



The Effect of Problem-Based Learning on Students' Adversity Quotient

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Keywords

Floor gymnastics;
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Abstract

Physical Education (PE) plays a vital role in developing students' physical and mental capabilities, including their Adversity Quotient (AQ) in facing challenges. This two-cycle Classroom Action Research (CAR) aims to examine the effect of a Problem-Based Learning (PBL) model in floor gymnastics on students' AQ. A total of 41 eleventh-grade students from class XI-2 at SMAN 10 Bandung were selected using a purposive sampling technique. Data were collected through AQ questionnaires, observation sheets, and skill tests, and subsequently analyzed using a paired t-test and reflective analysis. The results indicated that the PBL model exerted a significant positive effect on students' AQ, marked by an increase in the mean score from 64.54 to 73.61. Nonetheless, a mean N-Gain value of 0.2453 (low) and an effectiveness percentage of 24.52% (ineffective) indicated that the rate of improvement progressed slowly on a small scale. In conclusion, the PBL model in PE simultaneously has the potential to intervene in students' psychological aspects. The PBL model is empirically proven to transform students' mental resilience profiles through massive vertical migration, in which the number of students in the Quitter category (easily giving up) was successfully reduced to 0%, while the proportion of students in the Climber category (resilient fighters) surged sharply from 7% to 37%. However, to achieve an optimal increase in AQ, a consistent application of the model over a longer period is required, accompanied by the modification of safe instructional tools.

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INTRODUCTION

Physical Education, Sports, And Health is an integral part of the national education system in Indonesia. It aims not only to stimulate physical fitness and motor skills but also plays a crucial role in developing the mental, psychological, and social dimensions of students. One psychological aspect that urgently needs to be nurtured through school physical activities is the adversity quotient. Stoltz defines aq as a measure of an individual's intelligence or contextual capacity to face, overcome, endure, and transform any obstacle or difficulty into an opportunity for success. Based on initial observations and a survey of the learning situation conducted at sman 10 bandung, the floor gymnastics learning process still encounters substantial constraints. The majority of students exhibit a low level of resilience (adversity); they tend to be passive, easily give up when facing physical obstacles, experience anxiety, and lack the self-confidence to explore new, more complex movements.

The Problem-Based Learning model is viewed as a highly relevant approach to address these issues. (Arends, 2012) explains that Problem-Based Learning is a student-centered learning method that utilizes real-world problems as the primary stimulus for learning, thereby training students to think critically, creatively, and collaboratively in solving problems. Through the syntactical stages of PBL, students are confronted with the technical challenges of floor gymnastics and are actively encouraged to explore solutions. This problem-based approach is theoretically linear with the four main dimensions of adversity quotient formulated by (Stoltz, 2000), namely control (the ability to control situations), ownership (responsibility for problems), reach (limiting the impact of difficulties), and endurance (resilience in facing challenges).

This is also in line with (Ramdhany, 2019) assertion that PBL encourages active student involvement from the very beginning of learning through the presentation of real-world problems, stimulating students to develop critical thinking skills and mental toughness in finding solutions. Previous studies demonstrate that the application of pbl and the measurement of aq have been widely conducted within purely cognitive academic domains, yet leave a clear research gap in the context of educational sports. Research by (Rifai et al., 2023) confirms the success of PBL in simultaneously boosting cognitive, affective, and psycomotor learning outcomes. More specifically, (Wyn et al., 2021) proved that there are significant differences in floor gymnastics learning outcomes between students taught with pbl compared to traditional methods. From an educational psychology perspective, (Paloloang et al., 2022) and (Kusumawati, 2017) found a strong correlation between high levels of AQ and improvements in academic achievement as well as student self-regulation skills. Furthermore, (Yulia Fitri, 2017) and (Hulaikah et al., 2020) identified a positive interaction effect between the Problem-Based Learning model and students' aq levels on their problem-solving ability.

