alone and provide a variety of alternative problems. 6) Deciding and taking action can be measured by the student's ability to determine the solution and choose the possible alternative that will be chosen.

3. Results and Discussion

The aim of this research was to determine the effect of implementing the inquiry collaborative PBL learning model on student learning outcomes. The PBL learning model was carried out in the experimental group in class IID with a total of 38 students, while the control group in class IIA with a total of 36 students used the lecture method. Class IID as the experimental group and class IIA as the control group were carried out using cluster sampling; previously, a balance test had been carried out on the entire population of level II of the Indonesian Language and Literature Education Study Program, Muria Kudus University, and Muhammadiyah University of Malang for the 2023–2024 academic year. The learning ability test results (posttest) of the two groups treated with different methods were compared so that it could be seen whether there was an influence of the application of the PBL learning model on students' learning ability abilities.

The development of the inquiry collaborative PBL learning model in educational research methodology courses has been developed based on the needs of lecturers and students in the Indonesian Language and Literature Education Study Program. The process of designing an inquiry-based collaborative PBL learning model is carried out by combining PBL and inquiry syntax. The stage of designing a collaborative inquiry PBL learning model is carried out by combining the PBL learning model with inquiry. The aim is for students to get double benefits from both learning models. PBL learning is rich in nuances of cooperation and trains students to have the ability to solve problems through discussions and presentations, while inquiry demands and trains students to have the skills to find solutions to problems scientifically. Each model has characteristics and advantages, so if they collaborate, students can get maximum benefits.

There are five PBL learning syntaxes: orienting students to problems, organizing students to learn, guiding individual and group investigations, developing and presenting work results, and analyzing and evaluating the problem-solving process. Inquiry learning syntax consists of six stages: problem orientation, formulating problems, making hypotheses, exploration (gathering information or data), testing hypotheses, and drawing conclusions. This combination basically combines PBL activities with inquiry syntax. This collaboration resulted in the formation of a new syntax, namely the syntax of the collaborative inquiry PBL learning model.

The draft inquiry collaborative PBL learning model that has been developed is then validated by learning model experts and education experts to obtain input. The input from these experts was used to revise the draft inquiry collaborative PBL learning model. Next, an FGD was carried out to find out the advantages and disadvantages, as well as input from lecturers and policymakers. Input from lecturers in FGD activities is used to perfect the inquiry collaborative PBL learning model before it is used in the field to determine the level of effectiveness of the model.

To determine the level of effectiveness of the collaborative PBL learning model, this inquiry was carried out experimentally. The experiment was carried out in 2 classes, namely class A for the experimental group and class B students as the control class. This experiment was carried out from February 2024 to May 2024. This experiment was carried out involving 1 class A lecturer and the control class also involved 1 class B lecturer. The lecturers experimented with learning student educational research methodology using the Inquiry collaborative PBL learning model based on the draft Implementation Guide book Inquiry collaborative PBL learning for students in the Indonesian Language and Literature Education Study Program, FKIP UMK. Before carrying out the experiment, both the experimental group and the control group were given the same educational research methodology ability test (pretest), as well as afterwards (posttest). The pretest and posttest results were then tested for normality and homogeneity.

The normality test in this study consists of class A as well as class B. In the calculations, the Asymp Sig value is greater than the confidence level $\alpha = 0.05$. This means that the sample group comes from a normally distributed population. A summary of the normality test results is depicted in the table below.

Tabel 2: Normality test result for class IA student

No	Group	Asymp Sig Value	Level of confidence	Information
1	IA	0.124	0.05	Normal
2	IIA	0.156	0.05	Normal
3	IB	0.160	0.05	Normal
4	IIB	0.245	0.05	Normal

Information :
IA : Experimental group for class IA preetest
IIA : Experimental group for class IIA posttest
IB : Control group for class IB preetest
IIB : Control group for class IIB Posttest

Tabel 3: Normality test result for class IIA Student

No	Group	Asymp Sig Value	Level of confidence	Information
1	IA	0.171	0.05	Normal
2	IIA	0.117	0.05	Normal
3	IB	0.171	0.05	Normal
4	IIB	0.270	0.05	Normal

Information :
IA : Experimental group for class IA preetest
IIA : Experimental group for class IIA posttest
IB : Control group for class IB preetest
IIB : Control group for class IIB Posttest

a. Homogeneity test result

Base oh homogeneity test, the population variance obtained by the test results is as the described in the table below:

Table 4: Homogenity test result

No	Group	df	Sig value	Level of confidence	Information
1	IA	160	0.717	0.05	Homogeneous
2	IB	160	0.732	0.05	Homogeneous
3	IIA	159	0.745	0.05	Homogeneous
4	IIB	159	0.651	0.05	Homogeneous

Information:

IA : Experiment group IA class

IB : Control group IB class

IIA: Experiment group IIA class

IIB: Control group IIB class

From the summary of homogeneity test results in the table above, it is clear that the sig value is greater than 0.05. Therefore, it can be concluded that the population data variance is homogeneous. Next, descriptives of the pretest and posttest results of the IA experimental class are shown in Table 4.

