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Article

Do students' learning outcomes in mathematics change depending on the availability of learning facilities

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Abstract: The purpose of this quantitative descriptive study is to ascertain how students' learning outcomes in mathematics are impacted by the availability of learning facilities. In order to increase learning outcomes, the teaching and learning process will be more successful if supported by sufficient facilities, such as proper study tables, additional illumination sources, lighting indications throughout the house, appropriate study chairs, appropriate bookcases, availability of math textbooks and worksheet books, internet access at home, sufficient cell phones, student-owned question banks, and internet use can all support learning activities. Thirty students in all took part, and checklists, questionnaires, and documentation were the instruments utilized to collect data. Descriptive analysis of the learning outcome variable data revealed that 20 students in class XI, or 67.67%, finished with a Minimum Passed Value of 80, whereas 10 students, or 33.33%, were incomplete. Using SPSS, a straightforward linear regression calculation method yielded the following results: Y = 98,793 + 0,590X. The findings of the study demonstrate that student learning outcomes are influenced by the accessibility of learning facilities. For additional study, you can focus on variables other than the availability of learning facilities that affect student learning results.

Keywords: availability of learning facilities; mathematics learning; student learning outcomes

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1. INTRODUCTION

The teaching and learning process or teaching activities will be more successful if supported by adequate learning facilities, so that learning outcomes can be improved. (Sternberg, 2014) stated that, "Complete learning facilities will essentially facilitate, accelerate, and deepen the understanding of students or students in the learning process". Schools must have adequate learning facilities and in good condition, this aims to support the learning process(Hossain, Tarmizi, & Ayub, 2012). Learning facilities play a very important role in supporting student creativity in order to achieve learning process(Sitorus & Masrayati, 2016). Utilizing learning facilities in learning is expected to provide ease in absorbing the material presented(Hadinugrahaningsih, Rahmawati, & Ridwan, 2017). The use of learning facilities is a factor that must be considered in learning activities, because learning activities will run well if supported by good learning facilities and vice versa if there are no good learning facilities it will cause students to be hampered in learning so that it can affect student learning outcomes.

Aini, Emanuel, & Chamidah (2021) argues that, "There are two factors that influence student learning outcomes, namely internal factors and external factors. External factors are factors that come from outside the student, such as environmental factors(Putut, Emanuel, Maulina, & Soewardini, 2024) and instrumental factors (curriculum, programs, facilities and infrastructure and teachers). Environmental factors consist of social and non-social. Social environmental factors include schools, families, and communities. The social environment of schools such as teachers, administration, and classmates can influence a student's learning process. The social environment of the family because of a harmonious atmosphere will help students carry out activities well. The social environment of the community, namely the place where students live, will influence their learning process. Non-social environmental factors can be in the form of fresh and cool air conditions, balanced lighting, and a calm atmosphere. While internal factors are factors originating from students such as facilities and infrastructure at home, physiological conditions, psychological conditions (interests, intelligence, talents, motivation and cognitive abilities)(Baeten & Simons, 2014). Based on the mid-term exam scores for the 1st semester in Mathematics, there were 30 students, and it turned out that almost half of the students who did not complete the exam, namely 10 students or 33.33% had a score range below 80 and 20 students or 67.67% had a score of 80 and above even though the minimum completion criteria was 80. Judging from the number of students who did not complete the exam, it means that there are causal factors that cause students' scores not to reach the Minimum Completion Criteria. These causal factors do not only come from within the students, but can also come from outside the students. In this study, the researcher focused on the learning facility factor. The availability of student learning facilities can certainly make it easier for students to participate in learning activities. In the learning process, students need complete learning facilities, such as: the availability of classrooms, library rooms, laboratory rooms, learning equipment and supplies, namely Liquid Crystal Display (LCD), computers and their devices, lights, fans, bookcases, tables, chairs, whiteboards, markers, erasers and textbooks. Learning facilities are very helpful for students and teachers in carrying out the learning process.

Learning facilities can also make students more enthusiastic about learning(Martin & Betser, 2020; Swidan & Daher, 2019). For example, if there is a LCD facility in the class when studying mathematics discussing the material on function derivatives, the teacher can show videos about the application of derivatives to students(Sudarsana,dkk., 2019). Thus, students will be more enthusiastic in following lessons and will not get bored easily. The availability of facilities and infrastructure at home includes wifi, computers, mobile phones, books, and adequate study rooms and study environments at home(Pyper, 2017). Based on observations that have been made, there are some students of SMA Hang Tuah 4 Surabaya who do not have adequate learning facilities and infrastructure at home. Based on the background above, however, the researcher suspects that the influence of the availability of facilities and infrastructure at home has an impact on student learning outcomes at school, particularly in math classes. Students' learning outcomes in mathematics are impacted by the availability of quality learning facilities.

