

THE EFFECT OF PROBLEM BASED LEARNING ON STUDENTS' MATHEMATICS DISPOSITION REVIEWED FROM GENDER

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Abstract

The purpose of this study was to determine the mathematical disposition of students who obtained the Problem Based Learning (PBL) learning model with students obtained the conventional learning models in terms of gender (male and female) in MTsN Tanah Datar District. This type of research is an experimental study in which the research design used is Randomized Pretest-Posttest Control Group Design. Sampling was done by purposive sampling and a sample of 146 students was chosen. The research instrument used was a mathematical disposition questionnaire consisting of 30 statements. Data processing techniques were performed using t-test, U-test and two-way ANOVA test. From the research results, it is known that: (1) The mathematical disposition of students who learn with PBL models is higher than students who learn with conventional models. (2) The mathematical disposition of male and female students who study with PBL models is higher than those who learn with conventional models. (3) The mathematical disposition of female students is higher than that of male students 'mathematical dissociation (4) There is no interaction between learning models and gender in influencing students' mathematical dispositions.

Keywords: mathematical disposition, gender, Problem Based Learning model

1. INTRODUCTION

Mathematical disposition is an important part of the curriculum of mathematics. Mathematical disposition is a tendency to behave, act or behave towards a particular treatment. These tendencies naturally form certain patterns of attitudes or behavior in a person [4]. This mathematical disposition consists of mathematical soft-skills and basic mathematical competencies that need to get the teacher's attention in the implementation of learning process [7]. The statement is in accordance with the mathematics learning guidelines in the 2013 curriculum, namely that the development of soft skills and mathematical hard skills must be carried out simultaneously and equally.

Mathematical disposition is similar to values and characters and other mathematical soft skills and cannot be taught, but is actively and continuously developed [7]. However the reality on the ground shows that the mathematical disposition in the process of learning mathematics has not been actively developed. Though mathematical disposition is a basic competency in mathematics.

The facts show that the low mathematical ability of students in Indonesia, especially junior high school students, is still not satisfactory. This can be seen from the results of the 2015 Program for International Students Assessment (PISA)

which shows Indonesia ranked 63 out of 69 countries and the 2015 Trends in International Mathematics and Science Study (TIMSS) which recorded that Indonesia ranked 45th from 50 countries. Related to this problem, the low mathematical ability of students needs to get serious attention from all groups in the school, especially mathematics teachers. The the low mathematical disposition, can also be seen when the authors make observations and interviews with teachers and some eighth grade students at MTsN, Tanah Datar District. Based on the results of interviews conducted with mathematics teachers, it is known that the interest in learning mathematics is still very low, students are not eager to solve mathematical problems and students have low self-confidence when they are assigned to submit the results of their discussions, where it can be seen from the still many students who refuse to do it. This is supported by the results of interviews with several students at MTsN Tanah Datar, where the average student states that mathematics is an abstract lesson and is not useful in life so many of them do not like learning mathematics. Based on the statement above, it can be concluded that the mathematical disposition of students in MTsN Tanah Datar is still low.

Based on Permendikbud No. 65 of 2013 concerning Process Standards, to encourage students' ability to produce contextual work, both individually and in groups, it is strongly recommended to use a learning approach that produces work based on problem solving [12]. Therefore, the authors chose the PBL learning model as an alternative mathematical learning model that is in accordance with the 2013 curriculum and is assumed to be able to solve problems that occur in all MTsN in Tanah Datar District. PBL learning model is considered to be able to increase students'

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mathematical disposition. This is based on the results of existing research which states that the mathematical disposition of students taught with the PBL model is higher than students taught conventionally [8] [2] [3] [5] [15].

Another factor besides the PBL model that can affect students' mathematical problem solving abilities is gender. Gender differences naturally lead to physiological differences and psychological differences in learning. According to Eisenberg, Martin and Fabes, there are mixed findings in research about mathematical abilities. In some analysis, boys are better at mathematics [16]. Men consistently report slightly more positive perceptions of the classroom environment compared to women [11]. The importance of this research on gender is due to the fact that is happening in the field, based on data on student semester grades and the results of interviews with mathematics teachers, it is found that the learning achievement or mathematics scores of female students are better than male ones. This contradicts the theory and the results of the research found that the mathematical ability of male students is better than female students.

The author in this study examined the use of PBL models in class VIII MTsN on circle material. In addition, researchers also examined the effect of the PBL model on the mathematical disposition of MTsN students in Tanah Datar District in terms of gender. Based on the description above, the purpose of this study is to see whether there is an influence of the PBL Learning Model on the Mathematical Disposition of Students reviewed from Gender in MTsN Tanah Datar District

2. RESEARCH METHOD

This research is an experimental research that places mathematical disposition as the dependent variable, the learning model as the independent variable and gender as the moderator variable. The learning model applied in this study is PBL (X1) as the experimental class and the conventional model (X2) as the control class, while gender variables are classified as male and female.

