Analysis of Problem Solving Ability in View Of Self Confidence in a PBL Learning Model Based on Blended Learning with Diagnostic Assessment

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Abstract

This study aims to determine the effectiveness of the PBL-Based Blended Learning with Diagnostic Assessment model to improve Problem Solving Ability, and to find out how problem-solving abilities are viewed from students' Self Confidence in the PBL learning model based on blended learning with diagnostic assessment. Based on the results of the study, it was found that (1) the Learning Model Based on Blended Learning with Diagnostic Assessment was effective in increasing Problem Solving Ability. (2) Subjects who have high self-confidence in problem-solving abilities, these subjects fulfill the four indicators of problem-solving abilities, namely understanding the context of the problem, designing a solution to solve the problem, solving the problem, and reviewing. (3) Subjects who have Self Confidence are in problem solving ability, this subject fulfills three indicators of problem solving ability namely understanding the context of the problem, designing a solution to solve the problem, and solving the problem. (4) Subjects who have low self-confidence in problem solving abilities, this subject fulfills one indicator of problem solving ability, namely understanding the context of the problem.

Keywords: Problem Solving Ability, Self Confidence, Problem Based Learning, *Blended Learning*, Diagnostic Assessment

1. Introduction

In the realm of formal schooling, science is a subject that is one of the graduation necessities in the public test. Numerous understudies believe that math is a confounding and wearing subject out. In this manner, teachers should make fun showing ideas and teachers ought to show learning materials connected with regular daily existence in taking care of numerical issues, so that during the growing experience there will be significant learning for understudies. The greatness of the job of science expects understudies to have the option to dominate math, since learning math understudies can involve it for of taking care of regular understudy issues. One of the capacities that should be dominated by understudies is the capacity to tackle numerical issues,

Critical ability to think is a significant view point for understudies to have as (2012) Math learning in schools should have the option to plan understudies to have numerical critical thinking and correspondence capacities, as an arrangement to confront the difficulties of improvement and change. The right learning model can urge understudies to be more dynamic and ready to tackle issues well. One model that can be utilized by educators to further develop understudies' numerical critical thinking skills is to utilize the Issue Based Learning model. As per Arends in Suprihatiningrum (2013) PBL is a learning approach, in which understudies take care of on legitimate issues with the end goal of building their own insight, creating request and higher-request thinking abilities, creating freedom and fearlessness.

Lack of student confidence in the ability to do math problems causes low self-confidence of students, resulting in low ability to solve mathematical problems in this material. The attitude that students must have is Self Confidence or in other words the nature of self-confidence, this self-confidence must be possessed by students in learning activities at school. According to Sahrul (2022), self-confidence is one of the most important things that individuals need to develop activity and creativity as an effort to achieve achievement. Students' self-confidence can later lead students to achieve problem-solving skills.

The existence of communicative interaction between students and other students as well as with the teacher is realized in the learning process that uses a particular learning approach. One learning approach that emphasizes active learning techniques is blended learning. Blended learning can increase student interaction with other students and teachers(Westover, 2014). *Blended learning* considered as the integration of face-to-face learning and learning with online approaches(Sukarno, 2011).The use of the internet in learning (e-learning) can provide new nuances in the world of education and can improve students' ability to think(Budiharti, 1998). *Blended learning* teachers can create digital classes that can involve the whole class so that student activity can be fully monitored and provide a place for students who are often online to have fun and play games.

Inability of students to master the lesson, it is necessary to have an assessment or assessment of student understanding in order to find out the obstacles and weaknesses of students. Assessment is a process for making the right decisions from the results of gathering information(Hartati, 2018), assessment has a special term to describe activities carried out by teachers where these activities are used to obtain information about the knowledge, skills, and attitudes of students(Rahman, 2017). So the data is concluded from the various opinions above that assessment is a follow-up activity that is obtained from how to collect information with the aim of being able to make decisions accurately.

Students' difficulties in understanding the material can be seen and determined through the diagnostic method(M Abidin & R Heri, 2019).To overcome the difficulties that occur, each lesson ends with a diagnostic test which is used to analyze student difficulties. So that it can be detected which students still have difficulty with the material being taught when using the PBL model.

