

## STUDENT'S LEARNING ACHIEVEMENT BASED TYPE OF SCHOOL AND DEPARTMENT (CASE STUDIES IN EARLY SEMESTER STUDENTS OF THE PEKALONGAN UNIVERSITY MATHEMATICS EDUCATION STUDY PROGRAM, ACADEMIC YEAR 2020/2021 IN INTRODUCTORY MATHEMATICS BASICS COURSES)

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### ABSTRACT

This article discusses the description of the learning achievement of students in mathematics education study programs in introductory basic mathematics courses based on the type of school and department. The description of the type of schools and department in this article uses senior high school (SMA)/ Madrasah Aliyah (MA) in science department and senior high school (SMA)/ Madrasah Aliyah (MA) in non-science department / Vocational high school (SMK) / Vocational Madrasah Aliyah (MAK). The subjects of this study were students of the mathematics education study program at the Faculty of Teacher Training and Education (FKIP) at the University of Pekalongan in the early semester of the 2020/2021 academic year who took 32 basic introductory mathematics courses. The results show that the average student from senior high school in Science department. Based on the test results, 75% of students in the early semester of the mathematics education study program FKIP Pekalongan University came from senior high school in Science department and the other 25% from senior high school in non-science department or vocational high school (SMK / STM) from the Pekalongan area. Seen on an average basis for the results of doing the test questions for the group of students from senior high school in Science department is 75.62 and the group of students from senior high school in non-science department or vocational high school (SMK / STM) is 65.

**Keywords:** learning achievement, Pekalongan university, introductory mathematics basics courses

### INTRODUCTION

Higher education institutions are required to be able to produce quality graduates according to society's needs. This becomes a challenge for every university, so that the academic community is directed to be able to actualize themselves professionally based on their respective duties.(Indrawati et al., 2016)

The Mathematics Education Study Program of the Faculty of Teacher Training and Education (FKIP), University of Pekalongan, is one of the institutions that produces mathematics teacher candidates

who are expected to have graduates who are competent in their fields. This is based on statute Number 14 Year 2005 concerning Teachers and Lecturers Article 10 paragraph (1) teacher competence includes pedagogical competence, personality competence, social competence, and professional competence. These four competencies are described in the curriculum and vision and mission of the study program as graduate competencies.

In the curriculum of the Mathematics Education Study Program of the Faculty of Teacher Training and Education at the University of Pekalongan, there are several

courses that must be taken by 1st semester students, one of which is the basic mathematics introduction course. Basic introductory mathematics courses have a description, namely through these subjects students are able to apply existing materials at the high school level. So it can be said that this course is a strengthening / equality course of perception because the school backgrounds of the students are various.

Senior high schools consist of senior high schools (SMA / MA) and vocational high schools (SMK / MAK). Both are formal educational institutions that can be taken by students to develop their knowledge. In SMA / MA and SMK / MAK mathematics is a requisite subject taken by students. In senior high school, there are two commonly offered majors, namely Science and Social Sciences. Students who major in science will get a larger portion of mathematics subjects than social studies because there are obligatory and optional mathematics. Meanwhile, senior high school is slightly different from vocational high school, namely formal education at the secondary education level that organizes vocational programs. There are 9 fields of expertise in the content standards of vocational high school, namely (1) technology and engineering, (2) energy and mining, (3) information and communication technology, (4) health and social work, (5) agribusiness and agrotechnology, (6) maritime, (7) business and management, (8) tourism, (9) arts and creative industries (Permendikbud No. 34/2018 Tentang Standar Nasional Pendidikan SMK/MAK, 2018). Mathematics is still required because it relates to everyday life.

The condition for someone to continue to college is to have graduated from high school or vocational high school. At high school, there are various majors, so that when someone is going to college, of course, they will adjust to the appropriate major. Because the majors taken while in high school, hopefully, will have an influence on

the continuation of choosing his education (Gulo, 2016).

Learning success is influenced by various factors. First, internal factors include physical aspects such as health; psychic aspects such as intellectual, emotional, motivation; and social aspects such as the ability to socialize with the environment (Hendikawati, 2011). The two external factors include family, school, community and the surrounding environment (Saputro et al., 2015).

