

The Relationship between GPA and Prerequisite Courses on the Mastery of Simple Machines Concepts among Physics Education PLP Students at FKIP Untan

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Abstract - This study aims to determine the effect of GPA and prerequisite courses simultaneously on the mastery of simple machine concepts in PLP II students at FKIP Untan Pontianak. This correlational study involved 50 seventh-semester students of the Physics education study program at the Faculty of Teacher Training and Education (FKIP) Pontianak, Tanjungpura University. Data collection was carried out using measurement techniques, namely tests. The achievement of prerequisite courses and microteaching competence of students were taken from the academic section of the faculty. The analysis found that GPA and prerequisite courses on mastery of simple machine teaching materials were significantly related to correlation coefficients ($r = 0.38$, $r = 0.34$, $p < 0.05$, respectively). In addition, the multiple correlation coefficient was also significant ($R = 0.38$, $p < 0.05$). This means that the relative contribution of the predictor variables of this study to the mastery of simple machine teaching materials is 15.1%, and the remaining 84.9% is determined by other factors not examined in this study. The study showed that GPA and prerequisite courses were significantly related to student's ability in the learning process.

Keywords: GPA; Prerequisite Courses; Simple Machine Concepts

INTRODUCTION

The Faculty of Teacher Training and Education (FKIP) of Tanjungpura University is one of the State University Teacher Education Institutions (LPTK) in West Kalimantan that accommodates thousands of students from various regions. In the Academic Year 2021/2022, were 50 students in the Physics Education Program of the Faculty of Teacher Training and Education. One of the courses at FKIP Tanjungpura University aimed at producing highly competent and professional educators is Introduction to School Fieldwork (PLP).

According to the PLP handbook (2020), PLP is a process of observation and apprenticeship conducted by undergraduate education students to study the aspects and management of education in educational institutions. PLP is a stage in the preparation process of professional teachers in the Bachelor's Degree in Education program. It

involves assigning students to implement their learning outcomes by observing the learning process in schools, practicing the development of teaching materials and guided teaching, and engaging in reflective actions under the guidance and supervision of supervising lecturers and mentor teachers hierarchically (Basyuni, 2020).

To become a professional teacher, sixth-semester students who are prospective teachers must take micro-teaching and practical real-world experience (PLP) in their seventh semester, which is generally part of the curriculum of teacher training institutions (LPTK) in Indonesia (Bhakti & Maryani, 2016). Simply put, micro-teaching and PLP are integral to preparing prospective professional teachers (Musfah, 2015). There are several pedagogical competency courses that students in LPTK must complete before enrolling in micro-teaching, namely: teaching strategies,

instructional media, curriculum analysis, teaching and learning evaluation, and instructional design. These prerequisite courses are essential in the LPTK curriculum (UPT PPL, 2018).

In addition to the prerequisite above courses, another factor that can influence the placement of PLP II students in schools for practical learning is the Cumulative Grade Point Average (CGPA) (Hasanah et al., 2018). The CGPA is influenced by various factors, such as the quality of instructors, measured through the level of formal education completed, mastery of teaching methods, and mastery of the subject matter. The Cumulative Grade Point Average (CGPA) records each course taken during the study period from the first semester to the eighth semester.

Previous studies on CGPA and prerequisite courses have been conducted to determine their influence on students' subject mastery. The research findings concluded that subject mastery is a prerequisite for learning outcomes in mathematics (Putri et al., 2014). Astuti (2018) found that: 1) micro-teaching ability is significantly related to PPL practice; 2) interest in becoming a teacher is positively correlated with micro-teaching ability and PPL practice, and 3) the determination index of micro-teaching and interest in becoming a teacher on PPL practice is 7.50%. The research by Djudin (2019) showed a significant relationship between prerequisite courses and students' ability to perform micro-teaching. The analysis revealed that self-concept, interest in becoming a teacher, and academic achievement in prerequisite courses are significantly associated with the micro-teaching competence of prospective teachers. There is a significant relationship between the score of prerequisite subjects and the score of micro-teaching practice for students in the Mathematics Education

Study Program at FKIP Unsyiah (Alfisyahrin, 2018). The research by Mentari (2017) indicated a 13.5% positive relationship between the Cumulative Grade Point Average (CGPA) and the comprehensive examination scores of students in FKIP Unsyiah. There is a significant relationship between the CGPA and comprehensive examination scores of students in FKIP Unsyiah.

Based on the previous research reviewed, studies specifically focused on examining the influence of CGPA and prerequisite courses on subject mastery have been limited, including in FKIP Tanjungpura University, Pontianak.

