The effect of problem-based learning on students’ critical thinking and speaking competence

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Received: 11 December 2022; Revised: 25 December 2022; Accepted: 31 December 2022

Abstract: This study is generally attempted to find the effect of Problem-Based Learning towards students’ critical thinking and speaking competence at SMA Muhammadiyah Mataram. This research applied experimental research using MANOVA. The population of this research was the students of SMA Muhammadiyah Mataram. The sample of the study was 29 students consisting of two classes. The results of the study show that there is a significant effect of Problem-Based Learning towards students’ critical thinking and speaking. Research data found that the mean score of critical thinking was 74.50 and class control was 54.00; 0.05. While the mean for the speaking of the experimental class was 75.83 and control class was 60.45; 0.05. It can be concluded that the use of Problem Based Learning has a positive effect on students’ critical thinking and speaking competence and has correlation both of them at the SMA Muhammadiyah Mataram.

Keywords: Problem-based Learning; Critical Thinking; Speaking Competence


Introduction

Speaking is one of the four basic competencies that should be mastered by the students, other than the three competencies such as listening, reading, and writing. It is an important competence to learn by students to improve their communication abilities. Without speaking we cannot convey our ideas or opinions effectively (Ratnasari & Arbain, 2019). Speaking is the way to communicate with each other. According to Thornbury (2005), speaking is as so much a part of daily life that we take it for granted. The average person produces tens of thousands of words a day, although some people – like auctioneers or politicians – may produce even more than that. Meaning that speaking is the activity that happens continuously in human life to communicate to everyone, usually each person can speak thousands of words or even more every day. In the context of learning English, especially in speaking, speaking seems to be a competency that is quite difficult to learn because in learning speaking students are required to be able to express opinions, convey the intent and message, express feelings and all emotional conditions, and so forth. Therefore, the role of teachers is very reliable in teaching students well so that every competence can be achieved.

Luoma (2004) defines speaking as interaction and speaking as a social and situation-based activity. All these perspectives see speaking as an integral part of people’s daily lives. Thornbury (2005), states speaking is so much a part of daily life that we take it for granted. The average person produces tens of thousands of words a day, although some people – like auctioneers or politicians – may produce even more than that. Based on some opinions of the experts...
above, the researcher concludes that speaking is an important competence to do communication and interaction between two persons or groups. Speaking is a process of the product such as opinions and information with each other.

According to Brown (2004) there are five indicators of speaking. Those are: (a) Pronunciation, pronunciation is the way for students to produce language when they speak. It deals with the phonological process that determines how sounds vary and pattern in a language. (b) Grammar, it is needed for students to arrange a correct sentence in conversation, or the student’s ability to manipulate structure and to distinguish appropriate ones. The utility of grammar is also to learn the correct way to gain expertise in a language in oral and written form. (c) Vocabular, one cannot communicate effectively or express their ideas both oral and in written form if they do not have sufficient vocabulary. So, vocabulary means the appropriate diction which is used in communication. (d) Fluency, Fluency can be defined as the ability to speak fluently and accurately. Fluency in speaking is the aim of many language learners. Signs of fluency include a reasonably fast speed of speaking and only a small number of pauses and “ums” or “ers”. These signs indicate that the speaker does not have to spend a lot of time searching for the language items needed to express the message. (e) Comprehension, for oral communication certainly requires a subject to respond to speech as well as to initiate it.

Thus, the students have the ability to think critically in speaking; to be able to master the competence in speaking especially in English; the students have to strength in themselves to be able to speak fluently without stammering. In other words, many factors can affect their speaking competencies. One of the factors affecting students' speaking competence is students have difficulties in their critical thinking; it knows that critical thinking is defined as the ability to think critically, it is can improve the comprehension of the students and also the ability in speaking. By thinking critically, the students can speak logically and easily to understand and comprehend.

According to Jones et al. (2013) Critical thinking is essentially a questioning, challenging approach to knowledge and perceived wisdom. It involves examining ideas and information from an objective position and then questioning this information in the light of our own values, attitudes, and personal philosophy. Critical thinking is the cognitive activity associated with using the mind. Learning to think in critical analytically and evaluative ways means using mental such as attention, categorization, selection, and judgment (Cottrell, 2017; Hartati et al., 2020). Critical thinking is the way to think by our mind quickly and precisely, in other words, critical thinking means that thinking spontaneously.