Diagnostic test results provide information about concepts that have not been understood and those that have been understood. After knowing the difficulties of students, the task of a teacher must be to help students master these difficulties, namely by following up on the results of diagnostic tests by providing treatments that are appropriate to the location of the difficulties of students. The results of research conducted by Samsul Arifin(2019) that learning that applies the problem-based learning model with effective diagnostic assessment of mathematical problem-solving abilities. The results of the follow-up diagnostic assessment by giving a diagnostic assessment test that provide appropriate treatment based on the difficulties found by students have a significant effect on developing problem-solving skills. According to Samuel(2019) problem-based learning models with diagnostic assessments require students to be active in completing individual or group assignments during the learning process, so that the application of problem-based learning models with diagnostic assessments can be carried out properly.

2. Research Problems

Based on the background above, there are research problems as follows: Is the PBL learning model based on blended learning with diagnostic assessment effective in improving problem solving abilities in terms of students' self-confidence? How is problem-solving ability viewed from students' self-confidence in the PBL learning model based on blended learning with diagnostic assessment?

3. Methodology of Research

The type of research used is mixed research (mixed method). The research design used was the pretest-posttest control group design. In this study, two classes were taken, namely the experimental class and the control class. The experimental class will be applied to the PBL learning model based on Blended Learning and the control class will be applied to the Discovery Learning learning model. This study uses an embedded mixed methods strategy. As for qualitative research as the primary method while quantitative research as a secondary method.

4. Sample and Data Collection

The population in this study were all class VII students of SMP 1 Jati Kudus for the 2021/2022 academic year. The population in this study was randomly selected using Cluster Random Sampling and took 2 classes to be used as the experimental class and the control class. The research sample was class VII F which applied the PBL learning model based on blended learning with diagnostic assessment and class VII G applied the learning model Discovery Learning and class VIII A which was used as a trial class. The subject taking technique in this study used a purposive sampling technique

5. Finding/Results

5.1 Problem Solving Ability (KPM) in High Self Confidence Subjects

S-6 and S-30 are subjects who have high self-confidence based on self-confidence questionnaires. S-6 always tries to have the courage to ask when there are subjects that are not understood, tries to be mature in solving a learning problem, likes challenges in learning, is always optimistic in learning, dares to ask questions while learning is in progress, has clear learning goals, does not feel that other people are more capable than him in learning, do not depend on friends in doing assignments, are not easily anxious in facing difficult questions, do not find it difficult to develop strengths possessed in class, do not feel inadequate in doing assignments, dare to do questions in front of the questions in front of the class, always trying to complete the task without the help of others,

S-30 always tries to have the courage to ask questions when there are subjects they don't understand, tries to be mature in solving a learning problem, likes challenges in learning, is always optimistic in learning, dares to ask questions when learning is in progress, feels they don't have clear learning goals , feel that other people are more capable than him in learning, feel dependent on friends in doing assignments, feel easily anxious when facing difficult questions, find it difficult to develop strengths in class, feel less able to do assignments, dare to do questions in front questions in front of the class, always trying to complete assignments without the help of others, always assuming that all questions must have a solution,always used as a reference by friends in working on questions, trying to develop their talents, afraid of being wrong in answering questions, hesitant in making decisions independently, feeling embarrassed when presenting in front of the class, feeling easily discouraged if unable to do assignments well, feel friends don't want to hang out with them because they are not smart enough, choose silence rather than participate in expressing opinions and are reluctant to express ideas in front of the class, have a strong will in learning, and feel they have good academic achievements at school.feel friends don't want to hang out with him because he is not smart enough, chooses silence rather than participate in expressing opinions and is reluctant to express ideas in front of the class, has a strong will in learning, and feels he has good academic achievements at school.feel friends don't want to hang out with him because he is not smart enough, chooses silence rather than participate in expressing opinions and is reluctant to express ideas in front of the class, has a strong will in learning, and feels he has good academic achievements at school.

