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# The Effect of Problem-Based Learning Model (PBL) and Adversity Quotient (AQ) on Problem-Solving Ability

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**Abstract** This study aimed to analyze whether the result of students' problem-solving ability with using problem-based learning model better than conventional learning, to analyze the results of problem-solving ability of students who have high average of adversity quotient better than students who have low average of adversity quotient, to find out interaction between problem-based learning model mapping and adversity quotient of students' problem-solving ability. Two class of students namely; problem-based learning class and conventional learning class were investigated on student's problem-solving ability. The results showed that: problem-solving ability of students used problem-based learning model better than conventional learning, problem-solving ability of students who have high average of adversity quotient better than students who have the low average of adversity quotient, and there was interaction between the problem-based learning model and conventional learning with adversity quotient to improve students' problem-solving ability.

***Keywords:*** *problem-based learning model, conventional learning, adversity quotient, problem-solving ability*

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## 1. Introduction

Problem-solving ability using the thought process to solve the difficulties of known, collecting facts about the difficulties and specify the additional information required [11]. Students' ability to solve problems in everyday life serve as an idea whether or not the quality of education, especially for students of compulsory education age. Problem-solving ability of students in Indonesia, especially in North Sumatra is still relatively low. It is based on the results of PISA (Program for International Student Assessment) and TIMSS (Trends in International Mathematics and Science Study). Which, showed that the problem-solving ability of students in Indonesia is still ranked low namely in 69 position from 76 countries. In theory, low ability students in problem-solving authentic one reason is because the learning process is still teacher centered. Teacher centered learning is more centered on teachers, lack of student involvement in the learning process so that students get the material passively and less skilled in solving problems.

To overcome the problems that have been mentioned above will require a solution to be able to change the conventional learning into a more interactive learning model is centered on the student or student centered. One of the models of learning that can be applied to enhance students' ability in problem-solving and higher level thinking is a model of Problem-Based Learning (PBL). PBL can help students develop thinking skills, problem-solving skills, and skills intellectual in this study the roles of adults with experience through various situations rill or situations are simulated and become students learn independent [2]. Additionally PBL not only help students actively involved in learning but prepare students for real life [19]. PBL models can involve students to solve problems through the stages of a scientific method with an authentic investigation of the problems that occur in everyday life. Adopting PBL in a teacher education context involves the need to focus attention on making explicit connections for students with both the teaching and the learning processes that underpin PBL; connections that students are required to reflect upon in light of their own future teaching practice [7]. PBL step by Arends [2] there are: (1) Giving the orientation of the problem to students; (2) organizing the students to examine; (3) Assisting the investigation independently and groups; (4) Developing and present the artifacts and exhibit; (5) Analyzing and evaluate the process of answer the problem, while the PBL step according to Eggen & Kauchak [5] (1) Reviewing and presenting problem; (2) Develop a strategy; (3) Implementing the strategy; (4) Discussing and evaluating the results. Although it has some advantages but it does not mean there are no problems in the implementation of problem-based learning.

In solving the problem occurs thought process in the minds of students so that students can find answers to the problems of physics. To arrive at the success of finding answers, students will experience various problems as a barrier in solving the problem. So that every student has different abilities in dealing with problems. In this case the Adversity Quotient (AQ) is considered to have a role in the thinking of students in learning physics. Stoltz [17]

stated that the success in learning as well as by intellectual intelligence and emotional intelligence, the other decisive factor is adversity quotient. Also according to Al-Kumayi [1] if a person has a high AQ then he will be able to overcome difficulties and can survive for no despair in addressing the problem.

The study results include the implementation of the PBL model of research Wardana [20], which analyzes the effect of problem-based learning and AQ to the high-level thinking skills and conceptual understanding of physics. Wismayana [21] analyze the effect of problem-based learning and adversity quotient students' mathematics achievement and self-concept of students SMA N 4 Singaraja Bali Indonesia. Temel [18] to investigate the effects of problem-based learning on pre-service teachers' critical thinking dispositions and perceptions of problem-solving ability. Research Dwi [4] found that using the model PBL can improve understanding of concepts and problem-solving abilities of physics. Research Ferreira [6] found that there is the impact of problem-based learning on student attitude toward science, problem-solving skills and sense of community in the classroom.

The different of this research between the earlier research is to find the interaction of Problem Based Learning Model and conventional learning with Adversity Quotient in increasing the problem solving ability.

## 2. Method

This research is a quasi-experiment aimed to see the effect of PBL model on problem-solving ability that distinguished the above average AQ and below the average AQ. The population in this research was State Senior High Scool 1 class X in Takengon, North Sumatera that consist of five classes. Sample in this research were two classes by using simple random sampling, first class as control class taught by conventional teaching and second class as experimental class taught by PBL model. Both of sample classes consist of 34 students. With the design of the study was two group pretest-posttest design. The study design with a 2x2 factorial design to technical analysis of variance (ANOVA) two ways. Data collection techniques in this study will be obtained through a problem-solving ability tests and questionnaires AQ. Data collection will be conducted in two stages, collect data about student AQ and collect data about students' physics problem-solving ability.