Elder and Paul (2020) there are some of the indicators of critical thinking, they are: (a) Purposes, critical thinkers should be aware of the condition that when reasoning, it may have different purposes and a critical thinker should be able to identify. (b) Questions, a critical thinker should be giving questions to gaps in some of the information to know the issue. (c) Information, must actively decide which of possible experiences, data, and evidence, we will use. (d) Point of view, critical thinkers should understand the limitations of perspective, orientation, and points. e) Assumption, assumptions should be made clear and justified by sound evidence. (f) Concepts, the concept is the general categories or ideas by which we interpret, classify, or group the information we use in our thinking. (g) Inference, inference, or interpretations used to draw conclusions and give meaning to data, inferences as interpretations or conclusions. (h) Implication, the implication is the actual results of acting upon our reasoning. The implications of reasoning are an implicit creation of our reasoning.

Suyadi (2013) problem-based learning is a strategy that can be defined as a series of learning activities that emphasize the process of solving problems scientifically Problem-based
learning is a learning strategy that involves students in solving problems by integrating various concepts and skills of the discipline. This strategy involves collecting and presenting the findings (Berns & Erickson, 2001; Komalasari, 2013). Problem-based learning is a development of curriculum and teaching system that develops simultaneous problem-solving strategies and the fundamentals of knowledge and skills by assigning learners an active role as an unstructured daily solvent breaker (Finkle & Torp, 1995; Shoimin, 2014). The some definitions imply that Problem-based learning is an instructional atmosphere directed by a daily problem.

According to Shoimin (2014) the procedure in teaching speaking by using Problem-Based Learning strategy follow as (1) Teacher explains the purpose of learning. Describes the logistics required. Motivate students involved in selected troubleshooting activities; (2) Teacher monitors students to define and organize learning tasks related to the problem (set topics, tasks, schedules and more); (3) Teacher encourages students to gather appropriate information, experiments for explanations and troubleshooting, hypothetical data collection, and problem-solving; (4) Teacher assists students in planning and preparing their work with friends; (5) Teacher helps students to do reflection or evaluation of their investigations and the processes they use.

In addition, Shoimin (2014) says there are some advantages of Problem-Based Learning, they are: (a) Students are encouraged to have problem-solving skills in real situations. (b) Students have the ability to build their own knowledge through learning activities; (c) Learning focuses on the issue so that the unrelated material does not need to be learned by the students. This reduces the burden on students by memorizing or storing information. (d) Scientific activity occurs among students through group work. (e) Students used to use sources of knowledge from libraries, the internet, interviews, and observation. (f) Students have the ability to assess their own learning progress. (g) Students have the ability to conduct scientific communication in the discussion or presentation of their work. (h) Enhanced student learning difficulties can be addressed through group work in the form of peer teaching deficiency.

Methods

The research design of this study was categorized into the quantitative method. The quantitative method can be interpreted as a research method based on positivism philosophy, used to examine the population or a particular sample, data collection using research instruments, and quantitative data analysis/statistics, with the aim to test the hypothesis that has been applied (Rachmat et al., 2021; Sugiyono, 2006). In this research, the researcher applied experimental research using Multivariate Analysis of Variance (MANOVA) which is to test whether the average vector of two or more sample groups is drawn from a sample having the same distribution (Fajaruddin et al., 2021; Sutopo & Slamet, 2017).

The researcher will use the different treatments for two groups namely experimental and control. The experimental group will be treated by using Problem-Based Learning and the control group will be treated by Inquiry. Both groups was given the same test. The non-equivalent control group design can be seen in Table 1.

<table>
<thead>
<tr>
<th>Table 1. Non-equivalent control group design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
</tr>
<tr>
<td>Experimental</td>
</tr>
<tr>
<td>Control</td>
</tr>
</tbody>
</table>
The population of this research is the second-grade students of SMA Muhammadiyah Mataram which consists of two classes, they are; VII A consists of 11 students, VII B consists of 18 students. The total number of students is 29 students. In this study, the researcher divides two classes as a sample, and to determine the sample, the researcher must be used a sampling technique, and the sampling technique that the researcher used here is saturation sampling. The researcher used this sampling technique because the population was less than 30 students. The researcher has two groups of students, namely the experimental group and the control group. There were 29 students as the sample, comprised by VII A consisting of 11 students and VII B consisting of 18 students.

