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Comparison of the Effectiveness of Problem-Based Learning and Project-Based Learning Models in Terms of Students' Problem Solving Ability and Math Anxiety

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Abstract

This study aims to describe the effectiveness of problem-based learning and project-based learning models and compare the effectiveness of problem-based learning and project-based learning models in terms of problem solving ability and math anxiety of junior high school students. This research is a quasi-experiment research with pretest-posttest nonequivalent group design. The population size in this study was all VIII grade students in one of the public junior high schools in Yogyakarta. The sample selection used purposive sampling technique. The sample size in this study were VIII C and VIII D students. To test the effectiveness of both learning models, paired t-test and one sample t-test were used. To compare the effectiveness of learning models using MANOVA then continued with Tukey HSD post-hoc test. The results showed that problem-based learning and project-based learning models were effective and problem-based learning model was more effective than project-based learning model in terms of students' problem solving ability and math anxiety.

Keywords: *Problem-Based Learning; Project-Based Learning; Problem Solving Ability; Math Anxiety*

Introduction

The World Economic Forum states that students in the 21st century must have good problem-solving skills. This is in line with the Partnership for 21st Century Skills, an educational institution based in Tucson, Arizona, which identifies that students in the 21st century must have problem solving skills. In the Book on Learning Outcomes (CP) of mathematics subjects in 2022 page 5 and Content Standards Permendiknas No.22 of 2006 places problem solving skills as the goal of learning mathematics.

The National Council of Teachers of Mathematics (NCTM) places problem solving skills as one of the main standards in mathematics learning (NCTM, 2000, p.29). NCTM places problem solving ability as the first order because it plays a role in developing students' understanding, skills, and foundation in mathematics as well as being a very important skill to face challenges in the 21st century. Based on this, it shows that every individual should ideally have good problem solving skills as a provision in facing challenges in the 21st century and especially in achieving success in learning mathematics (Sinaga et al., 2023; Fredy et al., 2021).

But in fact, students' problem solving skills in Indonesia are still relatively low (Attami et al., 2020). Based on TIMSS results in 2011 Indonesia ranked 38 out of 42 countries while in TIMSS 2015 Indonesia ranked 44 out of 49 countries with a score below the TIMSS average of 397 (Mullis et al., (2012) & Mullis et al., (2016). Indonesia's 2018 PISA results ranked 72 out of 78 countries showing the same thing that problem solving skills (OECD, 2018).

Similar results are also shown in statistics material. Based on research by Jr. & Diego (2021) and Fitri et al., (2023) students' problem solving ability in statistics material is still relatively low. One of the causes of low problem solving ability is that the learning model used by teachers does not involve students in the learning process, teachers tend to be the center of learning (Rustella & Chotimah, 2023). According to Son et al., (2019) one of the causes of low problem solving skills is the learning process that tends to be teacher-centered. The learning process that tends to be teacher-centered results in a lack of active student involvement in mathematics learning and ultimately students are less able to develop their skills (Attami et al., 2020).

Another factor that is thought to cause low problem solving ability is student math anxiety (Rizki et al., 2019). According to Rusyda et al., (2021) math anxiety is an emotional condition associated with feelings of displeasure, anxiety, depression, worry, boredom and rejection when discussing math, solving math problems in everyday life or when studying math in class. According to Amam et al., (2019) high math anxiety interferes with student performance such as when learning math and math tests. One of the factors that cause math anxiety comes from environmental factors, such as the mathematics learning model used by the teacher (Deleq et al., 2023). According to Sousa (2015, p.169) teacher-centered learning (explaining-exercise-memorizing) is one of the main sources of mathematics anxiety because it focuses on memorization rather than on understanding concepts and reasoning.

Based on the explanation above, it underlines the urgency of improving problem solving skills as a key step in achieving success in learning mathematics and answering challenges in the 21st century. This is in line with the purpose of mathematics to develop problem solving skills so that they can be a provision to face real-life challenges in the 21st century and achieve success in the academic field, especially learning mathematics. By prioritizing the development of effective problem-solving skills and providing a supportive learning environment to reduce anxiety, educators can help students achieve better outcomes in mathematics, strengthen their academic foundation and open the door to long-term success.

