



The Effect of Computer Laboratory Facilities and Learning Interest on Students' Learning Outcomes

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Abstract

This research aims to know the effect of computer laboratory facilities and learning interest on student's learning outcomes. Used ex-post facto quantitative research with exogenous, endogenous, and intervening variables. Population and sample of this research were mathematics education department students for the 2020/2021 academic year, totaling around 80 people. The instruments used were questionnaires and written test. Data analysis technique used is path analysis. Based on the research that has been done, it's concluded that: (1) description of computer laboratory facilities, students' learning interest and students' mathematics learning outcomes in order are in the medium, high, and high categories, (2) there is a direct effect of computer laboratory facilities on mathematics education department student's mathematics learning outcomes, (3) there is a direct effect of learning interest on students' mathematics learning outcomes, (4) there is a direct effect of computer laboratory facilities on mathematics education department student's mathematics learning interest, and (5) there is an indirect effect of computer laboratory facilities on students' mathematics learning outcomes through learning interest.

Abstrak

Penelitian ini tujuannya untuk mengetahui pengaruh fasilitas laboratorium komputer dan minat belajar terhadap hasil belajar mahasiswa. Merupakan penelitian kuantitatif jenis ex-post facto dengan variabel eksogen, endogen, dan variabel intervening. Populasi dan sampel penelitian ini ialah mahasiswa jurusan pendidikan matematika tahun ajar 2020/2021 berjumlah 80 orang. Instrumen yang digunakan yaitu angket dan tes tulis. Teknik analisis datanya yaitu analisis jalur. Berdasarkan penelitian yang telah dilakukan, diperoleh kesimpulan bahwa: (1) deskripsi fasilitas laboratorium komputer, minat belajar dan hasil belajar matematika mahasiswa secara berurut berada pada kategori sedang, tinggi, dan tinggi, (2) terdapat pengaruh langsung fasilitas laboratorium komputer terhadap hasil belajar matematika mahasiswa jurusan pendidikan matematika, (3) terdapat pengaruh langsung minat belajar terhadap hasil belajar matematika mahasiswa, (4) terdapat pengaruh langsung fasilitas laboratorium komputer minat belajar matematika mahasiswa jurusan pendidikan matematika, dan (5) terdapat pengaruh tidak langsung fasilitas laboratorium komputer terhadap hasil belajar matematika mahasiswa melalui minat belajar.

Keywords: Fasilitas Laboratorium Komputer, Motivasi Belajar, Hasil Belajar
Computer Laboratory Facilities, Learning Interest, Learning Outcomes

INTRODUCTION

Adequate educational facilities in every school and college are important things for educational actors. Adequate facilities will greatly support the learning process and enrich learning media so that learning objectives are easily achieved and learning outcomes will be as expected. A university must have infrastructure such as an adequate building, equipped with lecture rooms that meet health requirements, have good lighting, air ventilation, and be equipped with ergonomic chairs. It has a healthy canteen, toilets with a ratio of 1:25, a sports field equipped with sports facilities, a library equipped with contemporary books, a laboratory, a place of worship, a lecturer room, a leadership room, an administration room, and a clinic.

According to Payal (2007), campuses with facilities that exceed standards have lecture rooms equipped with air conditioners, projectors installed in each lecture hall, wi-fi that reaches all rooms, and other facilities. All these facilities really support the smoothness of the learning process, especially in today's digital age where student and lecturer interaction in learning is not only in the real world but also in cyberspace.

Facing the digital era 4.0, universities should be at the forefront of educational institutions in preparing the millennial generation who are able to compete in facing this era. It is unfortunate that the generation who live in the digital era is not used to electronic objects such as computers, laptops, LCDs, smartphones, and others. Therefore, every university must at least have an adequate computer laboratory.

Souck and Nji (2017) state that campus facilities appear to play an important role in influencing the implementation of the curriculum on campus and

therefore, the importance of campus facilities should not be underestimated. This study provides new evidence on the importance of campus facilities as a major determinant of students' achievement. Mwikali, Gakunga, & Kasivu (2016) explain that effective teaching and learning requires broad access to learning, in terms of exploring knowledge using computers. In fact, the availability of an internet connection will further broaden the horizons in the learning process, specifically using online media in explaining a particular topic in learning.