Table 5: Ability of pretest and posttest experimental science learning result

	N	Mean	Std Deviation	Std Error	95% confidence interval for mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Preetest	81	13.7531	2.23903	.24878	13.2580	14.2482	9.00	18.00
Postest	81	16.3210	2.07260	.23029	15.8627	16.7793	12.00	20.00
Total	162	15.0370	2.50686	.19696	14.6481	15.4260	9.00	20.00

Table 6: Ability Learning Results IIA Pretest-Posttest Experiment

	N	Mean	Std Deviation	Std Error	95% confidence interval for mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Preetest	80	16.4500	2.92480	.32700	15.7991	17.1009	12.00	22.00
Postest	80	18.98	2.85734	.31946	18.35	19.6234	15.00	24.00

		75			16			
Total	160	17.7188	3.15067	.24908	17.2268	18.2107	10.00	23.00

Table 7: Ability of IB control class Pretest and Posttest Learning Results

		Mean	Std Deviation	Std Error	95% confidence interval for mean		Minimum	Maximum
		Mean	Std Deviation	Std Error	95% confidence interval for mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Pretest	8	15.2514	2.46521	.27513	12.4808	13.6200	7.00	17.00
Postest	8	15.6545	2.02355	.26007	14.1823	15.1263	10.00	19.00
Total	1	13.8521	2.38084	.18468	13.4652	14.2385	7.00	19.00

Tabel 8. Ability of IIB control class Pretest and Posttest Learning Results

		Mean	Std Deviation	Std Error	95% confidence interval for mean		Minimum	Maximum
					Lower Bo	Upper Bound		

					und			
Pretest	8(	16.8361	2.81251	.32461	16.16678	15.2622	12.00	20.00
Postest	8(	18.5612	2.81854	.32506	17.71211	17.1861	13.00	22.00
Total	1(	17.6986	3.13383	.23897	15.12444	16.1484	10.00	22.00

The results of the questionnaire that have been distributed to lecturers are as below.

Table 9: Angket persepsi Dosen yang menerapkan pembelajaran

Item	Awal		Akhir	
	Exp (%)	Control (%)	Exp (%)	Control (%)
Mempelajari landasan pendidikan sangat penting	55	75	100	100
Menyampaikan materi landasan pendidikan di kelas itu sangat mudah	52	52	91	80
Materi landasan pendidikan di kelas cukup diajarkan dengan intruksi personal	52	32	0	31
Pembelajaran dengan model PBL kolaborasi Inkuiri sangat menyita waktu	74	51	0	21
Saya ingin menerapkan pembelajaran dengan model pembelajaran PBL kolaborasi PjBL	100	100	100	100
Saya mengerti proses pembelajaran dengan model PBL kolaborasi Inkuiri di kelas	23	51	88	71
Saya mengerti evaluasi pembelajaran landasan pendidikan dengan	23	52	98	91

	model pembelajaran
	PBL kolaborasi PjBL

Based on the results of the lecturer's perception questionnaire, it shows that in general, the inquiry collaborative PBL learning model regarding the importance of learning educational research methodology during the pretest was lower (55% for the experimental group and 75% for the control group), while at the posttest, the experimental group and the control group were the same at 100%.

The data from the educational research methodology skills test results, which were analyzed using the t test, had previously been tested for normality and homogeneity. Statistically, both educational research methodology ability scores are different because Fcalculation was 16.5875 and Ftable was 3.91 at the significance level of 0.05. Since Fcalculation > Ftable, it can be shown that inquiry-collaborative PBL learning has a very significant influence on educational research methodology for Indonesian Language and Literature Education Study Program students, FKIP UMK.

Based on the results of this research, lecturers need to adapt student learning needs to learning strategies. Multiple models of instruction are the practice of applying several different learning models in the teaching process. The choice of learning model to be used by a lecturer is determined by the characteristics of the learning material and learning objectives to be conveyed, the ability to meet student learning needs, and the ability to increase student learning capacity to optimal limits (Arifmiboy, 2018). In line with the views of (Arend, 2018: 111), it is impossible for there to be one teaching model that is considered superior for all educational purposes. In reality, each teaching model is often only suitable for certain types of learning; however, these models can also be combined to help students achieve learning goals (Suryanti et. al., 2020: 76). No single approach is consistently better than another.

The implementation of the inquiry collaborative PBL learning model is a combination of PBL and inquiry learning, so several previous studies related to PBL and inquiry learning outcomes can be used as a reference. Previous research results show that learning outcomes with PBL are more effective than traditional ones in improving academic achievement (Sahin, 2010; Evcim & Ipek, 2013; Wilson et al., 2017; Hoerunnisa et al., 2017; Subiyantari et al., 2019). A study on the effectiveness of learning outcomes also concluded that cooperative learning had the most positive impact on achievement variables (Darmuki et al., 2017).