Based on the explanation above, one of the efforts that can be made based on the results of previous research and suggestions from experts is to choose the right learning model. Choosing the right learning model according to the situation and conditions will make it easier for students to understand the material being taught which in turn will have a positive impact on academic success (Wiyono et al., 2021). According to Sousa (2015, p.169); Luttenberger et al., (2018); Ezeddine et al., (2023) and Pimta et al., (2009) choosing a learning model is one of the right ways to improve problem solving skills and control students' math anxiety.

One of the learning models that are thought to improve problem solving skills and reduce students' math anxiety is problem-based learning and project-based learning. According to Tan (2003, p.31) and Varela et al., (2023) problem-based learning and project-based learning models are learning that can improve problem solving skills. Both models encourage students to actively engage in higher-order thinking to construct their own meaning by applying what students have learned (Krauss & Boss, 2013, p.10). According to Stanley (2021, pp. 6-7) both models are inquiry learning where students are encouraged and allowed to let their curiosity about a given statement or problem foster a lot of creativity and higher order thinking.

According to Delisle (1997), the principle of problem-based learning is to educate students by involving them in problems to be solved, students learn through the process of interpreting questions, gathering additional information, creating possible solutions, evaluating options to find the best solution, and then presenting their conclusions. The problems presented can make students activate reasoning

strategies to find solutions to the problems they face so that students are accustomed to formulating hypotheses, analyzing problems and exploring various problem-solving solutions (Hmelo-Silver, 2004).

According to Ummah, et al. (2019) project-based learning encourages students to use knowledge and skills to interpret circumstances and plan appropriate approaches that require students to think critically and creatively find alternative ideas in solving the problems at hand (Ummah, et al., 2019). According to Helle and his colleagues (Tan & Chapman, 2016, p.36) project-based learning allows students to hone and develop problem-solving skills through the reconstruction of knowledge to develop projects and address the problems at hand.

Problem-based learning and project-based learning involve students in solving real-life problems (Tan, 2009, p.11; Tan & Chapman, 2016, p.35). Presenting real-life problems makes students more interested and motivated, which in turn can reduce students' math anxiety (Luttenberger et al., 2018).

Learning with problem-based learning and project-based learning models familiarizes students to be directly involved in the investigation process (Stanley, 2021, p.6). getting students involved directly can increase self-confidence and feel more prepared when facing mathematical challenges. This is in line with Blazer's (2011) opinion that getting students actively involved in the learning process such as exploration, thinking, practicing, and using knowledge, rather than listening to verbal descriptions of concepts can reduce math anxiety. In addition, the collaboration scheme contained in both learning models is thought to reduce students' math anxiety. According to Setyaningsih & Abadi (2018) sharing in groups makes all group members able to achieve the same understanding, so that students with low levels of understanding of the material will be helped more.

The advantages offered by the problem-based learning model include, 1) learning is more meaningful because it connects to the real world, 2) facilitates students to be actively involved in the problem solving process, 3) encourages collaborative learning (Delisle, 1997, pp.8-13), 4) makes students more motivated, 5) achieves more complex understanding, 6) can apply knowledge to new situations, 7) facilitates the development of inquiry (Arends, 2012, pp.403-404), 8) increases students' interest in learning (Kim & Song, 2021). The advantages offered by the project-based learning model include, 1) actively involving students in authentic learning (Tan & Chapman, 2016, p.35), 2) encouraging collaborative learning (Tan & Chapman, 2016, p.39), 3) increasing student motivation as it relates to the real world (Larmer, 2015, p.66). Based on the explanation above, both models present problems as the starting point of learning, collaboration in solving each problem and the advantages of each learning model which gives great hope that both are effective in improving problem solving skills and reducing math anxiety.