Indicators of solving ability are as follows: (1) Understanding the context of the problem, (2) Designing a solution to solve the problem, (3) Solving the problem, (4) Review. Based on the results of the research subjects S-6 and S-30 have high problem solving abilities and when faced with diagnostic assessments S-6 and S-30 can apply basic prerequisite knowledge that needs to be mastered in order to be able to follow the material of linear equations and inequalities so as to be able to understand the concept these linear equations and inequalities.

5.2 Problem Solving Ability (KPM) with Diagnostic Assessment on Low Self Confidence Subjects

S-23 and S-29 are subjects who have low Self Confidence based on the Self Confidence questionnaire. S-23 does not dare to try to ask questions when there are subjects that are not understood, is not mature in solving a learning problem, does not like challenges in learning, is not optimistic in learning, is brave enough to ask questions while learning is in progress, does not have clear learning objectives , feel that other people are more capable than him in learning, feel dependent on friends in doing assignments, feel easily anxious when facing difficult questions, find

it difficult to develop strengths possessed in class, feel less able to do assignments, sometimes dare to work on questions in front of the class, just try to complete the task without the help of others,

S-29 does not dare to try to ask questions when there are subjects that are not understood, is not mature in solving a learning problem, does not like challenges in learning, is not optimistic in learning, does not dare to ask questions while learning is in progress, does not have clear learning objectives , feel that other people are more capable than him in learning, feel dependent on friends in doing assignments, feel easily anxious when facing difficult questions, find it difficult to develop strengths possessed in class, feel less able to do assignments, don't dare to do questions in front of the class, does not try to complete the task without the help of others, does not assume that all questions must have a solution,not used as a reference by friends in working on questions, not trying to develop their talents, very often afraid of being wrong in answering questions, very often hesitant in making decisions independently, very often feeling embarrassed when presenting in front of the class, very often feel easily discouraged if they cannot do assignments well, very often feel friends do not want to hang out with them because they are not smart enough, very often choose silence rather than participate in expressing opinions and are very reluctant to express ideas in front of the class, do not have a strong will in learning , and do not feel they have good academic achievement in school.very often hesitates in making decisions independently, very often feels embarrassed when presenting in front of the class, very often feels easily discouraged if he cannot do assignments well, very often feels friends don't want to hang out with him because he is not good at it, very often choose silence rather than participate in expressing opinions and are very reluctant to express ideas in front of the class, do not have a strong will in learning, and do not feel they have good academic achievements at school.very often hesitates in making decisions independently, very often feels embarrassed when presenting in front of the class, very often feels easily discouraged if he cannot do assignments well, very often feels friends don't want to hang out with him because he is not good at it, very often choose silence rather than participate in expressing opinions and are very reluctant to express ideas in front of the class, do not have a strong will in learning, and do not feel they have good academic achievements at school.very often choose silence rather than participate in expressing opinions and are very reluctant to express ideas in front of the class, do not have a strong will in learning, and do not feel they have good academic achievements at school.very often choose silence rather than participate in expressing opinions and are very reluctant to express ideas in front of the class, do not have a strong will in learning, and do not feel they have good academic achievements at school.

Indicators of solving ability are as follows: (1) Understanding the context of the problem, (2) Designing a solution to solve the problem, (3) Solving the problem, (4) Review. Based on the results of the research, subjects S-23 and S-29 had low problem solving abilities and when faced with the diagnostic assessment S-23 and S-29 at first did not master the basic prerequisite knowledge so they were not able to understand the concept of linear equations and inequalities, then they were followed up. with remedial and finally both finished

5.3 The Effectiveness of Blended Learning-Based PBL Learning Model with Diagnostic Assessment in Improving Problem Solving Ability

a. Normality test

The final data normality test was carried out using SPSS 17.0 on the Kolmogorov-Smirnov test. The following results of the analysis of the final data normality test in the

experimental class can be seen in the final data normality test using the Kolmogorov-Smirnov test, namely by looking at the sig value, the following can be seen in Table 1.