Table 1. Research Design

Modertor Variable	Mathematics Disposition (Y ₁)	
	Experiment (X ₁)	Control (X ₂)
Gender	Male (A ₁)	X ₁ Y ₁ A ₁
	Famale (A ₂)	X ₁ Y ₁ A ₂

The study was conducted on VIII grade students at MTsN Tanah Datar District. The study was conducted during second semester of the 2019/2020 school year. The instrument of students' mathematical disposition was by using a questionnaire with 30 items of validation. The data obtained were then analyzed using the SPSS application. While for the

analysis conducted is in the form of descriptive statistical analysis, test data requirements which include normality and homogeneity tests, and hypothesis testing with t-test and two-way ANOVA.

3. RESULTS AND DISCUSSION

In this study, research was conducted on the level of mathematical disposition of students from male and female genders. The results of calculating the N-gain score on students' problem solving abilities are described in table 2.

Table 2. Descriptive Statistics of Student N-Gain Mathematical Disposition Scores Based on Gender

Characteristic	Mathematics Disposition			
	Male		Famale	
	Exp (X ₁)	Control (X ₂)	Exp (X ₁)	Control (X ₂)
N	37	33	39	36
Min	0,19	0,07	0,09	0,12
Max	0,47	0,32	0,57	0,45
\bar{x}	0,30	0,19	0,32	0,25

The results of students' mathematical disposition questionnaire given to the sample class indicate that the average mathematical representation in the experimental class is higher than the control class. The standard deviation of the experimental class is also higher than the control class. In this study, it is also seen the level of mathematical disposition of students in MTsN Tanah Datar District, from the gender of men and women, and whether the ability to solve mathematical problems of male students is higher than female students.

Table 3. Results of the Mathematical Disposition Hypothesis Test

	Mathematics Disposition			
	Students of MTsN	Male	Famale	Male> Famale
Asy.	0,00	0,00	0,00	0,130
Sig				

Based on table 3, a significant value of students' mathematical disposition in the MTsN of Tanah Datar district is 0.00. Therefore it can be concluded that there are differences in the mathematical disposition of students taught with the PBL model and students taught with the conventional model in MTsN in Tanah Datar District. This is supported by the average mathematical disposition of male or female students who learn to use the PBL model is better than students who study with conventional models. In contrast to that, it can be seen also

about the significant value for the mathematical disposition of male students is higher than female students where it is known from the significant value obtained is 0.130 so it can be concluded that the mathematical disposition of male students is no better than female students.

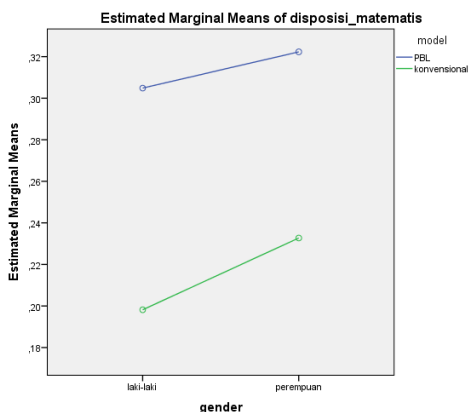


Figure 1. Mathematical Disposition Viewed from the Learning Model and Gender

Based on Figure 1, it can be seen that there is no interaction between learning models and gender in influencing students' mathematical dispositions. Many things cause the success of a learning process. One of them is the use of learning strategies in the learning process. The purpose of the learning strategy itself is to create a form of teaching with certain conditions so that it can help the teaching and learning process in order to create an effective, efficient and attractive learning process. PBL is one model that can be used to achieve the success of a learning where PBL is a learning model that is relevant to the demands of the 21st century.

The mathematical disposition of students who learn with the PBL model is higher than students who learn using conventional models. PBL models greatly affect students' mathematical disposition where this is supported by the results of research that show that the mathematical disposition of students taught with PBL models is higher than students taught with conventional models [8]. This finding is supported by the characteristics of the PBL model where PBL is a collaborative, communicative and cooperative learning model [13] so that by applying the PBL model, it can increase student activity during the learning process so that the mathematical disposition of students will also increase. The increasing mathematical disposition of students who learn by using the PBL model can be seen based on the graph in Figure 2.