The purpose of this study was to determine the effect of learning facilities on mathematics learning outcomes in class XI SMA Hang Tuah 4 Surabaya. The benefits of this study are divided into two, namely theoretical benefits and practical benefits. The two benefits

are as follows: theoretically, the results of this study can increase the reader's knowledge and as a reference for conducting similar or further research related to the problem of learning facilities on learning outcomes. Practical benefits: for researchers, the results of this study are useful as additional provisions to become prospective mathematics teachers in implementing learning. For schools, this study can be useful as information and input for school administrators to pay more attention to learning facilities in order to improve student learning outcomes. The study was conducted on class XI IPA 2 students, namely 30 students were given a questionnaire to determine the availability of learning facilities and infrastructure at home. Kelly(2014) states that, "A variable is the object of research, or what is the focus of an assessment". Whereas Cresswel(2013) states that, "Research variables are attributes or characteristics or values of people, objects or activities that have certain variations that are determined by researchers to be studied and then conclusions are drawn". From this opinion, it can be concluded that research variables are objects that are the focus of attention in a study that are determined by researchers to be tested for truth and then conclusions are drawn.

This research uses independent variables and dependent variables. Independent variables are variables that influence or cause changes or the emergence of dependent variables(Kelly, 2014). Whereas Cresswel(2013) states that, Independent variables are the estimated causes of several changes in the dependent variable, usually denoted by the symbol X. Based on the two opinions above, it can be concluded that independent variables are variables that influence other variables. The independent variable in this study is the learning facility factor. Adequate learning facilities have several indicators, including study room, study furniture, study equipment(Stewart, Troup, & Plaxco, 2019). The dependent variable is a variable that is influenced or is the result of the presence of the independent variable(Dawkins, 2015). The opinion that is in line states that the dependent variable is the main factor that is to be explained or predicted and is influenced by several other factors, which can be denoted by Y (Meyer, 2018). Based on the two opinions above, it can be concluded that the dependent variable is a variable that is influenced by the independent variable. The dependent variable in this study is mathematics learning outcomes. The indicator of learning success in this study is the Mid-Semester Exam (UTS) score in the odd semester of the 2024/2025 academic year. The hypothesis in this study is formulated in two forms, namely there is no effect of the availability of student learning facilities on mathematics learning outcomes in class XI IPA 2 SMA Hang Tuah 4 Surabaya (Ho) and there is an effect of the availability of student learning facilities on mathematics learning outcomes in class XI IPA 2 SMA Hang Tuah 4 Surabaya (H1).

2. RESEARCH METHODOLOGY

The form of research used in this study is "ex post facto, a research conducted to examine events that have occurred and sort them backwards to find out the factors that can cause the occurrence of these events"(Emre-Akdoğan, Güçler, & Argün, 2018). The researcher chosed the form of ex post facto research because the problems in this study are based on events that have occurred. In this case, Thirty grade 11 students of SMA Hang Tuah 4 Surabaya took part in the study. Based on the midterm exam results, data was gathered. The data collection tools in this study were questionnaires and documentation. The development of data collection tools was carried out in several ways, namely: (1) compiling variable indicators, (2) compiling questionnaire grids, (3) conducting questionnaire trials, (4) conducting questionnaire validity and reliability tests. Variable indicators included lighting,

sunlight, availability of study tables, availability of study chairs, good bookcases, availability of textbooks, availability of LKS books, internet facilities, cell phones, question banks, and use of the internet for learning. In the instruments, each of indicator's score ranges from 1 to 5. After calculated the average value from the total indicator scores, regression analysis is performed. In this study, the data was analyzed using the SPSS software. The data analysis technique used, at first, descriptive percentage analysis describes learning facilities and learning outcomes. The next analysis is a simple linear regression analysis that described the effect of learning facilities on learning outcomes.