In addition, it is known that there are other factors that influence the achievement of one's learning achievement. It was revealed that learning achievement in tertiary institutions was influenced by first the initial ability factors possessed by students during their education at the previous level (SMA / MA / SMK) (Hailikari et al., 2008), secondly interest in learning with a feeling of pleasure, liking, and concern for a science can affect the results (Astuti, 2015), the three lecturers' personalities which consist of four types (sanguine, choleric, melancholic, and phlegmatic) can have a positive impact on student learning achievement (Saputra & Yuniawan, 2012).

This article discusses the factors that influence the learning achievement of the type of school and department. Because the type of the school and department in the Mathematics Education Study Program of Pekalongan University are quite diverse. So that it will be described further related to student achievement based on the origin of the school and the department.

## RESEARCH METHOD

This research is an *expose facto* research (revealing the data as it is) with a qualitative approach. The subjects used in this study were students in semester 1 of the mathematics education study program at the Faculty of Teacher Training and Education at the University of Pekalongan who took the introductory basic mathematics (PDM)

course for the 2020/2021 academic year. The documents used are a list of active student names, learning outcomes (test results on the PDM course) and personal data (the type of school, department). The test instrument used is a multiple choice test. Due to the ongoing pandemic COVID-19 period, the test was carried out online using the google form. A total of 20 items and consisting of 8 materials at high school level, namely (1) linear equations and inequalities of one variable containing absolute values; (2) Two-variable system of linear equations; (3) Three variable linear equations; (4) Equations, inequalities, and quadratic functions; (5) Exponents and logarithms; (6) Trigonometric Equations; (7) Analytical Trigonometry; (8) Trigonometric inequality with given time 90 minutes.

### FINDING AND DISCUSSION

During the COVID-19 pandemic, the learning process was carried out online using the WhasApp group and the Spada class. This learning process is a new thing for lecturers and students who are required to be literate in learning technology. So that there are many obstacles in the learning process, especially in introductory basic mathematics courses. The knowledge transfer process is very limited and slow. So that quite a lot of students complain about not understanding the material taught by the lecturer.

Meanwhile, basic introductory mathematics courses are subjects whose material tends to still use materials in high school. So that the hope is that all students have the same perception regarding these materials. The mathematics material taught is 8 high school level materials, namely (1) linear equations and inequalities of one variable containing absolute values; (2) Two-variable system of linear equations; (3) Three variable linear equations; (4) Equations, inequalities, and quadratic functions; (5) Exponents and logarithms; (6) Trigonometric Equations; (7) Analytical

Trigonometry; (8) Trigonometric Inequalities.

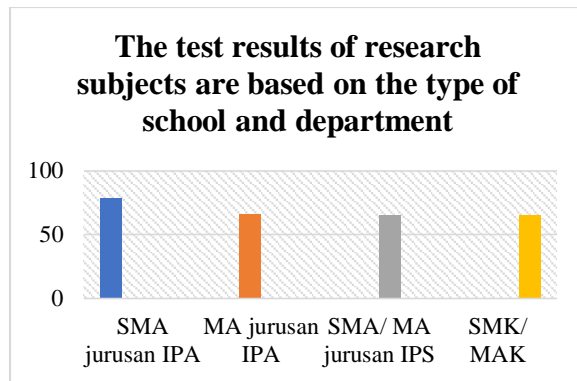
Based on the documentation, it was found that the research subjects who were first semester students of the mathematics education study program at the Faculty of Teacher Training and Education at the University of Pekalongan who took the basic introductory course in mathematics were 32 people consisting of 24 students high school graduates or madrasah aliyah (MA) in Science department, 1 student seem to be in the senior high school in social department, 7 students vocational high schools with various department such as computer and network engineering, finance, geomatics, accounting, multimedia and pharmacy as shown in table 1.

Table 1. School and Department data of research subjects

No	Type of school and department	Number of students
1.	Senior high school / Madrasah Aliyah department science	24
2.	Senior high school/ department social science	1
3.	Vocational high school	7

During the online test there were several problems that often occurred, one of which was the missing internet signal. So that the time to work 90 minutes feels less due to these obstacles.

Chart 1 shows the results of the subject tests which have been grouped by the type of school and department.



It appears in chart 1 that the test results of students from high school science department have a higher average score than other types of schools. This can be influenced by the quality of learning in previous schools. This phenomenon is often found that the quality of learning in senior high school is better than in Madrasah Aliyah. This may be due to the density of the curriculum in Madrasah Aliyah (Andriani, 2010). In addition, the number of hours of mathematics in high school science majors is more than other department.