Research on problem-based learning models and project-based learning models simultaneously has also been conducted and obtained comparative research results that there is a significant difference between the problem solving ability between groups using problem-based learning models and groups using project-based learning models on high school level statistics material, in this case the use of problem-based learning models is more effective than project-based learning models (Prasekti & Marsigit, 2017). Similar research has also been conducted by Purba (2023) showing that problem-based learning is more effective than project-based learning in terms of problem solving skills.

Ratri & Nurfalah (2023) showed that project-based learning is more effective than problem-based learning on flat-sided space building material. The same research was also revealed by Lase et al (2023) that the project-based learning model is more effective than the problem-based learning model in terms of problem solving skills. Ariyani's research (2017) shows that there is no difference in effectiveness between problem-based learning and project-based learning in terms of problem solving ability in high school statistics material. Based on the complexity above, it can illustrate that research with problem-based learning and project-based learning models needs to be carried out again because the results of previous studies show inconsistencies.

Some studies say there is a difference in effectiveness and others there is no difference in effectiveness, meaning that in previous studies say that problem-based learning is more effective than project-based learning models and in previous studies show project-based learning models are more effective than problem-based learning models, on the other hand the results of previous studies show there is no difference in effectiveness between problem-based learning and project-based learning. This research also needs to be re-examined because in previous studies using materials other than statistics at the junior high school level, so it is necessary to conduct research again to add empirical evidence whether there is a difference in effectiveness between problem-based learning and project-based learning models or not, and if there is a difference in effectiveness between the two models, it will produce more effective research problem-based learning or project-based learning.

Method

This research uses a quantitative approach. This research is a quasi experiment with a pretest-posttest nonequivalent group design. This research was conducted in one of the public junior high schools in Yogyakarta. The population size in this study was all VIII grade students consisting of four classes with the sample size was VIII C and VIII D with purposive sampling technique. Data collection techniques in this study used tests and non-tests. The instruments used in this study were problem solving ability tests and non-tests for students' math anxiety and learning implementation sheets. The test instrument consists of two, namely the pretest of problem solving ability given before treatment and the posttest of problem solving ability after treatment.

The number of pretest and posttest items of problem solving ability is 5 items of description to measure students' problem solving ability. The questions are made based on the grids and indicators that have been made, have answer keys and scoring rubrics that have been validated by expert lecturers. The pretest and posttest questions are certainly different, but still with the same indicators.

The non-test instrument in this study is a student math anxiety questionnaire. The questionnaire consists of 38 statement items. Filling in this questionnaire is in the form of a check to answer the statement and uses a Likert scale. The math anxiety questionnaire was given at the beginning or before treatment and after treatment to measure students' math anxiety. Furthermore, the instrument is calculated to estimate its reliability using the Cronbach's Alpha formula. A variable is said to be reliable if the reliability estimate value is at least 0.65. It was found that the problem solving ability test instrument and non-test for math anxiety exceeded 0.65, which means that the data is reliable so that it can be used consistently.

Data analysis techniques were carried out by descriptive analysis and inferential statistical analysis of the data obtained. Descriptive analysis was carried out by finding the average, standard deviation, minimum score, and maximum score of the data obtained, both for data before treatment, and for data after treatment. The analysis was also carried out to determine the percentage of learning implementation while answering the first effectiveness criterion, namely the percentage of learning implementation exceeding 75%, while the criteria table is shown in table 1. Analysis of problem solving ability data indicators using the minimum completeness criteria (KKM) of 75 shown in tables 1 and 2. While data on students' math anxiety is classified into criteria based on the scoring table for the math anxiety scale in this study with a range of 76.01 to 151.99 shown in table 3.