One of the teaching materials that PLP II students need to master for junior high school level is simple machines. In the 2013 curriculum, the physics topics include the concept of simple machines. Previous research has been conducted on the topic of simple machines by several researchers. Dahniar (2010) found that students needed help classifying and differentiating simple machine types. The research findings by Bogok (2014) indicated that students needed help distinguishing between the fulcrum, effort, and load points in simple machines. The researcher selects the topic of the simple machine due to its difficulty level for students. The student's learning difficulties and low achievement in this topic may be attributed to their inadequate understanding of the physics concepts being taught. More conceptual understanding can be necessary for students to determine which formulas to use when solving problems (Rumini, 2015). Students learning difficulties in the topic of simple machines require attention from PLP II students as prospective teachers to find alternative solutions. However, research has yet to be conducted to explore the information and subject mastery of simple machine teaching among PLP II students.

Based on the description mentioned above, the researcher is interested in conducting this study to investigate the relationship between CGPA and prerequisite courses among PLP II students and their subject mastery of simple machine teaching in FKIP Tanjungpura University, Pontianak.

RESEARCH METHODS

This research conducted a Descriptive-correlational study to determine the relationship between GPA (IPK) and prerequisite courses on the mastery of the concept of simple machines (Sugiyono, 2017).

The population of this study consists of students from the Physics Education program at the Faculty of Education and Teacher Training (FKIP) Pontianak, Tanjungpura University, who are taking the field introduction to schools and micro-teaching courses in the seventh semester of the academic year 2021/2022, totaling 50 students. The entire sample was selected from the population using a sampling technique.

Data collection was done through measurement techniques, specifically tests. The content validity of the instruments, which includes the suitability of indicators with the questions, the alignment with theoretical aspects, and the language used, was validated by experts' assessments. Instrument revisions were made based on expert comments and suggestions. The instrument's reliability was assessed using Cronbach's alpha coefficient, which yielded a value of 0.88, indicating that all the tested items were considered reliable (Sugiyono, 2017).

Students' achievement in prerequisite courses includes familiarity with school culture, teaching and learning strategies, physics lesson planning, physics teaching evaluation, and micro-teaching (Sari et al.,

2017). The average grades of these prerequisite courses obtained from the academic or instructional unit of the faculty will be calculated.

The correlation coefficient between GPA and prerequisite courses regarding mastery of simple machines will be analyzed using Simple Correlation (bivariate correlation) and Multiple Correlation. Data will be analyzed using the Statistical Packages for Social Science (SPSS).

RESULTS AND DISCUSSION

Results

The variable analysis technique in this study utilizes simple correlation analysis (bivariate correlation) and multiple correlations. These variables consist of independent variables, namely the Cumulative Grade Point Average (GPA) of Physics Education students at FKIP Untan and prerequisite courses, and dependent variables, namely the mastery of teaching materials on simple machines.

Before conducting hypothesis testing, prerequisite analysis tests need to be performed first, namely the normality test and the linearity test.

1. The Normality Test

The normality test is conducted to determine whether the data of GPA and prerequisite courses as independent variables and the mastery of teaching materials on simple machines as the dependent variable obtained in the study follow an approximately normal distribution. The normality test used in this research is the Kolmogorov-Smirnov test. The decision-making basis is as follows:

- a. If the significance value > 0.05 , then the residual values follow a normal distribution.

- b. If the significance value < 0.05 , the residual values do not follow a normal distribution.

The obtained significance value from the table is 0.568, which is greater than 0.05. Therefore, based on the decision-making basis that the significance value > 0.05 , the residual values, namely GPA and the mastery of teaching materials on simple machines, follow a normal distribution. Furthermore, the obtained significance value from the table is 0.470, which is also greater than 0.05. Thus, based on the decision-making basis that the significance value > 0.05 , the residual values, namely prerequisite courses and the mastery of teaching materials on simple machines, follow a normal distribution.

2. The Linearity Test

The linearity test determines whether two variables have a significant linear relationship. The linearity test aims to determine whether the relationship between the GPA and prerequisite courses variables is linear with the variable of mastery of teaching materials on simple machines. These two variables are related if an increase follows in the mastery of teaching materials on simple machines variable in the score of the GPA and prerequisite courses variables. The decision-making basis is as follows:

- a. If the significance value (Sig.) of deviation from linearity > 0.05 , there is a linear relationship between the independent and dependent variables.
- b. If the significance value (Sig.) of deviation from linearity < 0.05 , then there is no linear relationship between the independent and dependent variables.