Table 1. Final Data Normality Test

Data	Sig.	Information
Experiment Class	0.074	H0 is accepted

Based on Table 1. above, the value of Sig. 0.074 for the experimental class and a sig. value of 0.180 for the control class which is based on the test criteria, namely the sig. greater than 0.05 thenH0 is accepted and Ha is rejected, which means that the initial data from both classes come from normally distributed populations. The calculation results can be seen in Appendix C 2

b. Final Data Homogeneity Test

The final data homogeneity test was carried out using SPSS 17.0 on the Levene test. Following are the results of the initial data homogeneity test analysis in Table 2.

Table 2. Final Data Homogeneity Test

Data	Sig.	Information
Pretest Score (2 classes)	0.949	H0 is accepted

Based on Table 2. above, the value of Sig. 0.949 which is based on the test criteria, namely the sig. value is greater than 0.05 thenH0 is accepted and Ha is rejected, which means thatboth classes, namely the experimental class and the control class, are the same sample (homogeneous).

c. Due Diligence Test

The classical mastery test was carried out to find out whether blended learning-based PBL learning with diagnostic assessment can help students achieve classical learning mastery in problem solving abilities. The proportion test used in this study is the right-sided proportion test with the proportion of students who achieve KKM (75) at least75%of the number of students in the class according to opinionClark, Guskey, & Benninga(1983) The minimum completeness criteria are taken according to the KKM in the school. The hypothesis is as follows.

$H_o: \pi \leq 75\%$, The proportion of completeness of problem solving abilities in the Problem Based Learning (PBL) learning model based on blended learning with a diagnostic assessment of less than or equal to 75 has not yet reached 75%

$H_a: \pi > 75\%$, The proportion of completeness of problem solving abilities in the Problem Based Learning (PBL) learning model based on blended learning with a diagnostic assessment of more than 75 has reached 75%

Following Table 3.the processing results of the proportion/classical adequacy test using SPSS 17.0, namely the One Sample T Test.

Table 3.outputtest One Sample T Test

Sig	Information
0.000	$H_o$rejected

In light of the result results Table 3. outputsthe One Sample T test above got a sig worth of 0.000 where the test measures peruses ifsig (2-tailed) esteem is not exactly (<) 0.05 then H0 is rejected and Ha is accepted, and that implies that the proportionthe fulfillment of critical abilities to think in the Problem Based Learning (PBL) learning model in light of mixed learning with a demonstrative evaluation of more than 75 has arrived at 75% or a similar importance asproportionthe culmination of critical thinking abilities in the Problem Based Learning (PBL) learning model in view of mixed learning with a higher symptomatic evaluation than the old style KKM.The traditional learning dominance got by the exploratory class was 81.3% which intends that there were 26 understudies who finished KKM (75) out of a sum of 32 understudies. In light of the resultscompleteness test (individual and old style) it tends to be reasoned that understudies accomplish authority in learning.

d. Two Mean Difference Test

Next, a different test will be carried out which is used to find out whether the average problem solving ability in Problem Based Learning (PBL) based on Blended Learning is better than the average problem solving ability with conventional methods. The hypothesis to be tested is as follows.

$H_o : \mu_1 \leq \mu_2$, The average problem solving ability with Problem Based Learning (PBL) based on Blended Learning is less than or equal to the average problem solving ability of students with conventional learning.

$H_a : \mu_1 > \mu_2$, The average problem solving ability of students with Problem Based Learning (PBL) based on Blended Learning is more than the average problem solving ability of students with conventional learning.

The following is Table 4. OutputIndependent Sample T Test testSPSS 23.0 processing results.