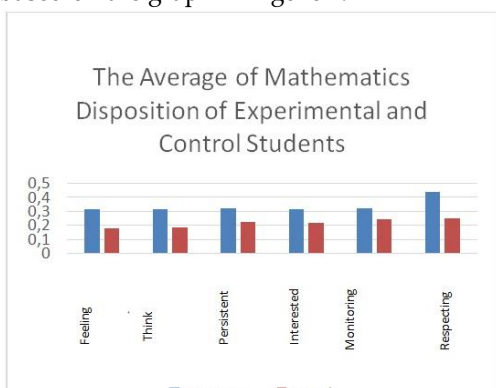


Figure 2. Average of Mathematical Disposition Indicators in Experimental and Control Class Students

Improved mathematical disposition of students who learn to use the PBL model compared to conventional models, where indicators of self-confidence, it is found that students argue if there are opinions that conflict with the opinions of other students regarding the answers to the questions presented in front of the class. This finding is supported by one of PBL's steps in developing and presenting the work and helping students to share assignments with their friends [17]. For the second indicator, which is flexible thinking, it was found that it was much more important for students to get the correct results than to do the procedure or step in working on the problem correctly. For persistent indicators, it was found that students would try to find solutions to the problems given regardless of the actual students also experiencing various difficulties. In the indicator of interest, it was found that students asked the teacher / friend when students had difficulty in determining the strategy for solving the problem given by the teacher. In addition, students also feel very satisfied when successfully finding solutions to the problems that for him are challenging. Furthermore, in monitoring indicators, it was found that if the answers found by students obtained were different from those of their friends, then students would discuss to check the truth and find the location of the errors of the two answers until they found the correct solution. In respecting indicators, it was found that students felt mathematics was an important lesson to learn. This happens because PBL learning is a learning model in which there are also issues relating to daily life [6].

The mathematical disposition of male students who learn with the PBL model is higher than those who learn with the conventional model. The PBL model greatly influences the mathematical disposition of male students. This is evident from the results obtained by students in the experimental class is higher than the control class students. Increased mathematical disposition of male students occurs along with the application of the PBL model. This is because students are required to be active in this learning process where the findings are supported by the statement that male students have aggressive characteristics [1].

The mathematical disposition of female students who learn with PBL models is also higher than those who study using conventional models. The PBL model greatly influences

the mathematical disposition of female students. This is evident from the higher results obtained by students in the experimental class compared to students in the control class. The increasing mathematical disposition of students in the experimental class is also supported by the results of research that women have characteristics that like to work together and talk more that fits the PBL model that requires students to work together in groups to solve a problem [1].

The mathematical disposition of female students is higher than that of male students which means this is not in line with theory, namely male students consistently report more positive perceptions than female students [11]. PBL learning is a collaborative, communicative and cooperative learning. PBL learning requires students to be active in following the learning process. Related to this, the PBL model is considered suitable with the learning characteristics of female students since they have more ability and skills to have relationships between people, both in terms of having a conversation and also giving information when compared with male students [9]. Therefore the mathematical disposition of women is better than that of men. Likewise, this finding is also supported by the results of research that women generally excel in the field of language and writing, where PBL is learning that requires students to be portrayed; speaking [14] and writing in handling problem solving and having good organizational and communication skills [10]. In addition, women have a high interest in learning mathematics [18].

There is no interaction between learning models with gender in influencing students' mathematical disposition. The PBL model has no effect on students with male and female genders related to the mathematical disposition they have. The problem-solving abilities of male and female students who learn with PBL and conventional models give results that are not much different. This is contrary to the theory in general that states that female students have more ability and skills in making relationships between people, both in terms of conversation and information exchange when compared with students with male gender [9]. The difference between theory and reality found in the field is caused by the PBL model being able to balance the mathematical disposition of male and female students considering that PBL is a collaborative, communicative, and cooperative learning that requires students to always be active during the learning process.

4. CONCLUSION

The mathematical disposition of students who learn with PBL models is higher than students who learn with conventional models, both male and female students. Besides, the mathematical disposition ability of male students is not better than female students. It is also known that there is no interaction between learning models with gender in influencing

students' mathematical disposition.