To fill this void of literature, this study was conducted. Based on the comprehensive background description, the problem formulation proposed in this classroom action research is whether there is an effect of implementing Problem-Based Learning floor gymnastics on students' adversity quotient, and how the students' adversity quotient level compares before (pre-test) and after (post-test) the problem-based learning-based instruction. Consistent with the problem formulation, the objective of this study is to analyze in depth the effect of pbl-based floor gymnastics learning on the improvement of students' adversity quotient and to identify changes in students' aq profiles before and after the implementation of the learning model (Afandi, 2014; Widayati, 2008). As a reference for empirical validation, the research hypotheses proposed consist of: the null hypothesis (Ho): there is no significant effect of implementing the pbl model in floor gymnastics material on the adversity quotient of students at SMAN 10 BANDUNG; and the alternative hypothesis (Ha): there is a significant effect of implementing the pbl model in floor gymnastics material on the adversity quotient of students at sman 10 bandung.

METHODS

This study employs Classroom Action Research (CAR) as its methodological framework. CAR is a form of reflective inquiry conducted within a classroom environment, aimed at improving instructional processes to enhance the effectiveness of teaching and learning practices (Afandi, 2014; Widayati, 2008). In its implementation, this method involves systematic observation and the execution of planned interventions, followed by critical reflection to evaluate its impact on overall

learning quality improvement (Purwanto, 2023). The implementation of this classroom action research follows a cyclical process consisting of four interrelated phases: planning, implementing, observing, and reflecting (Kemmis et al., 2014).

The subjects of this classroom action research were determined using a purposive sampling technique, which involves selecting a sample based on specific criteria and considerations relevant to the research objectives. Based on this approach, one class consisting of 41 students from class XI-2 at SMAN 10 BANDUNG was selected as the research subject. The primary consideration for choosing this specific class was empirical evidence regarding the students' low Adversity Quotient (AQ) during initial observations in Physical Education, Sports, and Health (PI) learning, particularly within the floor gymnastics module.

A. Research Instruments

Data collection in this study was conducted using the following instruments:

1. Adversity Quotient (AQ) Questionnaire
2. Observation Sheet
3. Floor Gymnastics Skill Test: (Handstand, Cartwheel, Tiger Sprong).

B. Data Analysis Techniques

The data analysis technique in this study integrates quantitative and qualitative analyses, with the details as follows:

1. Quantitative Data Analysis

- a. Mean calculation: $\bar{X} = \Sigma X / N$
- b. N-Gain calculation: $g = (\text{Posttest} - \text{Pretest}) / (\text{Maximum Score} - \text{Pretest})$
- c. Paired Sample t-test: $t = \bar{D} / (SD / \sqrt{n})$

2. Qualitative Data Analysis

Qualitative data obtained from the observation sheets during the action cycles were analyzed using a descriptive qualitative approach. This analysis serves to explore the classroom learning process as well as to support, reinforce, and clarify the quantitative findings obtained.

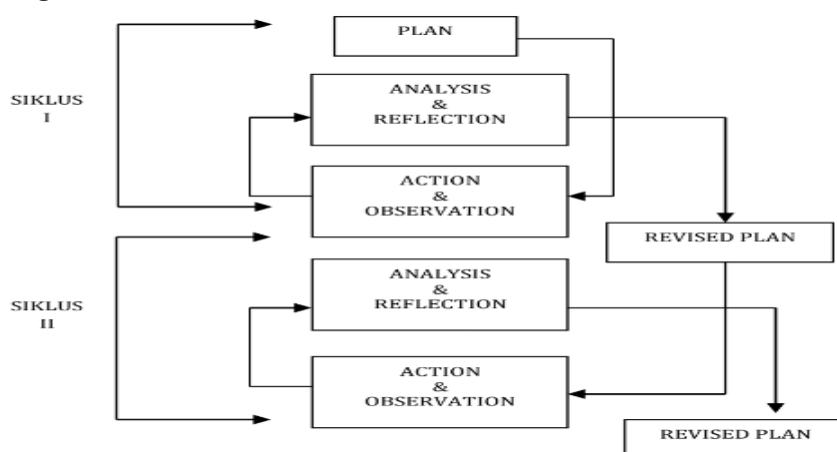


Figure 1. Classroom Action Research (Kemmis dan McTaggart)

RESULTS AND DISCUSSION

The result of the research is presented in the form of chart, table, or description. The analysis and interpretation of the result is needed to be elaborated before being discussed. The discussion is focused of elaborating the data and result of the analysis with the problems of the research or the purpose of the research in a broader theoretical context. In the discussion, also, providing answer of why based on the facts taken from the data. The discussion is written according to the data that is being discussed and supposedly not biased from the data result.

