



## The effect of the inquiry-based learning (IBL) model on EFL students' critical thinking skills

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**Abstract:** This research was conducted to discover whether the implementation of the IBL (Inquiry-Based Learning) model can improve EFL students' critical thinking skills and to what extent the IBL model influences their critical thinking skills. This research implemented an explanatory research design. The sample was the students of the English Education Study Program who were taking the subject of Writing in Professional Context at one of the public universities in Central Sulawesi. The instruments used to collect data were tests and interviews. The data that were obtained in this research were analyzed quantitatively and qualitatively. The results show that the implementation of the IBL model is effective in improving the EFL students' critical thinking skills. This achievement has to be supported by the implementation of a proper inquiry-based learning model. By implementing the IBL model, there is an increase in EFL students' critical thinking skills in six aspects: interpretation, analysis, inference, evaluation, explanation, and self-regulation.

**Keywords**    **Argumentative essays, Critical thinking skills, Inquiry-based learning**

**How to Cite**

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## INTRODUCTION

In the 21st century, learning underscores three main areas, namely content knowledge, soft skills, and literacy skills. To be successful in today's world, students need an understanding of core academic subjects, as well as other soft skills such as critical thinking, problem solving, creativity and innovation, communication, and collaboration. They should master soft skills to achieve qualified degrees (Sunarto, 2015). Soft skills are competencies belonging to someone which have become habits (Al Abduwani, 2012). Mahasneh & Thabet (2015) defined soft skills as skills and abilities related to personality and attitudes not in formal and technical areas. Cartono et al. (2018) stated that teacher candidates should have soft skills because later, they will be challenged to innovate with learning and classroom management due to the advancement of technology, information, and communication. Moreover, the enhancement of teaching and learning process can enhance the students' soft skills (Setiani & Rasto, 2016).

Related to the soft skills, in education, one of the soft skills, namely critical thinking skills are crucial. These skills should be taken into consideration when designing and improving the curriculum of language (Rochmahwati, 2015). Many researchers explicitly emphasize the importance of students' critical thinking (Defianty & Wilson, 2022; Wale & Bishaw, 2020; Ghaemi & Mirsaed, 2017; Thaiposri

& Wannapiroon, 2013; Al Sharadgah, 2014). The term critical thinking was introduced by John Dewey. He defines critical thinking as a mature consideration of belief or knowledge before finally arriving at a conclusion (Dewey, 1910). Furthermore, critical thinking is the ability to evaluate each argument thoroughly to get a logical conclusion (Agus, 2016). In line with that, Moon (2008) defined critical thinking as the ability to examine several information by categorizing them creatively and logically to analyze, evaluate, and obtain a more true and reasonable conclusion.

Critical thinking can grow when students are often trained to think critically in learning activities (Wijayanti, 2016). However, in reality, learning activities only emphasize theories and concepts without trying to sharpen students' critical thinking skills. For teacher candidates, critical thinking skills are very important to develop when teaching in the classroom (Munawwarah et al., 2020). Therefore, students' critical thinking skills should always be sharpened to habituate them to thinking logically and reflectively. Critical thinking skills can be trained by implementing an approach that can stimulate students to solve a problem.

One of the learning models that involves learners seeking and investigating is the inquiry-based learning (IBL) model. Lameris et al. (2021), Avsec & Kocijancic (2014), Gholam (2019), and also Sari & Wati (2017) have conducted research and explicitly emphasized that the IBL model is one of the best models to be implemented in teaching. Inquiry-based learning includes a series of observations (Rosita & Nuranisa, 2019). Furthermore, Wariyanti et al. (2019) explained that inquiry-based learning involves the learners' active role in solving a problem. Inquiry-based learning focuses on the involvement of students in constructing, investigating, and finding (Agus, 2016). Inquiry-based learning involves students' critical thinking and analytic skills (Telaumbanua, 2019).

Conducting inquiry-based activities can improve students' critical thinking skills, and it has a significant impact on students (Ghaemi & Mirsaed, 2017). In line with that, Wale & Bishaw (2020) stated that inquiry-based instruction could be a medium for enhancing students' critical thinking skills. Furthermore, Kusmaryono & Setiawati (2013) suggested implementing an inquiry-based learning method in teaching to get positive responses and trigger activity. One of the creativity skills that should be possessed by lecturers and teachers is creativity in using learning strategies or learning models (Kusniarti, 2015). Therefore, they should optimize the six critical thinking indicators in their assessment (Listiani, 2021).