Table 1. Criteria for learning implementation

Interval	Criteria
$80 < p < 100$	Very good
$60 < p \leq 80$	Good
$40 < p \leq 60$	Simply
$20 < p \leq 40$	Less
$p \leq 20$	Very Less

Table 2. Criteria for Problem Solving Ability

Interval	Criteria
$x \geq 75$	Very High
$58,33 \leq x < 75$	High
$41,67 \leq x < 58,33$	Medium
$25,00 \leq x < 41,67$	Low
$x < 25,00$	Very Low

Table 3. Student Math Anxiety Criteria

Interval	Criteria
$x \geq 151,99$	Very High
$126,67 \leq x < 151,99$	High
$101,34 \leq x < 126,67$	Medium
$76,001 \leq x < 101,34$	Low
$x < 76,01$	Very Low

Inferential statistical analysis of data before treatment using MANOVA with a significance value criterion of more than 0.05 which shows there is no difference in the average between the two experimental classes before treatment. While for the paired t-test and one sample t-test testing stages, MANOVA and Tukey HSD post-hoc tests. The paired t-test and one sample t-test tests were carried out with a significance value test criterion of less than 0.05. The paired t-test test is used for effectiveness criteria, namely the average posttest score is higher than the average pretest score of problem solving ability while the effectiveness criteria for math anxiety is the average pretest score of math anxiety is higher than the average posttest score of students' math anxiety.

Furthermore, the one sample t-test test is used for effectiveness criteria, namely the average posttest score of problem solving ability at least reaches the KKM set by the school, while for math anxiety, namely the average posttest score of students' math anxiety below 126.67. The criteria for the effectiveness of math anxiety below 126.67 have reasons because 126.67 in this study is included in the category below high and very high. This is in accordance with the opinion (Ashcraft & Kirk, 2001) that high anxiety has poor performance.

MANOVA with a significance value less than 0.05 will show that there is an average difference between the problem-based learning class and the project-based learning class. The test is then continued with the Tukey HSD post-hoc test with a significance value less than 0.05 to show which model is more effective in terms of students' problem solving ability and math anxiety.

Table 4. Description of Learning Implementation Percentage

Meeting	PBL Class		PjBL Class	
	Teacher	Students	Teacher	Students
2	100%	100%	93%	90%
3	95%	95%	93%	90%
4	95%	90%	93%	90%
5	95%	90%	97%	93%
6	100%	95%	100%	100%
Average	97%	94%	95%	92%

Table 5. Description of Problem Solving Ability Data

Statistics	PBL Class		PjBL Class	
	Pretest	Posttest	Pretest	Posttest
Average	47,84	78,49	49,26	75,04
Standard deviation	12,28	6,27	11,62	6,26
Ideal minimum value	0	0	0	0
Ideal maximum value	100	100	100	100
Minimum student score	22,50	65,00	25,00	60,00
Maximum student score	68,75	90,00	70,00	87,5

Table 6. Description of Student Mathematics Anxiety Data

Statistics	PBL Class		PjBL Class	
	Pretest	Posttest	Pretest	Posttest
Average	115, 31	88,93	118,44	106,03
Standard deviation	19,38	20,77	18,36	17,33
Ideal minimum value	38	38	38	38
Ideal maximum value	190	190	190	190
Minimum student score	84	56	81	66
Maximum student score	148	129	149	130

Results and Discussion

The data description of the percentage of learning implementation in both problem-based learning and project-based learning experimental classes can be observed in Table 4. It is obtained that the average value of learning implementation in both learning models exceeds 75%. This means that the first effectiveness criterion, namely the percentage of learning implementation exceeds 75% in both classes using problem-based learning and project-based learning, fulfills the first effectiveness criterion. In addition, the percentage of implementation in the two experimental classes were both in the very good criteria.

The description of problem-solving ability data for both problem-based learning and project-based learning classes can be observed in Table 5. Based on table 5, it is obtained that the average value of problem solving ability in both experimental classes is 47.84 and 49.26 before treatment, respectively. After being given the treatment, the two experimental classes were 78.49 and 75.04 respectively. This shows that there was an increase after being given treatment in both experimental classes. Both

experimental classes after being given treatment experienced an increase with the acquisition of an average value of very high criteria.

Description of student math anxiety data shown in table 6. Based on table 6, the average value before treatment in both experimental classes was 115.31 and 118.44 respectively. After being given treatment in both experimental classes respectively 88.93 and 106.03. This shows that after the treatment in both experimental classes experienced a decrease in math anxiety. Both experimental classes after being given treatment experienced a decrease in the average so that it was in the low criteria for experimental classes using problem-based learning models and moderate criteria for project-based learning models.