3. RESULTS AND DISCUSSION

3.1. Results

To learn well, adequate learning facilities should be available, including study rooms, study furniture, and study equipment. So in principle, learning facilities are everything that can facilitate the teaching and learning process. In this study, the data processing used is descriptive percentage analysis, namely the description of questionnaire questions and questionnaire answers consisting of 11 question items from 30 respondents. The percentage formula used is according to Kelly(2014) as follows:

$$P=f\_x/N \times 100\%$$

Information:

P = percentage

f_x= individual frequency

N = number of students

The criteria used are as follows:

Table 1. Criterias Score

Values of p	Criterias
$\mathbf{0 \leq P < 20}$	Very low
$\mathbf{20 \leq P < 40}$	Low
$\mathbf{40 \leq P < 60}$	Sufficient
$\mathbf{60 \leq P < 80}$	High
$\mathbf{80 \leq P \leq 100}$	Very High

The descriptive results of the percentage of the learning facility variable data can be seen in more detail reviewed from each indicator which can be presented as follows: Item 1 lighting in the house can be categorized as sufficient because it is worth 53.12%. Item 2 other lighting such as sunlight entering the study room can be categorized as very high because it is worth 83.33%. Item 3 regarding the availability of a study table that is suitable for learning activities can be categorized as sufficient because it is worth 60.42%. Item 4 a study chair that is suitable for learning activities can be categorized as low because it is worth 40.62%. Item 5 a bookcase that is suitable for storing books can be categorized as sufficient because it is worth 53.12%. Item 6 availability of math textbooks for each student can be categorized as sufficient because it is 44.79%. Item 7 regarding the existence of LKS books can be categorized as high at 62.5%. Item 8 regarding the availability of internet facilities at home can be categorized as sufficient because it is worth 41.67%. Item 9 on the availability of adequate mobile phones is categorized as sufficient because it is worth 41.67%. Item 10 on the question bank owned by students can

be categorized as sufficient because it is worth 57.29%. Item 11 on the use of the internet to help learning activities can be categorized as sufficient because it is worth 53.12%. Firdaus, Kailani, Bakar, & Bakry(2015) states that "learning outcomes are a measure to determine how far someone has mastered the material being taught". A person can be said to have learned if a change has occurred in him(Gcasamba, 2014). The results of the descriptive analysis of the learning outcome variable data were that 10 students or 33.33% did not complete it and 20 students or 67.67% completed it with a Minimum Completion Criteria of 80.

To find out whether there is an influence between learning facilities and student learning outcomes, a simple linear regression calculation technique is used using the SPSS program. The results of the simple linear regression equation calculation are Y = 98.793 - 0.590X. The constant value (a) is 98.793, meaning that if the student's learning facilities are 0 (zero), it may be the student's capability in learning is good. The learning outcomes are positive, namely 98.793 and the regression coefficient value of the student's learning facilities (b) is negative, namely 0.590, which means that for every decrease in student learning facilities by 1, the learning outcomes will also decrease by 0.590. One of the requirements that must be met in regression analysis is that the data and regression model are normally distributed(Yates & de Oliveira, 2016). Data normality can be seen from the Komlogorov-Smirnov normality test for each variable(Porcelli & Delgado, 2017).

The basis for decision making based on probability > 0.05, then the research data is normally distributed. The results of the normality test obtained a significance value for learning facilities (X) of 0.220 and for learning outcomes (Y) of 0.361. The significance value obtained > 0.05, which means that Ho is accepted or the data is normally distributed. After conducting a simple linear regression analysis, a hypothesis test will be carried out, namely the t-test and R2. T-test aims to determine whether learning facilities have a significant effect or not on learning outcomes. The test uses a significance level of 0.05 and 2 sides. The results obtained for the t table are 0.423, so Ho is accepted and H1 is rejected. So it can be concluded that learning facilities have an effect on the mathematics learning outcomes of class XI students.

Based on the calculations, the simultaneous determination coefficient value was obtained(R2) adjusted R square of 0.050 thus indicating that learning facilities affect students' mathematics learning outcomes. A value of 0.050 was determined based on the R2 test findings. The degree to which learning facilities affect learning outcomes is 0.050, which indicates that 5% of learning facilities have an impact on learning outcomes. The remaining portion is influenced by other variables that were not investigated in this study, including instrumental factors (i.e., curriculum factors, teaching programs/materials, and teachers), environmental factors (i.e., environmental factors), and raw input factors (i.e., student/child factors themselves). Learning facilities have very little impact on student learning outcomes, as seen by this number of 0.050, which falls into the extremely low group.Complete learning facilities are expected to be able to maximize students' abilities and minimize obstacles faced in learning, so that students' learning outcomes are in accordance with the expected goals, this is in line with the opinion of Chikiwa & Schäfer(2018) which states that, "Complete learning facilities will essentially make it easier, speed up and deepen students' understanding in the learning process". Based on the calculation of simple linear regression, the equation Y = 98.793 + 0.590X is obtained, which means that the constant value (a) is 98.793, namely if the

learning facilities (variable X) are zero, then the learning outcomes (variable Y) are 98.793. The regression coefficient value (b) of learning facilities (variable X) is positive, namely 0.590, which means that for every increase in learning facilities of one value, the learning outcomes will also raised by 0.590.