Ali (2014) explains that a computer laboratory is a facility used during practice in accordance with competencies in the field of information and communication technology (ICT). The learning that takes place resembles an ICT practicum which includes computer operations and word processing, numbers, presentations, and other applications. In line with that, Nurohman (2011) explained that a computer laboratory is a facility that can be used as a place to improve skills in the field of ICT. We can also use these laboratories to assist learning in other subjects such as Social Studies, Biology, and Mathematics. From these various definitions, it is concluded that a computer laboratory is a place that can be used to develop students' abilities and knowledge not only in the field of ICT but also in other sciences so that it becomes motivation, support, or students' interest enhancer.

The expected facilities are complete computer equipment, internet access, a clean, tidy, and spacious room, healthy laboratory lighting, air conditioner, sufficient chairs, desks, and large PC facilities in the teaching process. A computer laboratory is a very important facility that all departments in a university must prepare because most scientific fields have applications related to their

scientific fields, which will later be used in their professions. For example, *spss*, *matlab*, *maple* applications, and other applications used by students in the Mathematics and Natural Sciences field. These applications can be mastered well if the learning process is carried out by practicing in a computer laboratory.

Generally, universities have computer laboratories in each of their faculties or departments, but the completeness or quality of the computer laboratories they have is insignificant. Some have small and cramped computer laboratories, and some are not maintained so that many computers are damaged and cannot be used effectively. Others do not have enough electrical power so that sometimes practice is taking place and all computers are down. There are also computer labs that still use outdated windows and do not use original software. All these computer laboratory problems often become obstacles in the learning process so that learning does not run effectively and consequently affects students' interest and learning outcomes.

Mathematics education department students are prospective teacher students, these students must have skills in using computers such as solving math application problems with the help of computers, designing interesting learning with computer media, even having to get used to using computers for school students quizzes and the importance of the development of mathematics education department students because the screening in the world of work using computer tests. Interest is something that is present in a person that is not innate but something that arises in oneself and can be learned. The success of learning and teaching activities is not only due to the factors of the educators (teachers/lecturers) but also from the students (school students/college students). When

they are in the learning process, the manner of students can indicate their interest in learning, and vice versa, they are not interested in that learning. This sense of attraction is known as interest.

Syah (2009) defines interest as a strong desire to achieve something so that people try their best to achieve it. Azmidar, Darhim, & Dahlan (2020) Interest does not arise spontaneously but arises because of participation, experience, and habits while studying or working. Khayati & Payan (2014) Interest is a stimulus that can increase one's activity power. In addition, Djamarah (2002), interest is also a great desire for something. If a strong desire accompanies interest, it will produce good achievements.

Interest indicators (Pangestu, Sampardja, & Tiya, 2015), namely: (1) happy feeling or liking, (2) attraction, (3) attention, (4) provision of time, (5) tendency, and (6) satisfaction. However, this interesting questionnaire was adopted from the one developed by Irawati, M. (2018) with indicators: (1) happy feeling, (2) involvement, (3) attention, (4) attraction. The same thing, concluded by Lutfiyah, Utaya, & Susilo (2016) that great interest will encourage achievement. As well as research from Widayanti (2006) concluded that there was a positive effect of interest on learning achievement.

Factors that affect interest according to Anita (2007) are facilities when learning, teacher teaching quality, interaction and others, and factors in individuals such as intelligence, learning strategies, motivation, learning interest, and others. Another thing was concluded by Siahaan & Kumoro (2017) that laboratory facilities have a positive and significant effect on learning interest. Therefore, it is considered that computer laboratory facilities are important part of the learning process. Because it is related to the urge

to learn, and it is considered that computer laboratory facilities will affect learning interest. Complete computer laboratory facilities are important in the use of laboratories, if computer laboratories are actively used in complete learning, the facilities will make learning easier and more effective. This will be related to students' learning outcomes, if supported by facilities, the ease of learning will be obtained, and the results will be maximized.

The outcome is an achievement for an effort. Learning is the process of changing the manner of each individual, which leads to positive things. Assessment of learning outcomes in education consists of cognitive, affective, and psychomotor aspects. Therefore, mathematics learning outcomes are cognitive learning outcomes obtained by students in specific subject matters. This is in line with the conclusion of Rahmawati & Listiadi (2019) that computer laboratory facilities have an effect on learning outcomes.