Before testing the hypothesis of the research results, it is necessary to test the assumptions which include normality test and homogeneity test which can be observed in table 7.

Table 7. Normality Test Results

Class	Pretest	Posttest
PBL	0,179	0,819
PjBL	0,657	0,057

Based on table 7, the pretest data or before treatment and posttest or after treatment, it is found that both experimental classes are multivariate normally distributed. This indicates that the data after treatment is multivariate normally distributed. In other words, for data before treatment and after treatment, the assumption of multivariate normality has been met.

The results of the homogeneity assumption test for the experimental class can be seen in table 8.

Table 8. Homogeneity Test Results

Data	p-value
Pretest	0,968
Posttest	0,247

Based on table 7, it is known that the p-value in each data exceeds 0.05, which means that the pretest and posttest data are homogeneous or in other words the data has fulfilled the homogeneity test.

After knowing that the data is homogeneous, paired t-test testing is carried out to determine whether it meets the second effectiveness criterion. The test results are in table 9.

Table 9. Paired t-test results of PBL class

Aspects	p-value
Problem Solving Ability	0,000
Math Anxiety	0,000

Based on table 9, it is known that each aspect has a p-value below 0.05. This shows that the second effectiveness criterion for problem solving and the second effectiveness criterion for math anxiety are met. This means that the average posttest value of problem solving ability is higher than the average pretest value of problem solving ability and the average pretest value of math anxiety is higher than the posttest value of math anxiety in problem-based learning model learning" is fulfilled.

Furthermore, the paired t-test for testing the second effectiveness of the project-based learning model can be seen in Table 10.

Table 10. Paired t-test results of PBL class

Aspects	p-value
Problem Solving Ability	0,000
Math Anxiety	0,000

Based on table 10, it is known that each aspect has a p-value below 0.05. This shows that the second effectiveness criterion for problem solving and the second effectiveness criterion for math anxiety are met. This means that the average posttest value of problem solving ability is higher than the average pretest value of problem solving ability and the average pretest value of math anxiety is higher than the posttest value of math anxiety in project-based learning model learning" is fulfilled.

Furthermore, one sample t-test was conducted to determine whether the criteria for the effectiveness of the three problem-solving abilities, namely the average posttest score of problem-solving ability, at least reached the KKM set by the school. For the third effectiveness criterion of math anxiety, the average math anxiety posttest score is below the score of 126.67. The test results are in table 11.

Table 11. One Sample t-test results of PBL class

Aspects	T count	Table
Problem Solving Ability	23,402	1,7011
Math Anxiety	-15,537	-1,7011

Based on table 11, it is known that the problem solving ability aspect has t count> t table, meaning that the third effectiveness criterion is met, namely the average posttest score of problem solving ability at least reaches the KKM set by the school. While in the aspect of math anxiety, it is obtained that the t value < t table, which means that the third effectiveness criterion is met, namely the average posttest score of math anxiety below the score of 126.67.

PBL and PJBL models are familiarized to be actively involved in solving problems (Setiawan & Santoso, 2017; Varela et al., 2023). According to Anggiana (2019) problem-based learning helps students in developing problem-solving skills because it gives problems that are related to everyday life at the beginning of each lesson and familiarizes active students to face problems, negotiate problem-solving solutions so that problem-based learning can train students to improve problem-solving skills. In line with Magaji's research (2021) that problems in problem-based learning get students involved in a series of actions to solve them which in turn can improve problem solving skills.

In addition to the problem, collaboration in problem-based learning provides an opportunity for students to share ideas and take responsibility for the problem together. Based on the observation, students were involved in collaboration, sharing ideas and solutions, asking questions with their group mates in the problem-solving process. Nasution et al (2020) found that one of the contributions in developing problem-solving skills is the facilitation of collaboration activities where students discuss with each other to solve the problems given.