3.2. Discussion

Learning facilities that include existing lighting, sunlight entering the study room, availability of adequate study tables, appropriate study chairs, good bookcases, availability of textbooks owned by students, availability of practice books available, good internet facilities, mobile phones supported by internet availability, question banks collected by students, and use of the internet for learning can affect student learning outcomes. Agree with the idea of Hernama & Maharani(2023) that the existence of a comfortable study room and adequate facilities and infrastructure can support the improvement of student learning outcomes. Facilities and infrastructure can be in the form of study tables and chairs, supported by a collection of textbooks and LKS or question banks collected by students to support the achievement of student learning outcomes. Good internet and utilized properly by students in supporting their learning activities can also improve student learning outcomes. This opinion is in line with the thinking of Safitri & Nurhayati(2018) that the use of information technology in student learning activities can increase insight and knowledge about the material being or will be studied. With the use of good information technology, it can support the improvement of student learning outcomes(Sudarsana, et al., 2019). This idea is in line with research results of Fernández-Sanz, et al.(2017) and Zhang & Liu(2016) which states that information technology that is utilized properly will improve student learning outcomes.

Student learning facilities at home and at school play a very important role in improving student learning outcomes when understanding learning materials(Aini, et al., 2021). The more complete the facilities owned by students, the more their learning outcomes will increase. This is of course with the use of existing learning facilities wisely and carefully in accordance with the purpose of their use, namely to support student learning activities in order to improve student learning outcomes. This opinion is in line with Putut, et al.(2024) which states that the utilization of available learning facilities can support students' learning activities at school and at home. Learning facilities that are available well and completely if not used wisely and carefully can have different impacts from the purpose of their availability. The utilization of these learning facilities also requires assistance, guidance, and supervision from teachers at school and also by parents of students at home. Without good assistance, guidance, and supervision from teachers at school or parents of students at home, it can result in misuse of poor learning facilities by students(Maghfiroh, Agustini, & Basyar, 2023).

In the end, the learning activities carried out by students become unfocused and uncontrolled, which has an impact on their learning outcomes(Mai Sri Lena, et al., 2023). Therefore, the involvement of teachers at school and parents of students when studying at home is very necessary. All of this is needed to support the implementation of learning activities that are directed according to the curriculum and in the end the learning outcomes can be successful. Learning outcomes can be seen from the learning outcomes achieved by students on the learning materials they have studied(Felany, Kirana, & Anam, 2022). Student learning outcomes with good learning activities also reflect the learning achievements achieved by students at the end of the semester or at the end of the school year. Good learning

achievements can determine the next steps that can be taken by students to the next level, and also influence their behavior and attitudes in their lives in the family, school, and community environment around the student's residence(E. P.L. Emanuel , et al., 2021). Learning achievement also shows that students are able to take pride in their success in their learning activities.

5. CONCLUSION

Based on the results of the research and data analysis conducted by the researcher, it was concluded that the availability of student learning facilities at home affects learning outcomes, despite the fact that the impact is minimal. Adequate learning facilities include indicators of lighting at home, where the available lighting is very supportive in learning activities, namely students can read textbooks or other reading media very clearly. Other lighting such as incoming sunlight also greatly affects student learning outcomes. Sunlight that can penetrate the study room affects student learning outcomes. In addition, the availability of a study table that is suitable for learning activities also affects student learning outcomes. Students who have a comfortable study table can be used to carry out their learning activities well so that their learning outcomes can be optimal. The availability of a study chair that is suitable for learning activities supports student learning outcomes. Students who study by sitting on a chair are better than students who do not use a chair when studying.

In addition, the availability of a suitable bookshelf for storing math books also plays a role in achieving good learning outcomes. The availability of math textbooks owned by students is very influential because it can increase students' learning insights. The availability of practice books or math question banks also greatly supports the achievement of optimal learning outcomes. Students who do not have practice or question banks tend to lack insight and experience in solving math problems. In addition, the availability of internet facilities at home also plays a very important role in achieving student learning outcomes. Adequate internet facilities that can be accessed very well increase students' knowledge of the material being or will be studied. The availability of these internet facilities can increase students' enthusiasm for learning so that their learning outcomes increase. In addition, the availability of adequate cell phones, question banks owned by students, and the use of the internet can help learning activities so that their learning outcomes increase. The availability of student learning facilities at home can help students optimize their learning outcomes even though the impact is minimal. For further research, it is possible to pay attention to other factors that affect student learning outcomes, not only the availability of learning facilities.

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