ANALISIS TERHADAP PENCAPAIAN MATEMATIS SISWA BERDASARKAN GAYA BELAJAR

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Abstrak

Penelitian deskriptif dan komparatif ini bertujuan untuk melihat gaya belajar siswa SMP dan hasil belajar matematis mereka. Responden terdiri dari 50 siswa SMP di Lembang, Bandung Barat, Indonesia. Instrumen penelitian adalah Perceptual Learning Style Preference Questionnaire (PLSPQ) dan tes kemampuan pemecahan masalah matematis siswa. Hasil penelitian ada empat: (1) Hanya 20 persen siswa yang memiliki tepat satu gaya belajar, dan kebanyakan siswa memiliki gaya belajar kinestetik; (2) Siswa yang memiliki tiga gaya belajar atau kurang menunjukkan pencapaian matematis yang baik, dan siswa yang hanya memiliki gaya belajar minor menunjukkan pencapaian matematis yang secara rata-rata lebih baik dari siswa-siswa yang memiliki gaya belajar major; (3) Siswa-siswa menunjukan pencapaian matematis yang lebih baik saat mereka lebih dari satu gaya belajar; (4) Tidak terdapat perbedaan pencapaian matematis siswa yang signifikan, antara siswa yang memiliki tiga gaya belajar major atau kurang dan siswa-siswa yang memiliki lebih dari tiga gaya belajar major.

Kata Kunci: gaya belajar, pencapaian matematis, plspq

ANALYSIS ON STUDENTS' MATHEMATICS ACHIEVEMENT BASED ON LEARNING STYLES

Abstract

This descriptive and comparative study aims to see the students learning styles and mathematics achievements. The Respondents are fifty junior high school students in Lembang, West Bandung, Indonesia. The research instruments are Perceptual Learning Style Preference Questionnaire (PLSPQ) and mathematics problem solving test. The result of this study are: (1) Only twenty percent of the students have exactly one learning style and most of the students has kinesthetic learning style; (2) Students who have three or less major learning styles perform good mathematics achievement, and students who have minor learning styles only, perform better mathematics achievements averagely, comparing with students who have major learning styles; (3) Students perform better mathematics achievement when they have more than one learning style, (4) There is no significant difference in the students' mathematics achievement, between students who have three or less major learning styles and students who have more than three major learning styles.

Keywords: learning style, mathematics achievement, plspq

1. Introduction

Learning is an important activity that all human should do. Either children, productive age or old age, with different capacity. One way of learning for school age children is through learning in school, either in elementary school, high school or college or university. The variation in the student background and characteristic will lead to various learning style.

Learning style is one characteristics student have since he or she was born (Çalışkan & Kılınç, 2012), used to identified perception style, reaction and interaction in a learning environment (Övez & Uyangör, 2016). More further, learning style show how students absorb, arrange and process the information they received (Wassahua, 2016), or how students understand, set and maintain their learning experience (Reid, 1987). According to (Reid, 1987) there are six group of learning style, that are: Auditory, kinesthetic, group, visual, tactile and individual. The brief explanation of each learning style are: (1) Students who have auditory learning style will learn more effectively through their sense of hearing, (2) Student who has kinesthetic learning style will learn more

effectively through total physical involvement in learning, (3) Student with group learning style will learn more effectively through learning with friends, (4) Student who have visual learning style will learn more effectively through his sense of sight, (5) Student with tactile learning style will learn more effectively through hands-on activity, and (6) students with individual learning style will learn more effectively in learning alone. Previous research shows that student can have more than one learning style (Saija, 2020). Another researches finding shows that there is a relationship between student learning style and student learning achievement (Bosman & Schulze, 2018)(Jhaish, 2010).

Learning achievement interpreted by Sudjana (2004) as ability that student has after he went through the learning process (Nurhayati, 2014). Further, learning achievement is a benchmark which determine the student level of success in terms of the student knowledge and experience towards a subject (Syukur, M., Misu, 2014). For example, after student went through a learning process for a material in mathematics learning, then the student ability for that material is called the student learning achievement. Ability in mathematics learning is called as mathematics ability, which is divided into five abilities according to NCTM, that are: Mathematics communication ability, mathematics connection ability, mathematics reasoning ability, mathematics problem solving ability and mathematics disposition (Saija, 2012).

Many studies were made aimed to increased student mathematics achievement, and the findings shows that all applied learning strategy can enhance the students' mathematics achievement. Furthermore, many studies were made to see the relationship between student learning style and student mathematics achievement (Bosman & Schulze, 2018) (Rahman & Ahmar, 2017) (Syukur, M., Misu, 2014). Researches made towards the learning style of junior high school students in Bandung, and more studies aimed to enhance their mathematics ability, but this study will analyze the students' mathematics achievement based on their learning style, specifically junior high school students in West Bandung, Indonesia.