Rodliyah (2011) states that there was a significant effect of computer laboratory facilities on learning achievement. Eva & Siagian (2012) expresses that there is a significant effect between interest on learning achievement. Therefore, the authors are interested in researching the effect of computer laboratory facilities, learning interest on students' learning outcomes.

METHODS

This research is an ex-post facto quantitative research. This research was designed to explain the causal relationship as well as to test pre-made hypotheses between computer laboratory facilities, learning interest, and mathematics learning outcomes of mathematics education department students. The variables in

this research were exogenous, endogenous, and intervening variables. The exogenous variable contains computer laboratory facilities, the intervening variable contains learning interest and the endogenous variable contains mathematics learning outcomes. The population and sample of this research were all mathematics education department students for the 2020/2021 academic year, totaling around 80 people. The instruments used when measuring the computer laboratory facilities and learning interest variables were questionnaires and written tests for mathematics learning outcomes variables. The data analysis technique is path analysis assisted by *Amos for Windows*. Path analysis is used to study the relationship between variables in research.

The weaknesses of the research method used can be strengthened or expanded for further research using structural equation modeling (SEM) analysis by examining more exogenous, endogenous, and intervening variables and of course, by analyzing the supporting indicators for each variable.

RESULTS AND DISCUSSIONS

Research Results

Two kinds of statistical analysis results are presented here, namely the results of descriptive analysis and the path analysis results. The results of descriptive analysis of the data for each research variable include the distribution of frequency, mean, variance, standard deviation, minimum and maximum values. Meanwhile, the results of the path analysis are used to know the direct effect and indirect effect of the variables in this study as well as to know the significance of the relationship between some of the suspected variables.

From the research results that has been conducted on 80 mathematics edu-

cation department students with a research instruments in the form of intervals filled in by the students themselves. The following is a table of the frequency distribution of the scores for the computer laboratory facilities based on categorization criteria.

Table 1. Distribution of the Scores for the Computer Laboratory Facilities

No	Scores	Frequency	Percentage	Category
1	$20 \leq KP < 45$	7	9	Very low
2	$45 \leq KP < 55$	30	37	Low
3	$55 \leq KP < 65$	31	39	Medium
4	$65 \leq KP < 75$	9	11	High
5	$75 \leq KP \leq 80$	3	4	Very high
Total		80	100	
Mean	Std. Deviation	Variance	Min	Max
55.61	9.36	87.58	31	80

Table 1 shows that the frequency of the scores for the computer laboratory facilities differs only by 1 respondent between the low and medium categories, while the standard deviation is very small. Therefore, it can be concluded that the distance between the mean and the score of each respondent is close. The mean score itself shows that the score for the computer laboratory facilities in the mathematics education de-

partment of UIN Alauddin Makassar is in the medium category.

The chart in Figure 2 shows that the highest percentage is in the medium category. Of all respondents, only 15% of the 80 people indicated that the score for the computer laboratory facilities was in the high and very high category. Therefore, the computer laboratory facilities for mathematics education were still very minimal, as seen from 85% of the scores for the computer laboratory facilities were in the medium, low, and very low categories.

The following is a table of the frequency distribution of the scores for the mathematics education department students' learning interest from the results of the research that has been done.

Table 2. Distribution of the Scores for the Learning Interest

No	Score	Frequency	Percentage	Category
1	$20 \leq KP < 45$	2	2	Very low
2	$45 \leq KP < 55$	6	7	Low
3	$55 \leq KP < 65$	22	28	Medium
4	$65 \leq KP < 75$	38	48	High
5	$75 \leq KP \leq 80$	12	15	Very high
Total		80	100	
Mean	Std. Deviation	Variance	Min	Max
65.97	8.36	69.87	39	80