The analysis of statistical testing results in this study is divided into three main stages: descriptive analysis of students' Adversity Quotient (AQ) profiles, data analysis prerequisite tests

(normality and homogeneity), and inferential hypothesis testing (Paired Samples t-Test and N-Gain Score).

Table 1. Frequency distribution of students' adversity quotient categories

Variable	Categori	f	%
Pre-test AQ	Quitters	5	12%
	Campers	33	80%
	Climbers	3	7%
Total		41	100%
Pos-test AQ	Quitters	0	0%
	Campers	26	63%
	Climbers	15	37%
Total		41	100%

Based on the descriptive data in **Table 1**, a highly positive reconstruction of the students' mental resilience character is evident. In the initial condition (pre-test), the classroom climate was dominated by Camper-type students, reaching a percentage of 80% (33 students), and there were 12% (5 students) who stood at the critical point as Quitters. Only 7% (3 students) were identified as having the characteristics of a true Climber.

However, post-implementation of the PBL model in floor gymnastics material, the students' psychological profiles shifted massively. The Quitter character was completely reduced to 0%, the number of students categorized as Campers decreased to 63% (26 students), and the students who successfully migrated to become a Climber (resilient fighter) surged sharply, reaching 37% (15 students).

Table 2. Normality test

Variable	Sig.	Alpha	Description
Pre-test AQ	0,925	0,05	Normal
Pos-test AQ	0,181	0,05	Normal

In **Table 2**, the results of the Shapiro-Wilk test show a significance value (Sig.) of 0.925 for the pre-test data and 0.181 for the post-test data. The significance values of both variables are greater than 0.05 (Sig. > 0.05). Consequently, it can be concluded that the pre-test and post-test data of students' Adversity Quotient are normally distributed, thereby meeting the requirements for using parametric statistics. Tabel 3. Homogeneity Test (Levene's test)

After the data were declared normal and homogeneous, testing for the treatment effect was carried out using a Paired Samples T-Test analysis. This analysis tests the significance of the difference in students' mean AQ scores before and after the PBL model intervention in floor gymnastics.

Table 3. Hypothesis Test (Paired Samples t-test)

Variable	Mean	N	Std. Deviation	Std. Error Mean
Pre-test AQ	64,54	41	8,149	1,273
Pos-test AQ	73,61	41	8,426	1,316

Table 3 shows an increase in the students' mean Adversity Quotient scores. The mean AQ score during the pre-test was 64.54, which subsequently increased to 73.61 during the post-test. Descriptively, the margin of increase for the mean score is 9.07 points.

Table 4. Paired Samples t-test Analysis

Variable	Mean	t	df	Sig. (2-tailed)
Pre_AQ -Pos_AQ	-9,073	-7,269	40	0,000

Based on **Table 4**, the results of the Paired Samples t-test show a Sig. (2-tailed) value of 0.000. This significance value is smaller than the determined significance level (Sig. < 0.05).

Furthermore, the statistical power is supported by a t-value of -7.269 (where the absolute value of t-statistic > t-table).

This proves that there is a statistically significant difference in students' Adversity Quotient between before and after the implementation of Problem-Based Learning floor gymnastics instruction at SMAN 10 Bandung.

Table 5. Descriptive Analysis Results of N-Gain Scores

Variabel	N	Min	Max	Mean	Std. Deviation
N-Gain	41	0,03	0,89	0,245	0,201

Based on **Table 5**, the calculation results show that the mean N-Gain Score stands at 0.2453. According to Hake's criteria, this value falls into the "Low" category ($N\text{-Gain} < 0.30$). Meanwhile, the mean N-Gain value in the form of a percentage (N-Gain Score Percentage) is 24.52%. This percentage figure falls within the interpretation value of $< 40\%$, which signifies that the implementation of PBL floor gymnastics learning is in the "Ineffective" category when viewed from the acceleration or effectiveness of massive AQ improvement within a specific research period.