In addition, problem-based learning provides opportunities for students to be active, collaboration that can reduce students' math anxiety. This is in line with Blazer (2011) active involvement, collaboration and higher order thinking can reduce students' math anxiety. Ansari & Wahyu (2017) found that collaboration allows students to avoid high math anxiety because students are more free to discuss both with colleagues and teachers about material that has not been fully understood.

The project-based learning model is able to improve problem solving skills because project-based learning offers a learning process that encourages students to think and act based on the design of a project. In addition, students develop a defined plan, provide a solution to a question, and students learn different ways to solve problems by using various sources and contacting people from different perspectives and skills to answer questions based on the design of a project. According to Varela et al. (2023) which states that in answering a question from the project design, students are required to collaborate in a way that they learn from each other in their groups to answer the questions given.

The results of research by Fatimah, et al. (2023) stated that the project-based learning model facilitates the formation of a group. The group helps students to better understand, exchange ideas, discuss. This is also in line with the findings of Nurfitriyanti (2016) which states that by applying the project-based learning model students face a question or problem, exchange knowledge, and also complement each other's shortcomings so as to make learning outcomes and problem solving skills increase.

In addition, project-based learning provides opportunities for students to be actively involved in the learning process that requires students to apply mathematical concepts, in other words, students do not only listen to lectures or read mathematical theories, but students actively use their abilities in finding solutions to complete the project. The active involvement of students can provide opportunities to hone skills which in turn can provide more confidence when facing other problem challenges which can ultimately reduce students' anxiety about math (Blazer, 2011).

Learning with project-based learning is done collaboratively in each learning step which is strongly suspected to help reduce students' math anxiety. According to Setyaningsih & Abadi (2018) collaboration can create a learning environment that supports and helps each other. Students work in groups to complete projects so as to provide opportunities between students to provide emotional support and knowledge. When students work together, they can exchange ideas, solve problems and share responsibilities, which reduces individual pressure.

Furthermore, the comparison of the effectiveness of problem-based learning and project-based learning models in terms of students' problem solving ability and math anxiety was carried out by MANOVA test. The results of the MANOVA test to see the difference in effectiveness between the two learning models show that the p-value is 0.000. Based on the test results, it can be concluded that the data after treatment has a significance value smaller than 0.05. This means that the two classes have an average difference for both aspects measured with the learning model as a fixed factor.

In MANOVA testing on data before treatment, it is known that there is no difference in average between the two classes or it can be said that the initial ability of the two classes is statistically the same. This is indicated by a p-value of 0.060 greater than 0.05. The average difference after the treatment is due to the different treatment of the two classes. This indicates that the use of different models for the two sample classes caused the average difference between the two sample classes.

After it is known that there is a difference in effectiveness between the two approaches, a post-hoc tukey HSD test will be conducted to see which aspects distinguish the two learning models. The results of the tukey HSD post-hoc test are in tables 12 and 13.

Table 12. Tukey HSD Post-Hoc Test Results Problem Solving Ability Aspects

Class	diff	lwr	upr	p-value
PjBL-PBL	-2,762	-5,377	-0,146	0,039

Table 13. Results of Tukey HSD Post-Hoc Test for Mathematics Anxiety Aspects

Class	diff	lwr	upr	p-value
PjBL-PBL	-2,762	-5,377	-0,146	0,039

Table 12 and Table 13 show that problem-based learning is superior to project-based learning in terms of students' problem solving ability and math anxiety. The advantages of problem-based learning and project-based learning models in terms of problem solving ability and math anxiety can also be observed in Figure 1 and Figure 2 below.