A test for use problem-solving ability is a test essay by using indicators based on research results Heller et al. As for the indicators of problem-solving skills by Heller et al [8], namely: The visualization of problem, physics description, plan a solution, execute the plan, check and evaluate. Meanwhile, the test form AQ questionnaire Adversity Response Profile (ARP) is used to classify students in three categories: low (score 0-77), moderate (score 78-149) and high (score of 150-200). ARP questionnaire contains 20 events with five possible answers to each question. The scale used is the Likert scale. Answer every item instrument starting from very positive to very negative. For five possible answers using letters by replacing a scale of 1 to a, a scale of 2 to b, and so on, with a total score of 200.

## 3. Result

Results posttest physics problem solving ability of students and student AQ test results can be seen in Table 1.

From Table 1. The average obtained problem solving ability of students in class after being given the experimental treatment is 84,47dengan standard deviation of 6.34 and for the control class average was 77.18 and the standard deviation was 5.62. Average adversity quotient in the control class is 75.62 and 76.18 with the experimental class of high category. Each further divided two groups of students who have adversity quotient above average and below average. After testing the feasibility of the data is complete and fulfilled, testing the hypothesis. ANOVA statistical test results of two lanes are shown in Table 2.

Based on Table 2. obtained: 1) There are significant differences problem solving ability of students using PBL and Conventional for significance value of < 0.05, 2) There are significant differences problem-solving ability of students AQ group of students who have above average better than groups of students AQ below The average, because the significance value < 0.05, 3) There was interaction between PBL and Conventional classes with AQ to improve problem-solving ability with significant value < 0.05.

**Table 1. Values Problem Solving Ability Students**

| Learning outcomes | Group | N | Mean | Std. Dev. |
|---|---|---|---|---|
| Problem-solving ability | Conventional class | 34 | 77,18 | 5,62 |
| | PBL class | 34 | 84,47 | 6,34 |
| Problem-solving ability | AQ above average | 34 | 82,24 | 7,69 |
| | AQ below average | 34 | 79,41 | 5,99 |
| Problem-solving ability Conventional class | AQ above average | 16 | 77,19 | 4,71 |
| | AQ below average | 18 | 77,17 | 6,46 |
| Problem-solving ability PBL class | AQ above average | 18 | 87,94 | 4,15 |
| | AQ below average | 16 | 81,39 | 6,43 |

**Table 2. Results of ANOVA**

| Problem-solving ability | df | Mean square | F | Sig. |
|---|---|---|---|---|
| PBL vs. conventional class | 1 | 949,415 | 30,349 | ,000 |
| AQ (above The average vs. below average) | 1 | 180,474 | 5,769 | ,019 |
| The interaction PBL model and Conventional with AQ | 1 | 182,785 | 5,843 | ,019 |

**Table 3. Post Hoc Test by Test Scheffe**

| Problem-solving ability | | Mean Difference | 95% Confidence Interval | |
|---|---|---|---|---|
| | | | lower | upper |
| Conventional class AQ below average | Conventional class AQ above average | ,02 | -5,50 | 5,54 |
| PBL class AQ below average | Conventional class AQ below average | 4,20 | -1,32 | 9,72 |
| | Conventional class AQ above average | 4,22 | -1,13 | 9,58 |
| PBL class AQ above average | Conventional class AQ below average | 10,75* | 5,07 | 16,43 |
| | Conventional class AQ above average | 10,77* | 5,25 | 16,29 |
| | PBL class AQ below average | 6,55* | 1,03 | 12,07 |