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REFERENCES

- [1] Arief, Mufardisah. 2017. " Hubungan Gaya Belajar Berdasarkan Gender [1] Arief, Mufardisah. 2017. " Hubungan Gaya Belajar Berdasarkan Gender dengan Hasil Belajar pada Mahasiswa Teknologi Pendidikan Universitas Negeri Malang" 1 (1). Jurnal Kajian teknologi Pendidikan. MUD History <http://journal2.um.ac.id/index.php/jktp/article/view/3388>
- [2] Dedeh Tresnawati Chorodah, dkk. 2013. "Peran Pembelejaraan Berbasis Masalah Untuk Meningkatkan Kemampuan Komunikasi dan Disposisi Matematis Siswa SMA" 2 (2) . Infinity Jurnal. MUD History. <http://e-journal.stkipsiliwangi.ac.id/index.php/infinity/article/view/35>
- [3] Dita Mariyanti Dewi, dkk. 2019. "Pengaruh Disposisi Matematis Terhadap Pembelejaraan Problem Based Learning pada Siswa SMK di Kota Cimahi Kelas X" <https://jonedu.org/index.php/joe/article/download/130/110/>
- [4] Elda Herlina. 2013. Meningkatkan Disposisi Berpikir Kreatif Melalui Pendekatan APOS. 2 (2). MUD History. <http://e-journal.stkipsiliwangi.ac.id/index.php/infinity/article/download/33/32>
- [5] Eris Siti Zaozah, dkk. 2019. "Kemampuan Pemecahan Masalah dan Disposisi Matematis Siswa Menggunakan Pendekatan Problem Based Learning" 2 (1). Jurnal Pena Ilmiah. MUD History. <https://ejournal.upi.edu/index.php/penailmiah/article/view/11214>
- [6] Fida Rahmatiak Hadi. 2016. " Penerapan Pembelajaran Problem Based Learning (PBL) Untuk Meningkatkan Hasil Belajar Matematika Siswa Kelas IV Sekolah Dasar" 3 (2). Profesi Pendidikan Dasar. MUD History. <http://journals.ums.ac.id/index.php/ppd/article/view/2925>
- [7] Hendriana, Heris, dkk. 2018. Hard Skills dan Soft Skills Matematis Siswa. Bandung: PT Refika Aditama
- [8] Husnidar, dkk. 2014. "Penerapan Model Pembelajaran Berbasis Masalah untuk Meningkatkan Kemampuan Berpikir Kritis dan Disposisi Matematis Siswa". Jurnal Dikdik Matematika. MUD History. <http://www.jurnal.unsyiah.ac.id/DM/article/view/1340>
- [9] I Nyoman Surna dan D.Pandeirot, Olga. 2014. Psikologi pendidikan. Jakarta: Erlangga.
- [10] Ludmila A. Auhadeeva, dkk. 2016. " Gender Characteristics of Communicative Culture in Future Teachers" 11 (4). IEJME-Mathematic Education. MUD History <https://www.iejme.com/download/gender-characteristics-of-communicative-culture-in-future-teachers.pdf>
- [11] N. Hoang, Thienhoung. 2008. "The Effects Grade Level, Gender , and Ethnicity on Attitude and Learning Enviroment in Marhematics in High School". International elcetric Journal of Mathe,atic Education, 3(1)
- [12] Peraturan menteri Pendidikan dan Kebudayaan Republik

- Indonesia <http://bsnp-indonesia.Salinan-Permendikbud-No.-65-th-2013-ttg-Standar-Proses.pdf> (diakses 3 November 2019)
- [13] Rusman. 2017. Belajar dan Pembelajaran Berorientasi Standar Proses Pendidikan. Jakarta : Kencana
- [14] Siska Chindy Dilla, dkk. 2018. "Faktor Gender dan Resiliensi dalam Pencapaian Kemampuan Berpikir Kreatif Matematis Siswa SMA" 2 (1) MUD History https://www.researchgate.net/publication/333102991_KE_MAMPUAN_BERPIKIR_KREATIF_MATEMATIKA_DENGAN_MODEL_PEMBELAJARAN_MISSOURI_MATHEMATICS_PROJECT_MMP
- [15] Syafti, Oktaviani, dkk. 2019. "Peningkatan Disposisi Matematika Mahasiswa STKIP Pesisir Selatan pada Mata Kuliah Statistika Dasar dengan Penerapan Model Problem Based Learning" 4 (2)MUD History. https://www.researchgate.net/publication/336698392_PENINGKATAN_DISPOSISI_MATEMATIKA_MAHASISWA_STKIP_PESISIR_SELATAN_PADA_MATA_KULIAH_STATISTIKA_DASAR_DENGAN_PENERAPAN_PROBLEM_BASED_LEARNING
- [16] W. Santrock, John. 2015. Psikologi Pendidikan. Jakarta: Kencana
- [17] Yuyun Dwi Haryanti. 2017. " Model Problem Based Learning Membangun Kemampuan Berpikir Kritis Siswa Sekolah Dasar" 3 (2). MUD History. https://www.researchgate.net/publication/336276327_MODEL_PROBLEM_BASED_LEARNING_MEMBANGUN_KEMAMPUAN_BERPIKIR_KRITIS_SISWA_SEKOLAH_DASAR
- [18] Yurhands Dissou Arthur, dkk. 2017. " Gender Stereotype and Motivation in Learning Statistics among Tertiary Students in Ghana" 11 (3). MUD History. https://publikationen.uni-tuebingen.de/xmlui/bitstream/handle/10900/79405/Eike%20Wille_Gender%20Differences%20in%20Math-Intensive%20STEM%20Fields.pdf?sequence=1&isAllowed=y