In this study, the researcher used two kinds of instruments, the first is a speaking test. The test is evaluated into five criteria; they are pronunciation, grammar, vocabulary, fluency, and comprehension. The students are scored based on five components of speaking by using the scale rating scores of Brown and Lee (2001). The second is the questionnaire, which is used to know the qualities of the students’ critical thinking. In this research, the researcher provides 20 items.

Results and Discussion

Result

Based on the output results, N or the amount of data, in the experimental class and control class has a different amount that is the experimental class consists of 18 students and the control class consists of 11 students with the total number of the two classes consist of 29 students. The mean of the class experiment was 74.50 and class control was 54.00, it means that the critical thinking of class experimental more than class control with mean difference 20.5 with standard deviation (std. deviation) of the class experiment was 4.328 and class control was 6,419 which means that the mean is greater than the standard deviation, thus indicating that the results are quite good. The mean for the speaking of the class experiment was 75.83 and class control was 60.45, it means that the score of the mean of the class experimental was more than class control with a mean difference of 15.38 with the standard deviation (std deviation) of the class experiment was 6,002 and class control was 8.202 which means that the mean is greater than the standard deviation, thus indicating that the results are quite good. It happens, because the standard deviation is a very high reflection deviation, so the spread of data shows normal results and does not cause bias. The descriptive statistics can be seen in Table 2.

Table 2. Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>Class</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Thinking</td>
<td>Experiment</td>
<td>74,5</td>
<td>4,328</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>54,00</td>
<td>6,419</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>66,72</td>
<td>11,339</td>
<td>29</td>
</tr>
<tr>
<td>Speaking</td>
<td>Experiment</td>
<td>75,83</td>
<td>6,002</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>60,45</td>
<td>8,202</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>70,00</td>
<td>10,177</td>
<td>29</td>
</tr>
</tbody>
</table>

Based on the Table 2, we will make a conclusion by referring to the decision-making basis of the correlation test. The output is known between critical thinking and speaking competence with a significance score of 0,000<0.05 which means there is a significant correlation. For more explanation, the asterisk of the output is known that the Pearson correlation 0,854** is associated with each (**), meaning that there is a significant correlation between the variables with the total students of 29. The correlation result can be seen in Table 3.
Table 3. The Correlation result

<table>
<thead>
<tr>
<th></th>
<th>Critical Thinking</th>
<th>Speaking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Thinking</td>
<td>Pearson Correlation</td>
<td>1,854**</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>29</td>
<td>29</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed).

Finally, from the explanation itself, it can be concluded that there is positive correlation between the students’ critical thinking and speaking competence at SMA Muhammadiyah Mataram. In other words, there is the significant study between the two variables itself.

Based on the MANOVA hypothesis test. The test of MANOVA can be seen in Table 4.

Table 4. Multivariate Test

<table>
<thead>
<tr>
<th>Effect</th>
<th>Pillai’s Trace</th>
<th>F</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0,994</td>
<td>2104,823</td>
<td>2,000</td>
<td>26,000</td>
<td>.000</td>
</tr>
<tr>
<td>Wilks’ Lambda</td>
<td>.006</td>
<td>2104,823</td>
<td>2,000</td>
<td>26,000</td>
<td>.000</td>
</tr>
<tr>
<td>Hotelling’s Trace</td>
<td>161,909</td>
<td>2104,823</td>
<td>2,000</td>
<td>26,000</td>
<td>.000</td>
</tr>
<tr>
<td>Roy’s Largest Root</td>
<td>161,909</td>
<td>2104,823</td>
<td>2,000</td>
<td>26,000</td>
<td>.000</td>
</tr>
<tr>
<td>Treatment</td>
<td>Pillai’s Trace</td>
<td>.798</td>
<td>51,379’</td>
<td>2,000</td>
<td>.000</td>
</tr>
<tr>
<td>Wilks’ Lambda</td>
<td>.202</td>
<td>51,379’</td>
<td>2,000</td>
<td>26,000</td>
<td>.000</td>
</tr>
<tr>
<td>Hotelling’s Trace</td>
<td>3,952</td>
<td>51,379’</td>
<td>2,000</td>
<td>26,000</td>
<td>.000</td>
</tr>
<tr>
<td>Roy’s Largest Root</td>
<td>3,952</td>
<td>51,379’</td>
<td>2,000</td>
<td>26,000</td>
<td>.000</td>
</tr>
</tbody>
</table>

