

Exploring the Mathematical Disposition of Arabic Language Education Students in Statistics Courses

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Abstract. A person's attitude towards mathematics is reflected in a mathematical disposition. Students need dispositions to develop good work habits in mathematics. The purpose of this study was to analyze the mathematical disposition of Arabic Language Education students after carrying out statistics course. The subjects in this descriptive study were 29 Arabic Language Education students who were taking a Statistics course at one of the universities in Indonesia. The instrument consists of a mathematical disposition questionnaire in the Statistics course which consists of 20 statements with a Likert scale and which is further deepened through interviews in 1 student with high mathematical disposition and 1 student with lacking mathematical disposition. The results showed that most of the research subjects, namely 62.07%, had lacking mathematical dispositions and 37.93% had good mathematical dispositions. However, some students have good and very good mathematical dispositions, especially in the aspect of appreciating the usefulness of statistics in other disciplines and in everyday life.

Keywords: Mathematical disposition; statistic

INTRODUCTION

Learning in Higher Education is not only for the fulfillment of courses that must be taken by students but also forms a positive attitude of students in learning. Attitudes are known to be included in the affective domain which is known to be related to achievement (Fari et al., 2022; Soleha, 2018; Tukidi, 2014). Affective has emerged as an important part of several cognitive theories. The most visible affective factor is the emotional response to the plan to stop completing a task. The affective reactions that arise will influence students to decide whether to continue with the problems encountered or stop when they encounter difficulties (Mandler in Himmah, 2017; McLeod & Ortega, 1993). Attitude describes a tendency toward certain emotional feelings, can be positive or negative. In the context of mathematics, attitudes tend to be quite stable, involving affective and cognitive balance (Debellis & Goldin, 2006).

A person's attitude towards mathematics is reflected in a mathematical disposition. Mathematical dispositions are manifested in the way students do assignments, with confidence, a willingness to explore alternatives, persistence, and interest, and their tendency to reflect on their own thinking (NCTM, 1989). Students need dispositions that will enable them to persist in more challenging problems, to take responsibility for their own learning, and to develop good work habits in mathematics (Lappan, 1999). In the end, mathematical dispositions affect student

achievement (Himmah, 2017a; Yustinaningrum, 2021). Therefore, teachers need to know the mathematical disposition of their students in addition to their academic achievements. Mathematical disposition assessment should seek information about: (1) students' confidence in using mathematics to solve problems, to communicate ideas, and to provide reasons, (2) students' flexibility in exploring mathematical ideas and trying out mathematical methods. alternative methods of solving problems, (3) willingness to pursue mathematical tasks, (4) interest, curiosity, and inventiveness in doing mathematics, (5) tendency to reflect on what one thinks and does, (6) appreciates the use of mathematics in other disciplines as well as in everyday life, and (7) appreciate the role of mathematics in student culture, and its role as a tool and as a language. (NCTM, 1989).

This study describes the mathematical disposition of Arabic Language Education students who are taking Statistics courses. This study begins with the implementation of Statistics learning in a natural learning setting where the lecturer uses cooperative learning and uses mathematical literacy questions in several meetings.

METHODS

This research is a descriptive research that aims to describe students' mathematical dispositions. This research was carried out at one of the State Universities in Central Java,

Indonesia in 2023. The subjects of the study were 29 students of the Arabic Language Education study program. The research data collection technique was a questionnaire, namely by asking students to fill out a mathematical disposition questionnaire consisting of 20 statement items after students attended the lesson followed by interviews with selected subjects as representatives. The questionnaire was prepared based on the NCTM framework which consisted of seven indicators which were then validated by experts on the questionnaire to be used. The aspects that are measured are confidence in using mathematics related to statistics, students' flexibility in working on mathematics problems related to statistics, willingness to pursue mathematical tasks related to statistics, interest, curiosity, and inventiveness in working on statistical questions, reflecting on what is thought and done, appreciating the usefulness of statistics in other disciplines and in life, and appreciating the role of mathematics in relation to statistics in culture, tools, and language. The results of filling out the questionnaire by students were then analyzed about how many students had very good, good, poor, and very poor mathematical

dispositions with very good categories for scores $\geq 80\%$, good for $70\% \leq \text{scores} < 80\%$, lacking for $50\% \leq \text{score} < 70\%$, and very lacking for $0 \leq \text{score} < 50\%$ and a more in-depth analysis of each aspect is carried out.

RESULTS AND DISCUSSION

The research began with the implementation of learning in Statistics courses with natural settings where the teacher used cooperative learning models in several meetings and used mathematical literacy type questions. At the seventh meeting of learning, students were asked to fill out a mathematical disposition questionnaire related to statistics to obtain data about how students' mathematical dispositions were after participating in the lesson. After scoring according to the guidelines used, students are grouped into several categories, namely students who have very good, good, lacking, and very lacking mathematical dispositions. Data regarding the number of students based on the results of a mathematical disposition questionnaire related to statistics are presented in table 1 below.