2. Method

This descriptive and comparative study conducted in West Bandung. The research respondents are 50 junior high school students in West Bandung. The research instruments are questionnaire and test. To determine student learning style the questionnaire used is Perceptual Learning Style Preference Questionnaire made by (Reid, 1987) with 30 statements and five respond options: strongly agree (scored 5), agree (scored 4), undecided (scored 3), disagree (scored 2) and strongly disagree (scored 1). This questionnaire and the distribution of the statement numbers for each learning style and the categories, major, minor or negligible are adapted from C.I.T.E Learning styles instruments. (Muhtar, 2001)

To determine the student mathematics achievement, a test of mathematics problem solving ability is used. The test contained 5 essay mathematics problem solving problems and scored using an appropriate rubric for problem solving test. Before the test was used as a research instrument, the validity and reliability of the test were tested. The validity test shows that the test items were valid and the test has a very high reliability.

The descriptive and comparative analysis divided into four parts, that are: Students learning style, students' mathematics achievement based on number of major learning styles (MLS) students have, and students' mathematics achievement based on each of students' major learning style, Visual (V), tactile (T), auditory (A), kinesthetic (K), group (G), or individual (I), and comparative analysis for student mathematics achievement, between those who have lesser than 3 and more or equal three major learning styles. For comparative study, the analysis will be based on different between two means test, with normality and homogeneity test as the pre requisite tests. The normality test will lead to the use of either, t-test as parametric test or Mann Whitney test as nonparametric test.

3. Results and Discussion

3.1 Results

a. *Students' Learning Style*

The first result is according to the students' major learning style (MLS) will answer the question: Do each of the student has one learning style only or students can have more than one major learning style?

Table 1. Students' Major Learning Style

	1 MLS	2 MLS		3 MLS		4 MLS		5 MLS		6 MLS	0 MLS
I	0	GK	3	IVG	1	ITAG	1	IVAGK	2	1	4
V	0	AK	5	IGK	1	VTGK	1	ITAGK	1		
T	1	IG	1	IAG	2	TAGK	2	VTAGK	3		
A	1	IK	2	VGK	1	ITAK	1				
G	3	AG	1	ITA	1	VAGK	1				
K	5			IAK	1	IVTA	1				
				TAG	1						
				AGK	2						
n_1	10	n_2	12	n_3	10	n_4	7	n_5	6	n_6 1	n_7 4

It can be seen from Table 1 that there are only 10 (20%) students have exactly one major learning style (MLS), while 12 (24%) students have two, 10 (20%) students have three, 7 (14%) students have four, 6 (12%) students have five, 1 (2%) student have six and 4 (8%) students have no MLS. From students with one MLS, 50% have kinesthetic learning style, 30% group and 10% for auditory and also tactile. From students with two MLS, 10 out of 12 (83.3%) students have kinesthetic and 5 (41.7%) have group as one of the two MLS. From students with three MLS, 5 out of 10 (50%) students have kinesthetic and 8 (80%) students have group as one of the three MLS. More further, 5 out of 7 (71.4%) students have kinesthetic and the same percentage for group as one of the four MLS, while 100% of the students with five MLS have both kinesthetic and group learning styles. Deeper analysis on the data in table 1 showed that most of the students (64%) have kinesthetic learning style.

b. Students' mathematics achievement based on the number of MLS

This result will answer another question, when student have more than one MLS, will it increase the student mathematics achievement? Table 2 showed the data to answer this question.

Table 2. Students' Mathematics Achievement Based on the Number of MLS

Number of MLS	Number of student	Mean	St. Deviation
1	10	62	16
2	12	65	17.33
3	10	65	17.18
4	7	54	22.43
5	6	56	24.80
6	1	56	0
0	4	70	14.27

The result in Table 2 shows that the mathematics achievement of the students with two or three MLS at average are higher than those who have only one MLS. But, the average mathematics achievement of students with more than three MLS tends to decreased, and the standard deviation increased. Result also shows that students with all six learning style, perform lesser mathematics achievement, comparing with students who have only one, two or three MLS, this result will be analyzed further in the next section. Another result is that the students with no MLS, or students with minor learning style have better performance than students with one or more MLS.

c. Students' mathematics achievement based on student' learning style

The mathematics achievement of students based their learning styles is given in below table

Table 3. Students' Mathematics Achievement Based on Learning Style

	MLS	K	G	A	T	V	I
+ 0 MLS	n	5	3	1	1	0	0
	mean	54	66	72	82	-	-
+ 1 MLS	n	5	3	3	0	0	4
	mean	61	71	73	-	-	60
+ 2 MLS	n	4	7	8	3	3	5
	mean	62	66	66	63	50	76
+ 3 MLS	n	5	4	5	5	3	4
	mean	59	43	57	55	48	58
+ 4 MLS	n	6	8	6	4	5	3
	mean	56	57	56	63	55	50
+ 5 MLS	n	1	1	1	1	1	1
	mean	56	56	56	56	56	56
Over all Mean		58.07	59.88	62.33	61	52.08	62.24

The result analysis of above table is divided into six sections according to the learning style