Based on the results of the linearity test, it is found that the Sig. value of deviation from linearity is 0.382, which is significant. This result indicates that it is

higher than 0.05 and suggests that these two variables have a linear relationship. In other words, the CGPA variable (X1) and the mastery of teaching materials on simple machines variable (Y) have a linear relationship. Furthermore, the results of the linearity test reveal that the Sig. value of deviation from linearity is 0.432, which is significant. This result also indicates that it is higher than 0.05 and suggests that these two variables have a linear relationship. In other words, the prerequisite courses variable (X2) and the mastery of teaching materials on simple machines variable (Y) have a linear relationship.

3. Hypothesis Test

Hypothesis testing is conducted after obtaining the normality and linearity test results. The hypothesis testing used in this study includes simple correlation analysis (bivariate correlation) and multiple correlations.

- a. Hypothesis Testing Result for GPA (X1) and Mastery of Teaching Materials on Simple Machines (Y)

Based on the obtained analysis results, it can be seen that the significance value (Sig.) obtained using SPSS for the CGPA and the score of the simple machines test is 0.006. Therefore, based on the decision-making basis for the simple correlation test, which states that if the significance value < 0.05 indicates a correlation, or if the significance value > 0.05 , it indicates no correlation. It is determined that these two variables have a relationship or can be considered correlated.

Furthermore, the correlation values are also obtained, with a correlation value of 0.382 for the CGPA and a correlation value for the score of the simple machines test. According to the guideline for the degree of relationship, the value of 0.382 falls

between 0.21 and 0.40, indicating a significant positive relationship between the two variables (in the weak category).

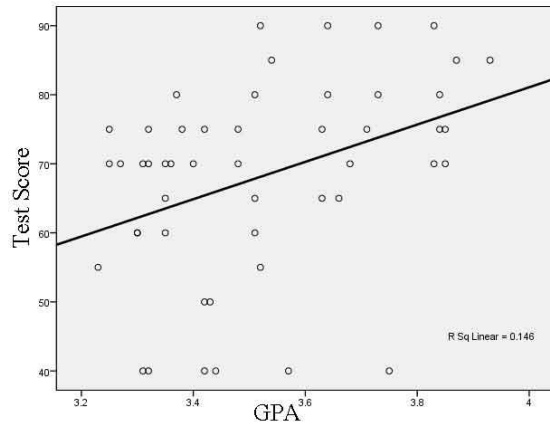


Figure 1. The Graph of the Relationship between GPA and Simple Machine Test Scores

b. Hypothesis Testing Result for Prerequisite Courses (X2) and Mastery of Teaching Materials on Simple Machines (Y)

Based on the obtained analysis results, it can be seen that the significance value (Sig.) obtained using SPSS for the prerequisite courses and the score of the simple machines test is 0.014. Therefore, it is determined that these two variables have a relationship or can be considered correlated because the significance value of 0.014 is less than 0.05.

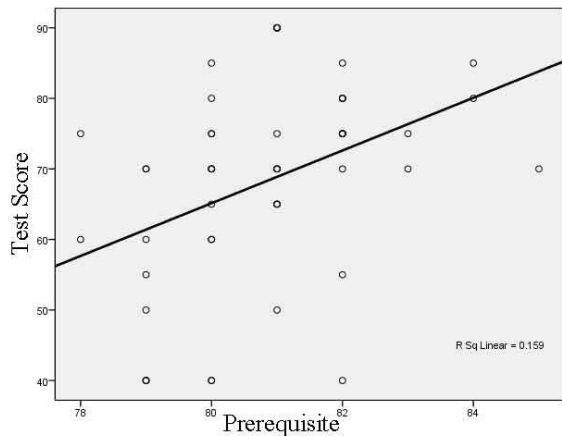


Figure 2. The Graph of the Relationship between Prerequisite Courses and Simple Airplane Test Scores

Furthermore, the correlation values are also obtained, with a correlation value of 0.344 for the prerequisite courses and a correlation value for the score of the simple machines test. According to the guideline for the degree of relationship, the value of 0.344 falls between 0.21 and 0.40, indicating a significant positive relationship between the two variables (in the weak category).

Based on the data analysis, the obtained significance value (Sig.) using SPSS for the F change value is 0.021. Therefore, it is determined that there is a simultaneous influence of GPA and prerequisite courses on the mastery of teaching materials on simple machines among PLP II students at FKIP Untan Pontianak, or it can be considered as a correlation because the significance value of 0.021 is less than 0.05.

Furthermore, the correlation value is also obtained, which is 0.389. According to the guideline for the degree of relationship, the value of 0.389 falls between 0.21 and 0.40, indicating a relationship between the two variables (in the weak category).