Table 1. Number of Students in Each Category Based on the Mathematical Disposition Score Results

Very Good		Good		Lacking		Very Lacking	
n_1	%	n_2	%	n_3	%	n_4	%
0	0	11	37.93	18	62.07	0	0

Based on table 1 it is known that there are no students who have a very good and very lacking mathematical disposition. Most of the students, namely as many as 62.07% had lacking mathematical dispositions and the rest had good mathematical dispositions. These results were deepened through interviews with 2 subjects, 1 student in the good category and 1 student in the poor category. The following are excerpts from interviews on several aspects of subjects with good (S1) and poor (S2) mathematical dispositions.

Q : Are you challenged to solve statistical problems?

S1 : Yes, I feel challenged...as much as possible I try and keep trying in working on statistical problems

S2 : No, because I am not confident in my abilities

Q : Are you confident in explaining the method you used to solve statistical problems?

S1 : Not really, because I did the problem with the help of a friend, because I also don't really like calculations and often forget how to do it afterwards, but when I have to explain and it turns out to be wrong it's also okay, that's self-correction for me because of a lack of understanding and must be more serious in working on problems and study more deeply.

S2 : No, because I still have doubts about the formulas, and I still have questions with my friends.

Q : Did you try more than one way to solve the same problem?

S1 : Yes, it depends on the question. If there is an easy way then I try with easy steps.

S2 : no

Mathematical disposition is formed from seven aspects which include: aspect 1, namely confidence in using mathematics related to statistics, aspect 2, namely students' flexibility in working on mathematics problems related to statistics, aspect 3, namely willingness in

pursuing mathematical tasks related to statistics, aspect 4, namely interest, curiosity, and inventiveness in working on statistical questions, aspect 5 is reflecting on what is thought and done, aspect 6 is appreciating the usefulness of statistics in other disciplines and in life, and aspect 7 is

appreciating the role of mathematics related to statistics in culture, tools, and language. Each of these aspects is analyzed to find out which aspect causes the students' mathematical disposition to be less so that it needs to be considered.

Table 2. The Number of Students in Each Category Based on the Mathematical Disposition Score Results based on the Mathematical Disposition Aspect

Aspect	Very Good		Good		Lacking		Very Lacking	
	n_1	%	n_2	%	n_3	%	n_4	%
1	6	20.69	8	27.59	14	48.28	1	3.45
2	4	13.79	7	24.14	16	55.17	2	6.90
3	4	13.79	9	31.03	15	51.72	1	3.45
4	3	10.34	4	13.79	19	65.52	3	10.34
5	1	3.45	12	41.38	13	44.83	3	10.34
6	6	20.69	9	31.03	13	44.83	1	3.45
7	2	6.90	7	24.14	16	55.17	4	13.79

Based on the data presented in table 2, even though in each aspect most of the students' mathematical dispositions are gathered in the lacking category, it can be seen that in every aspect there are students who have very good and very lacking categories.

In the very good category, the highest number of students was in aspect 1, namely confidence in using mathematics related to statistics and aspect 6, namely appreciating the use of statistics in other disciplines and in life, each of which was 6 students. Confidence in using mathematics, especially statistics, is possible because teachers use cooperative learning where there are activities for group discussions and presenting the results of work so that students can exchange ideas and participate in giving ideas or opinions. The learning model in question is the use of cooperative learning models of the think pair share and the power of two types. Although this study did not specifically examine the effect of the cooperative learning model on confidence in mathematics, based on several research results it was revealed that the use of group discussions had an effect and increased students' confidence in mathematics (Lubis, 2018; Pradika & Syamsuri, 2019). This is also reinforced that think pair share can increase confidence in mathematics (Handayani, 2020; Sampsel, 2013). However, the use of cooperative learning which has only been carried out several times has not raised student confidence much.

In aspect 6, namely appreciating the usefulness of statistics in other disciplines and in

life, it is possible to emerge because of the use of mathematical literacy-type questions during several meetings. This is because mathematical literacy connects mathematics learned in class with the real world in various situations (Masjaya & Wardono, 2018) so that students know the use of statistics both in other disciplines and in life which ultimately forms an attitude of respect for the use of statistics in students. Compared to other aspects, most students are in the very good and good categories in this aspect 6.

The lacking and very lacking categories are most prominent in aspect 4, namely interest, curiosity, and inventiveness in working on statistical questions. This is indeed seen during learning, students need a long time to find answers to a problem. Based on the search, in the Arabic Language Education study program, statistics courses are given in semester 4 and previously there were no mathematics-related courses. In addition, most of the students come from social studies, religion, and language majors when they attend high school. This means that students have received minimal mathematics material in recent years.

The results of this study require serious attention from the teacher because most students have a lacking mathematical disposition, even though students need a mathematical disposition in order to survive addressing problems, have full responsibility for learning, and have a strong will in learning mathematics (Adhiyati, 2020). Ways to improve mathematical dispositions need to be studied and carried out in stages and prioritized

according to the dominant aspects which are in the lacking and very lacking categories.

CONCLUSION

Based on the research results, it is known that most of the research subjects have lacking mathematical dispositions, even when viewed from every aspect. However, some students have good and very good mathematical dispositions, especially in the aspect of appreciating the usefulness of statistics in other disciplines and in life. This study has a weakness because it does not measure students' mathematical dispositions before learning, so it is not known with certainty whether the mathematical dispositions that are formed are influenced by the learning carried out or have been formed before. The researcher recommends tracing, researching, and carrying out ways to improve the mathematical disposition gradually according to the aspects that are still lacking and very lacking.

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