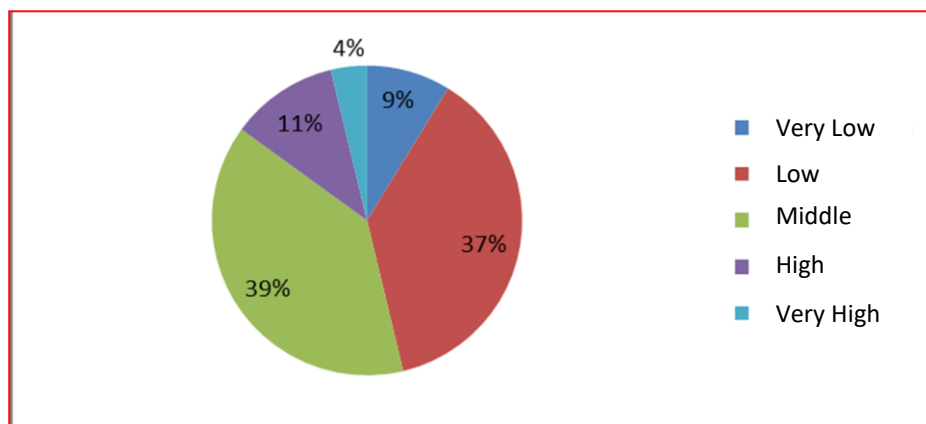


Figure 2. The Chart of the Distribution of the Scores for the Computer Laboratory Facilities

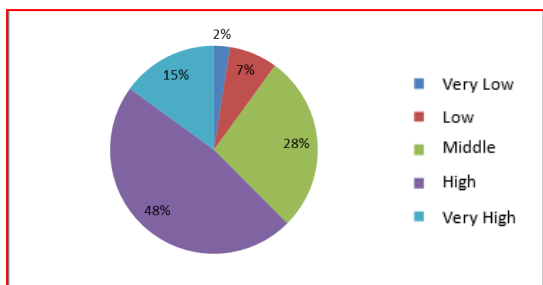


Figure 3. The Chart of the Distribution of the Scores for the Learning Interest

Table 2 shows that mathematics education department students' learning interest is very good, this can be seen from the frequency of 80 respondents. Only 8 people are in the low and very low categories. Meanwhile, the standard deviation is very small. It can be concluded that the score for the learning interest for each student has a close distance to the mean for the learning interest in general on the data. The mean of the scores for the students' learning interest is in the high category.

The chart in Figure 3 shows that the percentage of the students' learning interest scores are in the high category. Of the 80 respondents, 9% of students have a learning interest that is in the low and very low categories. This proves that the mathematics education department students' mathematics learning interest is very good, seen by 91% of respondents who have an interest score in the medium, high, and very high categories.

The following data is the practicum value of mathematics education department students. The practicum is carried out in the laboratory of the mathematics education department, where the practicum is a series of courses whose subject matter uses mathematics applications.

Table 3. The Distribution of the Mathematics Learning Outcomes

No	Score	Frequency	Percentage	Category
1	$0 \leq THB < 45$	0	0	Very low
2	$40 \leq THB < 55$	0	0	Low

No	Score	Frequency	Percentage	Category
3	$55 \leq THB < 75$	1	1	Medium
4	$75 \leq THB < 90$	28	35	High
5	$90 \leq THB \leq 100$	51	64	Very high
Total		80	100	
Mean	Std. Deviation	Variance	Minimum	Maximum
89.55	7.35	87.58	54.05	95

Mathematics learning outcomes of mathematics education department students are very good, almost all respondents are in the high, and very high category, 51 respondents out of 80 respondents have very high category frequencies. While the standard deviation is very small, namely 7.35, this shows that the score of each respondent has a very close distance to the mean of the score for the mathematics learning outcomes. Meanwhile, the mean of the score for the mathematics learning outcomes is in the high category.

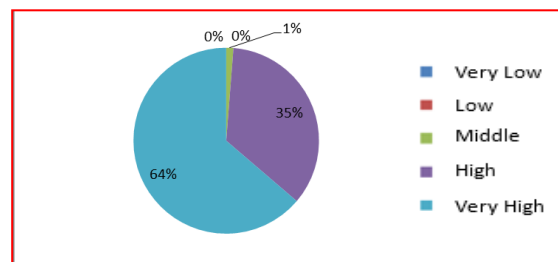


Figure 4. The Chart of the Distribution of the scores for the Mathematics Learning Outcomes

The chart in Figure 4 shows that the dominant respondents are in the high and very high categories, namely 99%, a perfect number. This proves that the learning outcomes of the mathematics education department practicum are very good. Of all the respondents, nobody has a score in the low and very low categories.

Prerequisite test before continuing to the hypothesis test in this research, namely the normality test and the linearity test have been fulfilled.