Table 4.outputIndependent Sample T Test test

Sig	Information
0.006	$H_o$rejected

Based onTable 4. Outputs Independent Sample T Test testthe output results above show that the sig value is 0.006 where the value is less than 0.05 (0.006 <0.05) so based on the test criteria it can be concluded that it is rejected which means the average H_o problem solving skill students in the Problem Based Learning (PBL) learning model based on Blended Learning are more than average students' problem solving abilitieson conventional learning or the same meaning as the average problem solving skill students in the Problem Based Learning (PBL) learning model based on Blended Learning are better than the average problem solving abilities of students in conventional learning

6. Discussion

6.1 Problem Solving Ability In terms of High Self Confidence

Based on the results of qualitative analysis, subjects who have high Self Confidence tend to have high problem solving abilities as well. Subject 6 and subject 30 are subjects who have high self-confidence with a high level of problem-solving ability. Subject 6 is classified as a subject that has high Self Confidence because this subject always tries to be brave to ask questions when there are subjects that are not understood, tries to be mature in solving a learning problem, likes challenges in learning, is always optimistic in learning, dares to ask when he is learning takes place, has clear learning goals, does not feel that other people are more capable than him in learning, does not depend on friends in doing assignments, is not easily anxious in facing difficult questions,

Based on the quantitative analysis of S-30 subjects, they have high problem-solving skills because they are able to fulfill the four indicators of problem-solving abilities. The first indicator is understanding the context of the problem, this subject is able to write down what is known and asked about the problem in full, not only that based on the results of interviews that have been conducted, this subject is also able to explain orally what is known and asked, so in general this subject really understands the context problem. The second indicator is to design a solution to solve the problem, this subject can determine how to solve the problem according to the problem correctly, proven based on the results of interviews this subject can explain the planning used in solving the problem and what formula must be used in order to find a solution to the problem. The third indicator is solving problems, this subject can solve problems with strategies that are formulated completely and correctly, it is proven that based on the results of interviews this subject writes and explains the steps for solving the problem in accordance with the problem. The fourth or final indicator is review, this subject has confirmed the answers to the questions and concluded the answers correctly as evidenced by the results of the interviews that the answers are correct and made the conclusions correctly too and can explain that he is sure of the answers.

6.2 Problem Solving Ability Viewed From Moderate Self Confidence

Based on the results of qualitative analysis, subjects who have moderate Self Confidence tend to have moderate problem-solving skills as well. Subject 15 and subject 26 are subjects who have moderate Self Confidence with a moderate level of problem solving ability. S-15 does not dare to try to ask questions when there are subjects that are not understood, is not mature in solving a learning problem, does not like challenges in learning, is not optimistic in learning, does not dare to ask questions while learning is in progress, feels that he does not really have a learning goal clear, feel that other people are more capable than him in learning, feel dependent on friends in doing assignments, feel easily anxious when facing difficult questions,

6.3 Problem Solving Ability In terms of Low Self Confidence

Based on the results of qualitative analysis, subjects who have low Self Confidence tend to have low problem solving abilities as well. Subject 23 and subject 29 are subjects who have moderate Self Confidence with a moderate level of problem solving ability. S-23 does not dare to try to ask questions when there are subjects that are not understood, is not mature in solving a learning problem, does not like challenges in learning, is not optimistic in learning, is brave enough to ask questions while learning is in progress, does not have clear learning objectives , feel that other people are more capable than him in learning, feel dependent on friends in doing assignments, feel easily anxious when facing difficult questions, find it difficult to develop strengths possessed in class.

6.4 The Effectiveness of the Blended Learning-Based PBL Learning Model with Diagnostic Assessment Improves Problem Solving Ability

Based on the results of quantitative analysis, the PBL learning model based on blended learning with diagnostic assessment is effective in increasing problem solving abilities as evidenced by the completeness test that will be tested in this study is the classical mastery test with proportion mastery test, the classical mastery test is carried out to find out whether PBL learning is blended based learning with diagnostic assessment can assist students in achieving classical learning mastery on problem solving skills. The proportion test used in this study was the right-sided proportion test with the proportion of students who achieved KKM (75) of at least 75% of the number of students in the class according to the opinion of Clark, Guskey, & Benninga (1983). The minimum completeness criteria are taken according to the KKM in the school (Faiz, 2020). Based on the output results of Table 4.6 The result of the One Sample T test above got a sig worth of 0.000 where the test rules peruses on the off chance that the sig (2-followed) esteem is not exactly (<) 0.05 H0 is dismissed and Ha is acknowledged, and that implies that the extent of culmination critical abilities to think in the Problem Based Learning (PBL) learning model in light of mixed learning with demonstrative evaluations of more than 75 have arrived at 75% or a similar importance as the extent of fulfillment of critical abilities to think in the Problem Based Learning (PBL) learning model in view of mixed learning with more symptomatic appraisal higher than the old style KKM. The old style learning dominance got by the trial class is 81, 3% which intends that there are 26 understudies who have finished KKM (75) out of a sum of 32 understudies. A total examination of handling results, individual learning fulfillment (KBI) and traditional learning fulfillment (KBK) should be visible in Supplement C 3. In light of the consequences of the culmination test (individual and traditional) it very well may be reasoned that understudies accomplish dominance in learning.