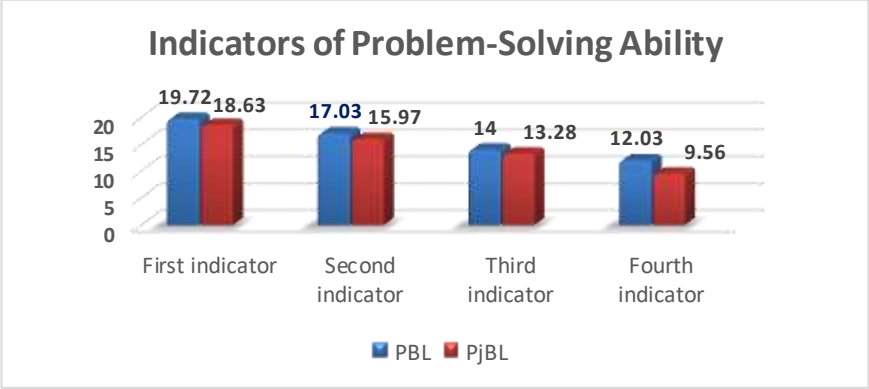

Figure 1. Average comparison of each indicator of problem solving ability

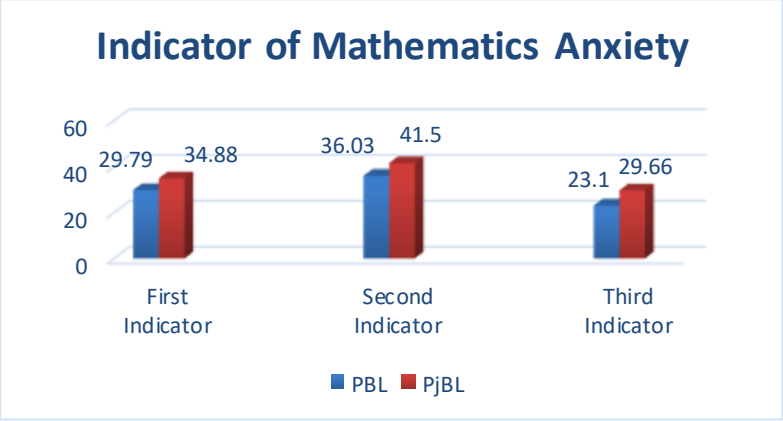

Figure 2. Average comparison of each indicator of mathematics anxiety

The problems given in the problem-based learning class are more when compared to the problems in the project-based learning class. In addition, in the project-based learning class, students are less directed to the problem, because the main focus of learning is more directed to project assignments that use the same data at each meeting so that it does not familiarize students to practice in solving problems with different data. In addition, the contribution of steps in the problem-based learning model adopted by Arends & Kilcher (2010) is more structured and focused on problem solving.

On the other hand, in project-based learning, there is a step where students need to focus on project planning where students need to plan the tools and materials and the schedule step which indicates that students are not required to focus on the problem-solving process but focus on the project design.

In addition, students must think about how to use technology (Canva) as a support to create infographics as a final product. It is likely that some students are not proficient in using Canva so they need to learn it. It is suspected that this distracts from the deeper problem-solving process than the problem-based learning model which structurally provides steps that facilitate the in-depth problem-solving process.

In addition, the problem-based learning model is superior in terms of students' math anxiety. This is thought to be because learning using problem-based learning facilitates all students to engage in a deep problem-solving process that allows all students to be more trained and allows students to increase confidence in their cognitive abilities so that anxiety in the first indicator can be reduced. According to Luttenberger et al., (2018) stated that self-confidence as a result of confidence in their abilities which ultimately reduces students' math anxiety.

Conclusion

The conclusion of this research is that problem-based learning and project-based learning models are effective in terms of students' problem solving ability and math anxiety based on the fulfillment of the three effectiveness criteria. Problem-based learning model is more effective than project-based learning model in terms of students' problem solving ability and math anxiety.

Based on the results of the research and discussion, suggestions that can be conveyed are the measurement of students' problem-solving abilities and mathematics anxiety in learning mathematics with problem-based learning and project-based learning models should be carried out continuously and carried out by expanding the material used in the study. problem-based learning and project-based learning models can also be used as one of the learning models that teachers can use in the learning process, especially in statistics and other materials to improve problem-solving abilities and reduce students' mathematics anxiety. In addition, related to further research, it is hoped that similar research is needed using a wider population, thus enabling broader generalization.

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