1) The kinesthetic students' mathematics achievement averagely increased when the students have one or two other MLS, but it decreased when thy have more than three MLS.
2) Students who have group learning style in this study showed that averagely their mathematics achievement fluctuate when they have one or two more MLS, but it decreased when the students have more than three MLS.
3) Students with auditory learning style perform better in learning mathematics when they have one or two other MLS, but the achievement are decreased when they have more than 3 MLS.
4) Students with tactile learning style in this study has better mathematics achievement averagely when they have is no other MLS.
5) There is no student with visual learning style only, and averagely students who have visual learning style plus two or more MLS have lower mathematics achievement comparing with the achievement of students who have kinesthetic, group, auditory or tactile learning style.
6) Like as in the visual learning style, there are no students with individual learning style only, averagely students who have the combination of three learning style, including individual learning style have better mathematics achievement

d. *Comparative Analysis*

Comparative analysis was done to see whether there is a significant difference for student mathematics achievement, between those who have three or less MLS and more than three MLS. This analysis is based on the finding that there are more students who have three or less MLS, comparing with the number of students with more than three MLS. The normality test was done first to choose whether to use the parametric or non-parametric test. table 4 shows the result of the normality test.

Table 4. Saphiro Wilk Normality Test

Group	Statistic	df	Sig.
123 MLS	0.941	32	0.078
456 MLS	0.946	14	0.501

Since both significant values are greater than 0.05 (alpha), the population of the students' mathematics achievement for three or less MLS and more than three MLS are normally distributed and t-test was used for different between means test. The homogeneity test result presented in table 5.

Table 5. Test of Homogeneity of Variance

	Levene Statistic	df1	df2	Sig.
Based on Mean	3.105	1	44	0.085

Since the significant value is greater than 0.05 (alpha), it can be concluded that both of the populations of students' mathematics achievement (who have three or less MLS and more than three MLS) variances are homogeny. The result of the different between means test presented in table 6.

Table 6. Different Between Means Test

	t-test for Equality of Means						
	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
						Lower	Upper
Equal variances assumed	1.841	44	.072	10.080	5.475	-.954	21.114

The significant value is greater than alpha (0.05). This means that there is no significant difference in the average mathematics achievement, between students who have three or less major learning style and students who have more than three major learning styles.

3.2 Discussion

Most of the students in this study have kinesthetic learning style. This result is accordance with the result from the previous study on junior high school students who learn mathematics in Bandung, West Java (Saija, 2020). But this finding is not accordance with (Arifin, 2015) study in Madiun, East Java, that most of the junior high students have group learning style which influence by one of the tradition of Indonesian people called "gotong royong" or working together. More further, the result that student who have kinesthetic learning style has lower problem solving ability comparing with student with auditory learning style is in accordance with the result in the previous study towards the junior high school students in Baturaden, East Java (Mursari, 2020) and towards senior high school students in Ngabang, West Kalimantan (Willia et al., 2020).

Another result in this study is that the students with no major learning style, or students with minor learning styles only have better performance or mathematics achievements comparing with students with one or more major learning styles. This result is congruent to Reid's observation that students with minor learning style can possibly perform better because the minor learning styles indicate the areas where students can function well as a learner (Reid, 1987).

The study result also showed that most of the students have more than one major learning style, and they perform better than students who have only one major learning style. Table 7 shows the students who has the highest mathematics achievement, based on the number of major learning styles.

Table 7. Highest Mathematics Achievements

Number of MLS	Maximum	MLS
1	82	T
2	88	K A
3	88	A T I
4	90	K I A T
5	87	K V T A G
6	56	K G A T V I

According to the data stated in Table 7, among students with one major learning style the tactile student show the best performance, but for students with two major learning styles, combination of kinesthetic and auditory give the best mathematics achievement. Further, among students with three or four major learning styles, combination of auditory, tactile and individual learning style showed better performance in mathematics learning, and when kinesthetic learning style also dominant, students will reach their best mathematics achievement. This finding show that the combination of oral explanation, hands-on activity and being involved physically in the class activity will help individual learners reach the best mathematics achievement. The study made by (Bosman & Schulze, 2018) also showed that students with multiple learning style are the top-achievers in mathematics. Above finding lead to a suggestion for teachers to implement multiple strategy in teaching which will help students reach optimal achievement in learning mathematics.

4. Conclusion

There are four findings in this descriptive and comparative study, that are: (1) Only twenty percent of the students have exactly one learning style and most of the students has kinesthetic learning style; (2) students with one, two or three major learning styles have better mathematics achievement, comparing with students who have more than three major learning styles. And, students who have minor learning styles only perform better mathematics achievements averagely, comparing with students who have major learning styles; (3) students who have either kinesthetic, group, auditory, tactile, visual or individual learning style, they perform better mathematics achievement when they have another major learning style. Combination of kinesthetic and auditory or group with auditory learning styles will make students perform better in mathematics learning, but in this study student who have the combination of kinesthetic, individual, auditory and tactile learning styles has the highest mathematics achievement; and (4) there is no significant difference in the students' mathematics achievement, between students who have three or less major learning style and students who have more than three major learning styles.

5. Acknowledgements

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