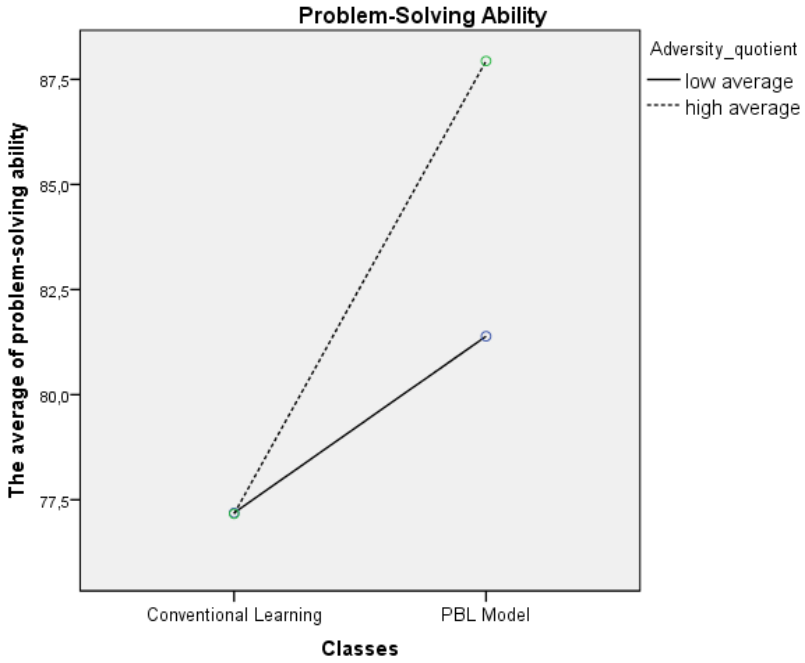


**Figure 1**. Interaction conventional classes and class PBL on adversity quotient below average and above average

In analyzing the difference between the groups then used the analysis of Post Hoc Test with Scheffe test. The results presented in Table 3.

Based on Table 3 test results Post Hoc Test Scheffe then obtained some comparisons interaction between groups as follows: 1) The problem-solving ability of in conventional class for groups of students AQ below average same as the problem-solving ability of students in conventional class for groups AQ is above average with significant p> 0.05, 2) Problem-solving ability in PBL class for groups of students AQ below average same as the problem-solving ability of students in conventional class for groups AQ below average with significant p> 0.05, 3) Problem-solving ability in PBL class for groups of students AQ below average the same as the problem-solving ability of students in conventional class for groups AQ above average with significant p> 0.05, 4) Problem-solving ability in PBL class for groups of students AQ above average better than problem-solving ability of students in conventional class for groups AQ below average with significant p <0.05, 5) Problem-solving ability in PBL class for groups of students AQ above average better than problem-solving ability of students in conventional class for groups AQ above average with significant p <0.05, 6) Problem-solving ability in the PBL class for groups of students AQ above average better than problem-solving ability of students in the class of PBL to group AQ below average with significant p <0.05.

For more clearly in view as the interaction will be shown in Figure 1.

Based on SPSS output 21 are as variable dependent is posttest of problem solving ability of students. Posttest used to output is the result of post-test score if the value of 77.18 and 84.47 so that in the chart there is interaction between the learning model with adversity quotient.

# 4. Discussion

## 4.1. Problem-solving Ability of Students Taught by Problem-based Learning Models Is Better than Conventional Learning

Problem-based learning by Joyce [10] is a series of learning that focuses on the process of critical thinking

and analysis to seek and find their own answers of a physical problem. The learning process is characterized by the problems encountered in everyday life, then the students deepen his knowledge of what is known and how to solve problems in groups in order to help each other so as to collaborate in solving problems.

The increased of problem-solving ability with PBL model because 1) the students are challenged by filing problems contextual beginning of learning [15], 2) the student is trying to ask questions and discuss with their friends and teachers [3], 3) through the process of observing, ask, gather information and communicate the students will build knowledge with experience and previous knowledge [13], 4) learning is stimulating the development of students' thinking skills in a creative and comprehensive [16], 5) the teacher gives motivation and train the students' problem-solving ability in a systematic [14], 6) purposefully embedded within the broader PBL process, creates opportunities to meaningfully develop knowledge, attitudes and skills pertinent to collaborative learning [7], 7) In the process of solving these problems, students use all its potential to solve the given problem both independently and cooperatively to forward it to the class discussion. When students have problems in the process of solving the problem, they put a question to the teacher or the other students to clarify the issues and the various tasks assigned. At the same time, students are able to share, maintain, or value the opinions or ideas of solving the problem raised by other students [12].

### 4.2. Problem-solving Ability in Group of Students Who Have Adversity Quotient above Average Better than Group of Students Who Have Adversity Quotient below Average

In the process, adversity quotient was instrumental in the formation of the student's perspective of looking at the problem. In other words adversity quotient that will either enhance the problem- solving physics students. This is because students who have adversity quotient above the average will assume that a given problem as an opportunity to achieve the goal, students will not easily give up until the student is able to solve a given problem. Unlike the case with students who have adversity quotient below average, students will easily give up and assume the problem is too difficult to solve. This is in line with the results of the research Carol Dweck [17], which proves that children with pessimistic responses to adversity will not learn and excel when compared with children who have patterns that are more optimistic. Then added by Humami [9], about the relationship between adversity quotient with academic achievement. The results show that there is a positive relationship between adversity quotient and learning achievement. This is demonstrated by the scores of students with better high adversity quotient in the acquisition of student achievement than students with low adversity.