Table 4. *R-Square* Value

	Estimate
X ₂	0.207
Y	0.184

The *R-Square* value can be seen in table 4, where $R^2_{x_2x_1} = 0.207$, and $R^2_{yx_1x_2} = 0.184$. for finding the value of the residual variable, the used formula is:

$$P_{X_2\varepsilon_1} \varepsilon_1 = \sqrt{1 - R^2_{x_2x_1}} = \sqrt{1 - 0.207} = 0.793$$

$$P_{Y\varepsilon_2} \varepsilon_2 = \sqrt{1 - R^2_{yx_1x_2}} = \sqrt{1 - 0.184} = 0.816$$

So that the following structural equation is obtained:

$$X_2 = 0.455X_1 + 0.793\varepsilon_1$$

$$Y = 0.241X_1 + 0.262X_2 + 0.816$$

Sobel test is a test to find whether there is a significant relationship of a mediating variable being able to be a mediator in that relationship. The following is a figure of the *sobel test* results.

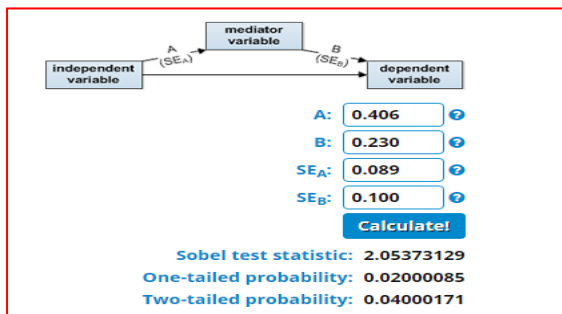


Figure 5. Sobel Test

The model in the figure above is the results model of the first and second regressions so that it can form a path analysis model where the learning interest variable is the mediator. The results of the calculation of the z value from the sobel test above get a z value that is 2.054, because the z value obtained is 2.054 > 1.96 where the significance level is 5%, is sufficient to prove that learning interest can

mediate the relationship of the effect of computer laboratory facilities on learning outcomes. Therefore, it can be concluded that computer laboratory facilities have a significant effect on students' mathematics learning outcomes through learning interest.

To prove how big the direct effect, the indirect effect, and the total effect can be seen in the Table 5.

Table 5. Decomposition of the Path Coefficients

No.	Effect of Variables	L	Through X ₂	Total
1	X ₁ to X ₂	0.455	-	0.455
2	X ₂ to Y	0.262	-	0.262
3	X ₁ to Y	0.241	0.119	0.360

Table 5 shows that the coefficient that directly affects computer laboratory facilities on learning interest is 0.455, and learning interest on learning outcomes is 0.262. For computer laboratory facilities on mathematics learning outcomes, the direct effect is 0.241, and the indirect effect of computer laboratory facilities on mathematics learning outcomes through learning interest is:

$$P_{X_2X_1} P_{YX_2} = (0.455) * (0.262) = 0.119.$$

Table 6. Correlation Matrix Between Variables

	X ₁	X ₂	Y
X ₁	1		
X ₂	0.455	1	
Y	0.360	0.371	1

Based on the results of the path analysis calculation, it is known that: (1) the contribution of computer laboratory facilities (X₁), directly affects mathematics learning outcomes (Y) around 8.68%, (2) the contribution of learning interest (X₂) which directly affects mathematics learning outcomes (Y) around 9.72%, (3) the contribution of computer laboratory facilities (X₁) which directly affects learning interest (X₂) around 20.7%, and (4) the contribution of computer laboratory facilities (X₁) which indirectly affects mathe-

mathematics learning outcomes (Y) through learning interest (X_2) around 10.69%.

Discussions

The description of the research results shows that the computer laboratory facilities are in the medium category. It can be seen from the categorization of the scores of 68 out of 80 respondents. The 68 respondents have medium, low, and very low categorization scores. Computer laboratory facilities (X_1) are complete laboratory facilities both from the condition of the room and the tools in it, which are measured by indicators according to Rodliyah (2011): (1) study place/room, (2) lighting, (3) several supporting books, and (4) learning equipment. Therefore, it can be concluded that the computer laboratory in the education department still needs attention related to facilities and infrastructure.

The description of mathematics learning interest shows that mathematics education department students' mathematics learning interest is in the high category. Of 80 respondents, 72 respondents have medium, high, and very high categories. In fact, there were only 8 respondents who have low and very low categories of interest in learning. Learning interest (X_2) (Irawati, M., 2018) is a tendency of the heart/mind to something that creates a feeling of liking and happiness to do it. And this interesting variable was developed with the following indicators: (1) happy feeling, (2) involvement, (3) attention, and (4) attraction. Therefore, it can be concluded that the mathematics education department students' learning interest is generally good.