In addition, based on the results of interviews with several research subjects, it shows that students who come from non-science majors experience several obstacles and difficulties in following the Basic Introduction to Mathematics course material, because according to them the content of the material studied in the previous school (the type of school) does not require the ability as the lecture followed by them, where this course is a basic course of expertise that demands the ability of students in matters related to the subject matter of mathematics at high school level majoring in Science such as: Exponents and logarithms, Analytical Trigonometry, and Trigonometric Inequalities. Meanwhile, in the previous school (the type of school), they studied mathematics only as a prerequisite for passing the national exam and so on.

However, there are also students who come from non-science department who have satisfactory (above average) achievements in the basic introductory

mathematics course, which is due to other factors outside of school learning, for example having taken private lessons or taking part in learning at institutions - tutoring institutions and the like.

**Question!**

Determine the possible sizes (in natural numbers) of a rectangle whose circumference is 50 cm and area is more than 150 cm<sup>2</sup>!

4 Tentukan ukuran (bilangan asli) yang mungkin dari persegi panjang yang kelilingnya 50 cm dan luasnya lebih dari 150 cm<sup>2</sup>!

Jawab :

$$K = 50 \text{ cm} \quad L = p \times l \quad l = 25 - p$$

$$L = 150 \text{ cm}^2 \quad 150 = p \times (25 - p) \quad \bullet l = 25 - 15$$

$$150 = 25p - p^2 \quad \bullet l = 10$$

$$K = 2(p + l) \quad p^2 - 25p + 150 = 0 \quad \bullet l = 25 - 10$$

$$50 = 2p + 2l \quad (p - 15)(p - 10) = 0 \quad \bullet l = 15$$

$$25 = p + l \quad p = 15 \vee p = 10$$

$$l = 25 - p$$

Jadi, ukuran (bilangan asli) yang mungkin adalah jika  $p = 15 \text{ cm}$  maka diperoleh  $l = 10 \text{ cm}$  dan jika  $p = 10 \text{ cm}$  maka  $l = 15 \text{ cm}$ .

Figure 1. The work of one of the students

Based on Figure 1, it is the work result of a 1st semester student who took an introductory basic mathematics course. This also happened to all students in the class. It appears that students have not been able to interpret the questions well. The solution should be as in figure 2.

known by :  
 $m$  = length  
 $n$  = wide  
 Circumference =  $K = 50 \text{ cm}$   
 Area =  $L = 150 \text{ cm}^2$

Ask:  
 possible sizes of a rectangle (in natural number)?

Answer:

$$K = 2(m + n)$$

$$50 = 2(m + n) \quad | : 2$$

$$25 = (m + n)$$

$$m = 25 - n$$

$$\begin{aligned}L &> (m \times n) \\150 &> (m \times n) \\150 &> (25 - n) \times n \\150 &> 25n - n^2 \\n^2 - 25n + 150 &< 0 \\(n - 15)(n - 10) &< 0 \\10 &< n < 15\end{aligned}$$

Because  $m$  and  $n$  are natural number,  
So the value of  $l$  that meets the  
requirements are 11, 12, 13, and 14

So, the possible rectangular sizes are  
 $n = \text{wide} = 11 \text{ cm}$   
 $m = \text{length} = 25 - 11 = 14 \text{ cm}$  and  
Or  
 $n = \text{wide} = 12 \text{ cm}$   
 $m = \text{length} = 25 - 12 = 13 \text{ cm}$  and

Figure 2. Right answer

It appears in Figure 1 that students have not been able to interpret questions properly. It is clear in the questions it says that the area size of the rectangle is more than 150. However, almost all the students answered as shown in the picture. This resulted in a fatal error in the process of solving to the final answer.

## CONCLUSION

The average score of students from SMA / MA majoring in Science on the Basic Mathematics Introductory Course quiz was 75.625, higher than the average score for students from the Non-IPA majors (SMA IPS and SMK), namely 65. IPA, the average value from IPA SMA was 78.89, greater than the average score of students from MA IPA, which was 65.83. Then in the group of students from the Non-IPA department (SMA IPS and SMK), the average score of students from IPS SMA was the same as the average score of students from SMK, namely 65, on the Basic Mathematics Introductory Course quiz.

Suggestions given to overcome differences in mathematical abilities are to carry out an entrance test with a standard test so that the study program can place

prospective students or provide other policies so that prospective students from non-science departments can attend lectures well, at least the same as students from the department. Science, for example, by providing matriculation to prospective students who come from non-science department.

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