Table 6. Effect Size and N-Gain Test Results

Indiccor	Measurement	Criteria
Effect Size (Cohen's d)	1,135	Large/Strong Effect
Average N-Gain Score	0,2453	Low Improvement Category
Average N-Gain Percentage (%)	24,53%	Ineffective Qualification

The results in Table 6 show a Cohen's d value of 1.135. Referring to Cohen's criteria ($d > 0.8$), this figure indicates that the PBL model has a large/strong effect on the shift in Adversity Quotient values. However, the N-Gain Score calculation produced an average value of 0.2453, which falls within the range of $g < 0.3$ (low improvement category). In line with this, the average N-Gain Percentage value is 24.53%, which, classically, falls into the ineffective qualification when viewed from the effectiveness of the overall ideal percentage increase.

The successful improvement of students' Adversity Quotient from the Quitter and Camper typologies toward Climber characteristics is inseparable from the crucial role of instructional design within the Problem-Based Learning moduls. Through five structured syntactical stages (Wyn et al., 2021) the essence of floor gymnastics learning which was initially perceived as daunting is deconstructed into an engaging scientific problem-solving challenge. In the initial phase of problem orientation, students are not immediately instructed to perform physical movements on the mat, but are instead cognitively stimulated to analyze movement problems through demonstration examples. When students work in groups to conduct investigations and examine the movements, the internal components of Control and Origin & Ownership within them begin to be integrated and influenced. Students are encouraged to think critically to identify the causes of basic technical failures.

This collaborative analysis process fosters an intrinsic sense of responsibility in students to correct their own technical errors without fear of being judged (Yulia Fitri, 2017) Furthermore, the PBL scenario mandates cooperation in providing safety assistance (spotting) among group members. The sense of security built from this mutual support system on the mat is gradually capable of reducing acute anxiety, fear of injury, and other psychological limitations (Lesmana & Raharja, 2025) This is precisely what linearly elevates the students' Endurance dimension, enabling those who initially gave up easily upon failure (Quitters) to transform into resilient field fighters (Climbers) who possess strong motivation to complete the floor gymnastics movement sequence challenges fully and correctly.



Figure 2. The gymnastics learning proces through (problem-based learning)

The implementation of Problem-Based Learning (PBL) in floor gymnastics learning, as demonstrated by the student and teacher activities at SMAN 10 Bandung in Figure 2, is a concrete example of a successful innovation in physical education. Through a combination of strategically planned physical obstacles and the supportive role of the teacher as a facilitator, students develop not only physical skills but also essential critical thinking skills.

CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that the implementation of the Problem-Based Learning (PBL) model in floor gymnastics material at SMAN 10 Bandung was associated with a positive and statistically significant improvement in students' Adversity Quotient (AQ). The Paired Samples t-test confirmed a significant difference between the pre-test and post-test AQ scores (Sig. = 0.000; $t = -7.269$), with the mean score increasing from 64.54 to 73.61, and the Cohen's d value of 1.135 indicating a large effect size. This improvement was also reflected in a positive shift in students' AQ categories, in which the proportion of students categorized as Quitters decreased from 12% to 0%, the Camper category declined from 80% to 63%, and the Climber category increased sharply from 7% to 37%.

However, the magnitude of this improvement was relatively limited when examined through the N-Gain analysis, which yielded an average score of 0.2453 (24.53%), falling into the "low" and "ineffective" categories according to Hake's criteria. This finding indicates that although PBL contributed meaningfully to shifting students' AQ profiles toward more resilient characteristics, the intervention had not yet reached an optimal level of effectiveness within the limited timeframe of this classroom action research.

Therefore, these findings suggest the need for longer intervention periods to allow the effects of PBL on students' adversity quotient to develop more optimally, as well as further investigation using stronger research designs—such as quasi-experimental or true-experimental designs with control groups—to more rigorously verify the causal effect of the PBL model on students' AQ in physical education contexts, particularly in floor gymnastics learning.

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