In general, the description of the mathematics learning outcomes of mathematics education department students is in the high category. This learning outcome is a mathematics practicum score

that is part of a certain course related to mathematics applications. Of the 80 respondents, there are 79 respondents who have a score of mathematics practicum scores in the high and very high categories.

Hypothesis testing was continued after passing the prerequisite test for normality and linearity of all variables in this research. The first hypothesis proves that there is a positive and significant effect of mathematics computer laboratory facilities on mathematics learning outcomes. The contribution of computer laboratory facilities (X_1) which directly affects mathematics learning outcomes (Y) is around 8.68% and the rest is affected by other factors not discussed in this research. This proves that the better the computer laboratory facilities, the better the learning outcomes.

The second hypothesis shows that there is a positive and significant direct effect of learning interest on mathematics learning outcomes. The contribution of learning interest (X_2) which directly affects mathematics learning outcomes (Y) is around 9.72%, and the rest is affected by other factors not presented in this research. Thus, it is concluded that learning interest has an important role in improving mathematics learning outcomes; the better the learning interest, the better the learning outcomes.

The third hypothesis proves that there is a positive and significant effect of computer laboratory facilities on mathematics learning interest. The contribution of computer laboratory facilities (X_1) which directly affects learning interest (X_2) is around 20.7%, and the rest is affected by other factors which are not discussed in this research. That way, it needs special attention related to the repairment of the computer laboratory facilities and infrastructure because this can affect

students' learning interest in carrying out practicum.

The fourth hypothesis shows that there is a positive and significant indirect effect of computer laboratory facilities on mathematics learning outcomes through learning interest. The contribution of computer laboratory facilities (X_1) which indirectly affects mathematics learning outcomes (Y) through learning interest (X_2) is around 10.69%, and the rest is affected by other factors not discussed in this research. Whether it is the direct or indirect effect, the computer laboratory facility variable contributes to mathematics learning outcomes. The contribution of the indirect effect of computer laboratory facilities through learning interest is higher than the direct effect on learning outcomes. The better the computer laboratory facilities, the better the learning interest and will have an effect on mathematics learning outcomes.

This is in accordance with Setyowati & Widana (2016) research, which explains that there is a direct effect of learning interest on mathematics learning outcomes with a path coefficient that is 0.526. Pamungkas, Basori, & Efendi (2017) concluded that learning interest had a positive effect on learning achievement, and computer laboratory facilities had a positive effect on learning achievement at SMK Negeri Sawit. Pramesti (2014) concluded that there is an effect between using laboratory facilities to support learning outcomes.

Kusumah (2014) concluded that computer laboratory facilities had a positive effect on the effectiveness of learning. Souck & Nji (2017) concluded that school facilities had a significant effect on internal school learning. Pangestu, Sampardja, & Tiya (2015) concluded that learning interest positively affected mathematics learning outcomes.

Research by Budiyarti (2020) also concludes that there is a positive direct effect of learning interest on accounting students' learning outcomes, obtained a correlation coefficient that is 0,5649 with a path analysis that is 0,1187. Viradiansyah & Listiadi (2020), in their research, also concluded that the results of multiple linear regression analysis proved that the t-count value for the computer laboratory facility variable on learning outcomes was 4,290, which means that $t_{\text{count}} > t_{\text{table}}$, which had a value 1,994 ($4,492 > 1,994$), so that computer laboratory facilities had an effect on learning outcomes.

Of the overall results of this research, there are many things that the researcher cannot control, especially when filling out the questionnaire. The used variables can be studied in more in-depth indicators that affect most of each variable. For the intervening variables, psychological variables that affect students' learning outcomes can be added.

CLOSING

Conclusion

The conclusions obtained from this research are: (1) description of computer laboratory facilities, students' learning interest and students' mathematics learning outcomes in order are in the medium, high, and very high categories, (2) there is a direct effect of computer laboratory facilities on mathematics education department student's mathematics learning outcomes, (3) there is a direct effect of learning interest on students' mathematics learning outcomes, (4) there is a direct effect of computer laboratory facilities on mathematics education department student's mathematics learning interest, and (5) there is an indirect effect of computer laboratory facilities on students' mathematics learning outcomes through learning interest.

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