The results of research using the Inquiry collaborative PBL model are also supported by the results of Inquiry learning research, which show that there are significant differences between the experimental group and the control group regarding average academic achievement, learning retention scores, and student perceptions of skills in carrying out investigations, both at cognitive and affective levels (Dedonno, 2016; Indiastutik, 2016; Martaida et al., 2017; Putri et al., 2020; Gunawan et al., 2020; Wardono et al., 2020; Suryanti et al., 2020). This result is also confirmed by other research studies, namely that the inquiry learning method is better than traditional teaching methods in terms of academic achievement (Nuryakin & Riandi, 2017). Other research results show that students achieve a better understanding of the content of learning through inquiry compared to the lecture method (Rahmadani et al., 2017; Rambe et al., 2018).

This inquiry-based collaborative PBL learning model has the potential to increase students' social interaction in learning educational research methodology. Social interaction is important considering the different characteristics of students in class (Darmuki & Hariyadi, 2019). The practice of using the inquiry collaborative PBL model is to carry out scientific work in cooperative groups so that this model is able to close the gap between upper and lower academic students, reduce tensions caused by differences in student backgrounds, and reduce the negative impact of competitive learning, which gives birth to unhealthy competition (Sahin, 2010; Gunawan et al., 2020). Student interaction in the PBL group is related to inquiry activities to discover concepts or facts through stages of scientific work, while in the PBL group, social interaction is encouraged in problem-solving activities through intense presentations and discussions to build a complete conceptual understanding of educational research methodology.

A literature review of studies on learning in the classroom reveals that the application of learning models using the inquiry collaborative PBL method is more effective (Leyva & Riu, 2016; Yemi et. al., 2018; Subiyantari et. al., 2019 (Jigsaw); Rambe et. al., 2018; Wardono et al., 2020; Winarni et al., 2020; Gunawan & Lestari, 2020 (Discovery Learning)). The research results of Leung et al. (2018) have collaborated with the discovery learning model with the Geogebra model assistant to show that learning activities are effective and enjoyable. Research by Suryanti et al. (2020) shows that the discovery learning model, which is combined with the problem-solving learning model, shows an increase in students' abilities and understanding in mastering material concepts well and optimally. Previous scientific studies conducted by (Darmuki & Hariyadi, 2019) found that classroom learning using the PBL learning model can maximize student learning outcomes. Learning strategies, which include learning models applied by lecturers in teaching and learning activities, will influence the success of learning objectives. The lecturer's ability to apply learning models will make it easier for students to receive learning (Darmuki, et al., 2018).

The weakness of this research is that the learning process in the classroom lies in the lecturer's commitment when implementing the collaborative inquiry PBL learning model, where the combination of the PBL learning model is more dominant than the inquiry learning model. Apart from that, another weakness during the learning process is that students lack a competitive atmosphere, so there are some students who dominate learning in class, even though in the end all students are actively learning. The strength of this research lies in social interaction in learning and students' needs in learning, so that it can build a complete understanding of students' concepts regarding educational research methodology

through problem solving. The application of the inquiry collaborative PBL learning model in this research is proven by the inquiry collaboration PBL learning model applied by lecturers in learning educational research methodology. It turns out that students find it easier to understand educational research methodology courses, so student competence is better.

The results of this research indicate that the application of the inquiry collaborative PBL learning model in educational research methodology is able to improve students' critical thinking abilities. This research is in line with research conducted by (Palupi, et al. 2020; Saputra, et al. 2019; Azizah, et al. 2018), who stated that there was an increase in students' and university students' critical thinking abilities through collaborative constructivist learning. Other research that supports this research is that conducted by (Utami & Giarti, 2020), which states that through collaborative learning and critical thinking, it is possible to improve learning outcomes, including thinking abilities. This research is also strengthened by research conducted by (Prayoga & Setyaningtyas, 2021) regarding the use of the collaborative inquiry PBL model to improve critical thinking skills and learning outcomes. It is proven by the data obtained that there has been a significant increase in each cycle.

4. Conclusion

The results of this research are very important for learning the Educational Research Methodology course. The inquiry-collaborative PBL model has a positive influence on students' critical thinking abilities and the effectiveness of learning in the classroom. It can be concluded that the inquiry collaborative PBL model is more effective than the lecture model because it is able to improve students' critical thinking skills in educational research methodology courses in the Indonesian Language and Literature Education Study Program. This research provides an overview for students, lecturers, and academics about improving the quality of the learning process and learning outcomes when the collaborative inquiry PBL model is applied in the classroom. This cannot be separated from the role of lecturers, students, appropriate learning models or methods in producing good learning outcomes, and other factors. Further research is needed to test the practicality and effectiveness of PBL and other learning models to determine critical thinking abilities and student learning outcomes in educational research methodology courses. The implication of this research is that the collaborative inquiry PBL model can be applied to other learning activities that can develop students' critical thinking abilities. It can be applied to other learning that can develop students' critical thinking abilities.

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