Although several studies related to the issue of critical thinking and the use of inquiry-based learning have been done, this research tried to find different things by not only looking at the effect of the IBL model on EFL students' critical thinking skills but also trying to investigate and elaborate on the extent to which this influence has on EFL students' critical thinking skills by conducting interviews. This research sought to investigate whether the IBL model can improve the critical thinking skills of EFL students and to what extent the IBL model influences their critical thinking skills. Therefore, this research aimed not only to analyze quantitative data from the students' tests but also to synthesize and elaborate the results into qualitative data from the interview. The results of this research are meaningful and important to assist the lecturers or teachers in examining the implementation of the IBL model in teaching after knowing the effectiveness of the implementation and the effect of the IBL model on the students. Besides, the results of this research can make an important contribution to the consideration of the learning model that the lecturers or teachers will use and how to develop and modify this learning model by adjusting to the students' needs.

Based on the background research, the questions to be answered in this research are:

1. Is the implementation of the inquiry-based learning (IBL) model effective in improving the critical thinking of EFL students?
2. What effect does the implementation of the IBL (Inquiry-Based Learning) model have on the critical thinking of EFL students?

## METHODS

The method implemented in this research was a mixture of quantitative and qualitative approaches called mixed methods research, specifically an explanatory research design. The

explanatory design is implemented to synthesize, elaborate, or explain the quantitative findings (Masrizal, 2012). In this research, first the researchers collected quantitative data, then they gathered the qualitative data by synthesizing and elaborating the quantitative findings to investigate to what extent the implementation of the IBL model influences the critical thinking skills of EFL students.

There were two variables in this research: inquiry-based learning was the independent variable, and critical thinking skills were the dependent variable. The research population was the students of the English education study program at one of the public universities in Central Sulawesi, and the samples were the students in the fourth semester who were taking the subject of Writing in Professional Context. They were selected using the purposive sampling technique because they had the characteristics that the researchers needed. The total number of participants was twenty. From the twenty students, five were chosen to be interviewed to get a more in-depth understanding of the effect of the IBL model on the students. They were selected based on their scores, i.e., representatives of those with high, medium or moderate, and low scores.

The instruments used to collect data were tests and interviews. The test was argumentative essay writing. The rubric was adapted from Facione & Facione (2013). In addition, a semi-structured interview was used to elaborate on the quantitative findings from the essay writing test. It is important to know how far the implementation of the IBL model influences EFL students' critical thinking skills. The data gathered in this research was analyzed quantitatively and qualitatively. Data from the argumentative essay writing pre- and post-tests were processed and analyzed statistically using SPSS by searching the paired sample t-test to see the effect of the implementation of the IBL model on EFL students' critical thinking skills, while data from the interview sessions were analyzed qualitatively according to Miles et al., 2018: data reduction, data display, and conclusion drawing and verification.

## RESULT AND DISCUSSION

### Result

The results consist of data from argumentative essay writing tests distributed in the pre-test and post-test. Besides that, qualitative data from the interview were also collected by synthesizing and elaborating quantitative findings. The results describe the influence or effect of the implementation of the IBL model on improving students' critical thinking skills based on six aspects of critical thinking.

### *The Implementation of the IBL Model*

The test administered in this research was argumentative essay writing. Among the twenty students taking the pre-test, the highest score was 83, while the lowest was 56. Then, in the post-test, the score of 89 was the highest, while the score of 60 was the lowest. The result of the descriptive statistics calculation is presented in the table below.

Table 1  
Paired samples statistics

	<i>Mean</i>	<i>N</i>	<i>Std. Deviation</i>	<i>Std. Error Mean</i>
<i>Pre-test</i>	70.95	20	7.937	1.775
<i>Post-test</i>	75.20	20	8.458	1.891

In the pre-test, the average score of students was 70.95, while in the post-test it was 75.20. The number of respondents or students involved as research samples was 20. In the pre-test, the standard deviation score was 7.937, while it was 8.458 in the post-test. Then, in the pre-test, the standard error was 1.775, while in the post-test, it was 1.891.

Because in the post-test, the average score was around 4.25 points higher than the pre-test, it can be concluded that after being treated with the IBL model, students' critical thinking skills, especially in writing argumentative essays, increased.

Table 2  
Paired samples test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre-test Post-test	-4.250	1.650	0.369	-5.022	-3.478	-11.517	19	0.000

Results of data analysis using a paired sample t-test show the test (sig.) <  $\alpha$ , which is 0.000 < 0.05, thus, it can be deduced that the IBL model significantly influences the students' critical thinking skills.