Discussion

This study aimed to determine whether there is a simultaneous relationship between GPA and prerequisite courses on the mastery of teaching materials on simple machines among PLP II students at FKIP Untan Pontianak.

The data analysis was conducted using the SPSS for Windows 17 program. There are several stages in analyzing the data in this study, namely the normality test, linearity test, and hypothesis testing.

The results obtained from the normality test using the SPSS program indicate that the GPA and prerequisite courses data for the mastery of teaching

materials on simple machines among Physics students at FKIP have a normal distribution.

Next, a linearity test was conducted to determine the linearity of the relationship between the independent and dependent variables. Based on the linearity test for the distribution of GPA and prerequisite courses on the mastery of teaching materials on simple machines, correlation coefficients of 0.382 and 0.432 were obtained, respectively ($p > 0.05$). These results indicate that the relationship between GPA and prerequisite courses on the mastery of teaching materials on simple machines among Physics students at FKIP Untan in this study is linear.

Furthermore, the relationship between GPA and the mastery of teaching materials on simple machines among Physics education students at FKIP Untan concludes that there is a significant positive relationship (in the weak category) between cumulative grade point average (GPA) and the mastery of teaching materials on simple machines among Physics education students at FKIP Untan Pontianak.

The correlation between GPA and the mastery of teaching materials on simple machines among Physics education students was analyzed using simple correlation, with a coefficient of 0.382 in a positive direction. This positive direction indicates that as the GPA of students increases, the score on the simple machines material test obtained by students also increases. Conversely, as the GPA of students decreases, the score on the simple machines material test obtained by students also decreases.

Furthermore, the relationship between prerequisite courses and the mastery of simple machine concepts among physics education students in FKIP Untan concludes that there is a significant positive relationship (in the weak category) between prerequisite courses and the mastery of

simple machine concepts among physics education students in FKIP Untan Pontianak. The correlation between the average scores of prerequisite courses and the mastery of simple machine concepts among physics education students was analyzed using simple correlation, yielding a coefficient of 0.344 with a positive direction.

The relative contribution of cumulative grade point average (GPA) and prerequisite courses to the mastery of simple machine concepts among PLP II students in FKIP Untan Pontianak is determined. The correlation coefficient falls within the range of $0.20 \leq r < 0.399$ (low category), with a value of ($R = 0.389$). The mastery of simple machine concepts by PLP II students in FKIP Untan is influenced by GPA and prerequisite courses by 15.1%, while the remaining 84.9% is determined by other factors not examined in this study.

Hypothesis testing was conducted to determine the influence of Cumulative Grade Point Average (GPA) and prerequisite courses on the mastery of simple machine concepts among physics education students in FKIP Untan. This study's hypothesis states that a significant relationship exists between the mastery of simple machine concepts among PLP II students, as measured by GPA and prerequisite courses in the Physics Education Program at FKIP Untan Pontianak. Based on the data analysis results, it can be concluded that the hypothesis stating the existence of a significant relationship between the mastery of simple machine concepts among PLP II students, as measured by IPK and prerequisite courses in the Physics Education Program at FKIP Untan Pontianak, is accepted.

Sri Mulyani (2013) demonstrated a correlation between Cumulative Grade Point Average and Comprehensive Examination Scores among the Geography Education

Program students at FKIP Unsyiah. The obtained correlation coefficient (r_{xy}) was 0.324, and the calculated $t_{count} = 2,81 > t_{table} = 2,00$.

Djudin (2019) showed a significant relationship between prerequisite courses and students' ability to conduct micro-teaching. The analysis found that self-concept, interest in becoming a teacher, and academic achievement in prerequisite courses significantly correlated with prospective teachers' competence in micro-teaching.

CONCLUSION

Based on the specific data analysis, a weak correlation exists between GPA and the mastery of simple machine concepts among PLP II students at FKIP Untan Pontianak. It is indicated by a simple correlation coefficient of ($r = 0.38, p < 0.05$). Furthermore, there needs to be a stronger correlation between prerequisite courses and the mastery of simple machine concepts among PLP II students at FKIP Untan Pontianak. It is indicated by a simple correlation coefficient of ($r = 0.34, p < 0.05$). The study also found the relative contributions of GPA and prerequisite courses to the mastery of simple machine concepts among PLP II students at FKIP Untan Pontianak. The correlation coefficient falls within the range of $0.20 \leq r < 0.399$ (categorized as low) with a value of ($R = 0.389$). The mastery of simple machine concepts among PLP II students at FKIP Untan is influenced by GPA and prerequisite courses to 15.1%. In comparison, the remaining 84.9% is determined by other factors not investigated in this study.

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