Moreover, an alternate test will be done which is utilized to see if the typical critical ability to think in Problem Based Learning (PBL) learning in light of Mixed Learning with Demonstrative Evaluation is superior to the typical capacity of customary critical abilities to think. In light of Table 4. The result of the Autonomous Example T Test, the result results above show that the sig esteem is 0.006 where the worth is under 0.05 (0.006<0, 05) then, at that point, in view of the test standards it very well may be reasoned that Ho is rejected, and that implies that the typical critical ability to think in the Issue Based Learning (PBL) learning model in light of Mixed Learning with Symptomatic Evaluation is more than the normal critical ability to think of understudies in regular learning or a similar importance as the normal - the typical critical ability to think in the Issue Based Learning (PBL) learning model in view of Mixed Learning with Demonstrative Evaluation is superior to the typical critical ability to think of understudies in customary learning.

Based on the results of the proportion mastery test, and the difference test of two proportions, it can be concluded that Problem Based Learning (PBL) based on blended learning with diagnostic assessment is effective for improving problem solving skills. The research results were strengthened by Istiqomah & Siswono(2020)where the learning outcomes of students in the problem based learning learning model are higher than the value of learning outcomes in the application of conventional learning. In the problem-based learning model, students are expected to address problems in the real world and questions related to solving story problems in mathematics, PBL has a higher value than conventional learning because problem-based learning starts learning activities by giving a problem. mathematical problems, where students are given the opportunity to solve them by discussing, conducting studies, to developing ways of solving problems according to the instructions that have been explained by the educator. From this settlement method, students more often ask questions that are not yet understood so that it is easier for educators to monitor the progress of the ongoing learning process. It is from this process that makes students more independent and creative in preparing learning plans. In addition, it is also reinforced by Dogoriti and Pange, J. and Dogoroti where if you use social networks properly, it will provide opportunities for significant results to improve educational outcomes (Wardono, 2016).

7. Conclusion

Based on the research, the following research results are obtained: 1) subjects who have high self-confidence in problem-solving abilities, these subjects fulfill the four indicators of problem-solving abilities, namely unzderstanding the context of the problem, designing a solution to solve the problem, solving the problem, and reviewing; 2) subjects who have Self Confidence are in problem solving abilities, this subject fulfills three indicators of problem solving abilities namely understanding the context of the problem, designing a solution to solve the problem, and solving the problem; 3) subjects who have low Self Confidence in problem solving abilities, this subject fulfills one indicator of problem solving abilities, namely understanding the context of the problem;

8. Recommendations

In this study, teachers need to know and pay attention to the level of self-confidence of their students so that they can motivate students appropriately to achieve learning goals. The Problem Based Learning PBL learning model based on blended learning with diagnostic assessment can be used as material for consideration in making policies to improve the quality of learning. Students need to be more confident in learning so they can improve their cognitive abilities, especially problem solving skills. For other researchers, the results of this study can be used as relevant references for subsequent research.

9. Limitations

Researchers realize that this research still has many limitations, including:

a. This study has research limitations, namely using 6 student samples.
b. The samples obtained by the researchers were still minimal and not proportional to the number of questionnaires distributed
c. This study only uses data from the results of the questionnaire. Measuring data using a questionnaire has several weaknesses, including the respondent being unable to provide further information because the answers are limited to the things that are asked. In addition, respondents may answer statements that are not in accordance with the actual situation

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