### The Influence of the IBL Model

Critical thinking skills consist of six aspects: interpretation, analysis, inference, evaluation, explanation, and self-regulation. The results of each aspect of argumentative essay writing can be seen in Table 3.

Table 3  
Results of each indicator of critical thinking skill aspects

No.	Aspects	Results of Indicators (%)	
		Pre-test	Post-test
1	Interpretation	78	82
2	Analysis	74	80
3	Inference	73	78
4	Evaluation	67	70
5	Explanation	67	72
6	Self-regulation	58	62
Average		71	75

The average scores for each aspect of critical thinking skills were different, as shown in Table 3. In the pre-test, the interpretation aspect got the highest percentage of 78, while the self-regulation aspect obtained the lowest percentage of 58. Similarly, in the post-test, the interpretation aspect also got the highest percentage of 82, and the self-regulation aspect got the lowest percentage (62%). Then, in the pre-test, the analysis aspect got 74%, while in the post-test, it rose to 80%. The percentage of inferences was 73 in the pre-test, while it was 78% in the post-test. The evaluation aspect obtained 67% in the pre-test, but in the post-test, it obtained 70%. The explanation aspect obtained 67% in the pre-test, and in the post-test, it increased to 72%. Based on table 3, it can be concluded that the analysis aspect experienced the most rapid development, at 6%, followed by the inference and explanation aspects (5%), the interpretation and self-regulation aspects (4%), and the evaluation aspect (3%).

In this research, the qualitative data from the interview section were also collected by synthesizing and elaborating the quantitative findings to investigate and measure how far the implementation of the IBL model influences the students' critical thinking skills.

When students were asked about how the inquiry-based learning model influenced their interpretation ability, one of them stated:

*"I have been better at understanding the meaning of data or information." (St1)*

Another student commented:

*"I can redeliver the information that I have using a simpler and more understandable word." (St2)*

Then, related to the analysis skills, one of the students explained:

*"I can find some alternative solutions for a problem. After reading some references, my knowledge increased, and of course, it opened my mind." (St4)*

Also, another student answered:

*"After completing some stages in learning, I can explain aspects related to the topic or problem given by the lecturer." (St1)*

In another point related to inferential skill, a student said:

*"The conclusion that I reached had confirmed the relevant information that I had obtained, so I did not withdraw a conclusion based on a not-very-strong reason." (St5)*

Furthermore, when students were asked about how the inquiry-based learning model influences their evaluation skills, one of them suggested:

*"To evaluate something or someone, it needs in-depth analysis, not just an assumption." (St2).*

Another student added:

*"Deeper thinking and more careful analysis are highly needed in assessing statements or opinions from other people or what we read." (St4)*

Related to explanation skills, a student commented:

*"After reviewing the literature, I became more confident to mention and write my argument because what I write is supported with proper reasons and accurate data." (St5)*

Furthermore, another student answered:

*"Sometimes I am not brave enough to express my idea because it is not supported by accurate data." (St3)*

And for the last point about self-regulation, a student said:

*"To defend my argument, I must have many supporting proofs." (St3)*

Interestingly, one of the students commented:

*"I always try to find out proofs and data related to the opinion that I write or deliver so that I can compete for the argument with others confidently." (St4)*

## Discussion

This part deals with the interpretation of results. This part also covers the explanation of the supporting data gathered during the research. Before giving treatment, the researchers pre-tested to see the students' initial ability. Afterward, the researchers treated students by implementing an inquiry-based learning model. Inquiry-based learning is divided into four stages: the orientation stage, conceptualization, investigation, and conclusion stage (Pedaste et al., 2015). In this research, those four stages were implemented.

The first stage was orientation. Here, the researchers presented problems or questions. Students were asked to give comments or ask a question related to the problem or question. Besides, they should identify the problems, discuss them in groups, and find a topic. In this step, students were trained to acknowledge, acquire, and identify a condition or problem.

The second stage was conceptualization. In this step, the students were trained to analyze ideas and reasons from other students. The students were also instructed to review the literature, evaluate it, and consider relevant information. After completing those tasks, they were asked to deliver their opinions supported by relevant evidence or references.

The third stage was investigation. This step allowed students to develop their investigation skills. They were asked to collect information and review relevant and accurate literature, then analyze the data and information they had collected. Collecting and analyzing data can foster students' critical thinking skills, especially in the aspects of analysis, explanation, and evaluation.

The fourth stage was the conclusion. Students were asked to draw conclusions from the data they had analyzed. The conclusion was withdrawn based on the relevant data and information. Each group raised an opinion or question. This stage trained students' critical thinking skills, specifically the aspects of self-regulation and inference.