The increased physics problem solving ability of students is also due adversity quotient viewed as intelligence / ability to fight in the face of difficulties or problems to achieve optimal problem-solving ability. Depth adversity quotient will affect students' learning ability. As Humami study [9] which showed that the level of intelligence of adversity affect the thinking of students to solve problems in the learning process. Where the results of physics problem solving ability of students who have adversity quotient above average better than adversity quotient below average.

### 4.3. There Was an Interaction between PBL Model and Conventional Learning with Adversity Quotient of the Students' Problem-solving Skills

There was an interaction in this study due to the adversity quotient important role in improving students' problem-solving ability. Where the problem based learning models also provide a better effect on students who have adversity quotient above average. This is because the model problem-based learning with adversity quotient above average cause more students are trying to resolve a given problem from collecting data, analyzing and evaluating data. So that students are actively involved in the learning process. While the students taught by conventional teaching, the students 'adversity quotient does not affect the value of students' physics problem-solving ability.

## References

[1] Al-Kumayi, S., Intelligence 99 (how to reach peace of life through the application of the 99 names of Allah), PT. Mizan, Jakarta, 2006.

[2] Arends, R.I., Learning to Teach, The McGraw-Hill Campanies, New York, 2008.

[3] Dewi, P.S.U., I.W. Sadia and Suma, K., "The Effect of Model Based Learning on Physics Problem Solving Ability through Numerical Control Talents Junior High School Students," Journal Program Ganesha Education University Graduate Studies Program Science, 4 (1).10-19. 2014.

[4] Dwi, I., M.,Arif, H. and Sentot, K., "The Effect of Problem Based Learning Model to Understanding Concepts and Problem Solving Ability," Indonesian Journal of Physics Education, 8-17. 2013.

[5] Eggen and Kauchak, Strategies and Models of Learning, Teaching Content and Thinking Skills, Indeks, Jakarta, 2012

[6] Ferreira, M.M. and Trudel, A.R., "The impact of problem based learning on student attitude toward science, problem solving skill and sense of community in the classroom," Journal of classroom interaction, 47 (1). 23-30. 2012.

[7] Harvey, R.M., Pourshafie, T. and Reyes, W.S., "What teacher education students learn about collaboration from problem-based learning," Journal of Problem Based Learning in Higher Education, 1 (1). 114-134. 2013.

[8] Heller,P., Ronald, K. and Scott, A., "Teaching Problem Solving Trough Cooperative Grouping," American Assosiation of Physics Teachers, 60 (7). 627-636. 1992.

[9] Humami, F., Mukhadis, A. and Sumarli, S., "The Effect of Numbered Heads Together (NHT) teaching model and adversity quotient on learning achievement subjects of energy conversion machines," Vocational technology, 37 (2). 119-128. 2014.

[10] Joyce, B., Weil, M., & Calhoun, E., Models of teaching (7th ed.), Pearson Allyn and Bacon, Boston, 2004

[11] Liliasari, Building the skills of Indonesian Human Thinking through Science Education, Faculty of MIPA UPI, Bandung, 2005.

[12] Listiani, Waode, "The Enchancement of Mathematical Critical Thinking Skills and Self-Efficacy at Senior High School Students though Learning-Based Problem Contextual Model," Journal of Mathematics Education, 1 (1). 56-62. 2016.

[13] Mundilarto, "The ability of a student using a quantitative analytical approach to problem-solving in physics," Jurnal Pendidikan Maternatileadan Sains, 3 (4). 44-53. 2003.

[14] Ogunleye, A.O., "Teacher and Students Perceptions of Students Problem-Solving Difficulties in Physics: Implication for Remidation," Journal of College Teaching and Learning, 6 (7). 85-90. 2009.

[15] Rahmat, M., "Problem solving ability through learning strategies thinking aloud pair problem solving class X SMA," Indonesian Journal of Physics, 5 (4). 45-56. 2014.

[16] Setyorini, U., "The application of the model problem based learning to enhance students' critical thinking skills SMP," Indonesian Journal of Physics Education, 7 (9). 52-56. 2011.

[17] Stoltz, Paul G., Adversity Quotient: Turning Obstacles into Opportunities, John Wiley and Sons, New York, 1997.

[18] Temel, Senar., "The effects of problem-based learning on pre-service teachers'critical thinking dispositions and perceptions of problem solving ability," South African Journal of Education, 5 (3). 155-165. 2014.

[19] Trianto, Designing Innovative-Progressive Learning Model, Kencana Prenada Group, Jakarta, 2010.

[20] Wardana, N., "The Effect of problem-based learning and Adversity Quotient of high-level thinking ability and conceptual understanding of physics," JIPP, 2 (3). 56-72. 2010.

[21] Wismaya, N.P., "The Effect of Problem Based Learning Model and Adversity Quotient Students of Mathematics Learning Achievement and Self Concept Students SMAN 4 Singaraja," Undiksha Journal, 1 (1): 21-27. 2009.