a. Design: Intercept Class
b. Exact statistic

In the Table 4 presents a multivariate significance test. the difference of the four-centroid categories in terms of Pillai’s Trace coefficients, Wilk Lambda, HotellingTrace, Roy’s Largest Root. The four coefficients of the above test if transformed into Fisher or F distribution are all significant at a = 0.05. Thus, it can be said that both treatments influence students’ critical thinking and students’ speaking competence. The analysis result shows that the score of F for Pillai’s Trace, Wilk Lambda, HotellingTrace, Roy’s Largest Root. Treatment has a significantly smaller than 0.05. That is, the score of F Pillae Trace, Wilk Lambda, HotellingTrace, Roy’s Largest Root are all significant. Thus, there are differences in the result of critical thinking and speaking between the experiment and control groups.

Discussion

There were two statements of the problem proposed as follows: is there any significant effect of Problem-Based Learning towards students’ critical thinking and speaking competence at SMA Muhammadiyah Mataram? and is there any correlation between critical thinking and speaking competence at SMA Muhammadiyah Mataram?. Those statements of the problem had been answered based on the research result above. Based on the previous chapter, it was explained if significant > 0.05 then H0 is accepted and if significant <0.05 then H0 is rejected. Based on those results, Problem-Based Learning had a significant effect towards students’ critical thinking, it can be inferred that the use of Problem-Based Learning in the second grade at SMA Muhammadiyah Mataram especially in the experimental group give a significant effect of critical thinking and speaking because the by Problem-Based Learning the students train to think critically and by critical thinking students can speak fluently. It is shown by the process
during the field, students taught by PBL have higher learning outcomes than Inquiry. Through Problem-Based Learning, the students have the ability to build their own knowledge by learning activities (Shoimin, 2014).

While using the teaching of inquiry prefers to require thinking critically without any direction from the researcher or teacher, because by the strategy of inquiry the students are required to solve the problem by themselves. So the result of the research is that Problem-Based Learning was effective towards students' critical thinking and speaking competence because the research that used Problem-Based Learning devastated for critical thinking students, it knows that critical thinking is defined as cognitive activity associated with using the mind (Cottrell, 2017). The result of the class experiment showed that better than the class control with the Inquiry strategy. It is because, in the application of PBL when doing the research, the researcher or teacher always guides students to think more critically when the group is distributed based on the lesson plan, while in the class control when doing the research, the students are required to think critically without any direction by the researcher or teacher because by the strategy of inquiry the students are required to solve the problem by their self. So the results showed that the class experiment better than the control groups or class control. The characteristic of Problem-Based Learning as follows: the process of Problem-Based Learning, the teacher act as a facilitator to guide the students and monitor the development of the students’ activities, and motivate them to reach the target which is be going to attain (Shoimin, 2014). Furthermore, in the outline after doing research, critical thinking, and speaking competence have positive correlation because both of them has dependence each other this proven when the researcher make research in SMA Muhammadiyah Mataram. It happens, because the critical thinking of the students indirectly also good in speaking competence. It was evidenced during the learning process. Students who think critically are easy to understand what has been taught to them they also easy to express their opinions by speaking well.

Finally, the researcher concluded that the use of Problem-Based Learning had a positive effect toward students’ critical thinking and speaking competence and also has a positive correlation between critical thinking and speaking competence.

**Conclusion**

Conclusions Based on the discussion in the chapter fourth about the effect of Problem-Based Learning towards students’ critical thinking and speaking competence at SMA Muhammadiyah Mataram, the researcher concluded that based on the result of the analysis of differences in the level of critical thinking and speaking competence by using Problem-Based Learning with the significance 0.000<0.05. So, it can be concluded that “there are positive effects of Problem-Based Learning towards students’ critical thinking and speaking competence at SMA Muhammadiyah Mataram”. It means that the alternative hypothesis (Ha) was accepted and the null hypothesis (H0) was rejected.

The result of the correlation test shows that the significant correlation of 0.000<0.05 with the asterisk of the above output it is known that the Pearson correlation 0.854** associated with each variable has an asterisk (**). So, “there is a positive correlation between critical thinking and speaking competence at SMA Muhammadiyah Mataram”.

**References**