After giving treatment, the researchers administered a post-test to see the effect of the implementation of the IBL model on students' critical thinking skills. Based on data analysis, it can be inferred that the IBL model significantly affects students' critical thinking skills. The research finding confirmed Masitoh et al. (2017) who found that students' critical thinking skills are influenced by guided inquiry learning. Through the IBL model, students can think more critically and improve the

quality of the argumentative essays they write. In line with that, [Golpour \(2014\)](#) also reported that the levels of students' critical thinking skills determine their writing ability.

Furthermore, the study carried out by [Widyastuti \(2018\)](#) informed that it is very important to develop and train the students' critical thinking skills to successfully use English, especially in academic contexts. Considering the results of the interview session, the students gave positive answers in this session, so it can be assumed that the implementation of IBL had a positive impact on them. They think that the implementation of IBL influences their critical thinking. The results are also consistent with the research done by [Fatkhriyah \(2019\)](#) where she found that most of the high school students who were involved in her research responded positively to the application of IBL in the classroom.

In addition, this research also discusses the students' critical thinking skills from six aspects. First, interpretation is about how to comprehend, understand, and state the meaning of data, situations, information, and evaluation. In pre-test and post-test, the interpretation aspect obtained the highest score. In this case, students experienced an increase of 4% as they could understand the meaning of a problem and write and explain all the information, they obtained using their own words, which were easy to understand. They could write about what they should do in relation to the problem.

Second, analysis is the ability to identify and synthesize the inferential correlation of a problem. In this research, the analysis aspect experienced the most rapid development, by 6%. The students were able to find a solution to the problem they encountered. They could also express and write the solution in the essay they made.

Next, inference is the ability to identify and draw a conclusion based on the evidence by considering relevant information. In the pre-test, the inference aspect reached a score of 73%, and it increased by approximately 5% in the post-test. Here, students were able to identify important and relevant information to reach a correct and logical conclusion.

Then, evaluation refers to the ability to examine and evaluate the correctness of an expression or opinion acceptable to ourselves and others. In the pre-test, the percentage of the evaluation aspect was 67; it only increased by 3% in the post-test, and the achievement became 70%. Related to this, students were expected to be able to evaluate and assess statements or opinions from the sources they have read, but some of them were unable to do it well.

After that, explanation is the ability to explain or state a statement or opinion based on evidence, methodology, and concept. In the pre-test, the explanation aspect got 67%, and it improved by 5% in the post-test (72%). Here, most students were able to write an argument supported by proper reasons. On the other hand, some were still unable to write proper reasons to support their argument or opinion.

Finally, self-regulation is the ability to regulate one's presence when solving a problem. In the pre-test, the percentage of the self-regulation aspect was 58%, and it increased by 4% in the post-test, which was 62%. In pre-test and post-test, the self-regulation aspect got the lowest percentage. It indicated that students were unable to analyze and evaluate the ideas they presented.

The results obtained from this research are also conformable with the results of research carried out by [Damawati & Juanda \(2016\)](#) and [Lazonder & Harmsen \(2016\)](#) who found that IBL influences the students' achievement reasoning ability and that they act more skillfully during the task. The IBL model also influences and increases the students' critical thinking skills. Students are more likely to have strong character and think more deeply before doing or deciding something ([Safi'i et al., 2021](#)). Students can become more enthusiastic in the classroom and achieve better results ([Irawan et al., 2019](#)). The research's results are also in line with [Golpour's \(2014\)](#) results, which reported that the students' writing ability is greatly influenced by their critical thinking level.

## CONCLUSION

Based on data analysis, it can be inferred that the implementation of the IBL model is effective in improving the students' critical thinking skills by implementing the proper stages of the inquiry-based learning model. With regards to the influence of the implementation of the IBL model on the critical thinking skills of EFL students, it can be concluded that by implementing the IBL model, there

is a significant increase in students' critical thinking skills. This increase includes six aspects: interpretation, inference, analysis, evaluation, explanation, and self-regulation. These findings suggest that lecturers or teachers should implement and adapt the IBL model in teaching and use it in the classroom. They can modify the IBL model stages based on students' needs. They can also combine some stages with another model to achieve better results. The lectures or teachers can consider the results of this research to refine the learning models that will be used in the classroom.

This research is still far from perfect and still has limitations because the scope of this research is still limited to writing skills and critical thinking. Future researchers are expected to expand the scope of research by trying to connect with other skills. And it can be done in different areas with more varied samples.

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