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# THE EFFECT OF UNIVERSITY ENTRANCE SELECTION PATHWAY ON FIRST-YEAR GPA OF UNDANA MATHEMATICS EDUCATION STUDENTS

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**ABSTRACT:** This study aims to see whether the university entrance selection path significantly affects the first-year GPA of UNDANA Mathematics Education students. This research was carried out in the mathematics education study program FKIP UNDANA by taking data on the university entrance selection path of 220 mathematics education students who entered in 2014 – 2020 and their GPA data after studying for one year in the mathematics education study program. This data then analyses using simple linear regression theory – one categorical independent variable with several categories assisted by the SPSS application. The study results show that the university entrance path has a significant effect on the first-year GPA of mathematics education students. The F value obtained is 5.043 with sig. = 0.007 < 0.05, so the hypothesis $H_0$ is rejected, and Ha is accepted. In addition, this study also shows that students with SNMPTN entrance pathways have a higher average first-year GPA than students with SBMPTN and SMMU entry pathways.
***Keywords:*** *university entrance selection path, GPA, regression with dummy variables.*

## INTRODUCTION

Nusa Cendana University (UNDANA) is the first higher education provider in East Nusa Tenggara. As the oldest university, UNDANA has made many service improvements to improve the quality of education and university output. UNDANA has also opened various academic programs such as Diploma 3 (D3) Programs, Undergraduate Programs (S1), Professional Programs, Masters Programs (S2), and Doctoral Programs (S3).

Admission of new students for the S-1 Program is carried out through national selection such as the National Entrance Selection of State Universities (SNMPTN) and the Joint Entrance Selection of State Universities (SBMPTN); and an independent test known as Undana Mandiri Entrance Selection (SMMU). New student admissions are nationally 80% (eighty percent) and Mandiri 20%, through written exams and invitations according to applicable regulations. (Copy of the Attachment to the Regulation of the Minister of Research, Technology, and Higher Education Number 93 of 2016 concerning Minimum Service Standards for the University of Nusa Cendana)

The mathematics education study program is one of the study programs at the Faculty of Teacher Training and Education (FKIP) UNDANA. It was founded in 1968 and has produced mathematics education graduates and professional teachers. High school graduates from East Nusa Tenggara are also quite demanding to continue their higher education in this study program. It is seen in the UNDANA student body data for the interest of high school graduates in the mathematics education study program. Therefore, various efforts have been made by the mathematics education study program to maintain the quality of the study program graduates, such as objectivity in providing student academic assessments, which can be seen in the student's Grade Point Average.

The Grade Point Average (GPA) is a number that shows the cumulative achievement or progress of student learning starting from the first semester to the last semester that has been taken. GPA is also used as a criterion for giving academic sanctions and evaluating studies at the end of the program. Study evaluation is carried out twice, at the end of semester four and semester 8. Students who have a GPA of less than two and do not achieve the minimum number of credits earned (SKSD) will be given the option to transfer to another study program or another university.

Seeing the importance of GPA on the sustainability of a student's education in university the researchers were interested in seeing whether the university entrance path affected the GPA of the first-year students of Mathematics Education at the University of Nusa Cendana.

## THEORETICAL FRAMEWORK

### Path of Admission and Allocation of New Student Accommodation

The admission path for new Undergraduate students at PTN (state universities) is carried out through (a) the National Entrance Selection of State Universities (SNMPTN). Which is carried out based on the results of tracking academic achievements or portfolios of prospective students; and (b) Joint Entrance Selection of State Universities (SBMPTN) is carried out based on the results of the computer-Based Written Examination (UTBK) and other criteria agreed by the PTN. In addition to accepting new students through the SNMPTN and SBMPTN, PTNs can conduct independent selection using the UTBK results. The quota for the capacity of each Study Program provided for prospective new students participating in the SNMPTN is set at least 20% (twenty percent) of the capacity of the Study Program concerned. The quota for each Study Program provided for prospective new students participating in the SBMPTN is set at least 40% (forty percent) of the capacity of the Study Program concerned. Meanwhile, the quota for each Study Program provided for prospective new students who take part in the independent selection is set at a maximum of 30% (thirty percent) of the capacity of the Study Program concerned. (https://ltmpt.ac.id/).

### Grade Point Average (GPA)

The Grade Point Average (GPA) is a number that shows student achievement in the academic field. It is obtained from the sum of the results of multiplying credit score by weight value of each subject divided by the number of credits for all courses that students from the first semester have contracted to the last semester they have taken. (Wulandari, 2015)

## METHOD

The type of research used in this research is quantitative research. This research was carried out in the UNDANA Mathematics Education Study Program in July 2021. The population in this study were students of Mathematics Education FKIP UNDANA in 2014 - 2020, so the population in this study amounted to 480 students. The sampling used formula of Slovin, with an error of 5%, so that the sample taken by the researcher was 220 students. After obtaining the number of samples, the samples will be divided proportionally for each entry path in each year of entry. The sampling technique used in this study is Proportionate Stratified Random Sampling. Researchers collect data through study documentation. The requested data is on the number of students from 2014 to 2020 and GPA data for first-year students from 2015 to 2021.

To determine the effect of the independent variable, the University entrance selection path (X) on the dependent variable for the first-year GPA of Undana mathematics education students (Y), simple linear regression analysis was used - one categorical independent variable with several categories. Due to the data on the University entrance selection path in the form of 3 categories (1 = SNMPTN, 2 = SBMPTN, and 3 = SMMU). Codes 1, 2, and 3 assigned to each university entrance selection path do not represent anything and are merely a label. However, because linear regression assumes all independent variables are numeric, if we include the university entrance path variable into a linear regression model, the code values of the three categories will be interpreted as numerical values for each category. Therefore, when we use linear regression without changing the value of the category code, it will give us unreasonable results. To avoid errors, we can create a **dummy variable** for the university entrance path variable. (www.southampton.ac.uk).

The dummy variable only has 2 (two) values, 1 (one) and 0 (zero)—a value of 1 (one) for one category and 0 (zero) for another category. The number 1 (one) indicates the presence of an attribute, while the number 0 (zero) indicates the absence of an attribute (Widarjono, 2007). Each dummy variable represents one category of a non-metric independent variable, and each non-metric independent variable with k categories can be expressed in k-1 dummy variables (Ghozali (2005); Field (2009)). Because the independent variables consist of 3 categories, namely SNPMTN, SBMPTN, and SMMU, 3-1 = 2 dummy variables will be used in data analysis. The baseline group in this study was SNMPTN which was used to compare with other groups. The dummy variables used in this regression model are coded SBMPTN = 1 and SMMU = 1. This means that we will include 1 as the value of X in the regression equation Y = a + bX (www.southampton.ac.uk).

### Hypothesis Tester

Hypothesis testing in this study uses the F test. Mellisa (1993) says that the appropriate significance test for the influence of independent variables with many categories on the dependent variable is the F test. The differences in each categorical variable are explained by the entire set of dummy variables and not by a single dummy variable. Meanwhile, the t-test is used for each coefficient which indicates that the expected value of the dependent variable for

each category in the independent variable is significantly different from the baseline group.

a) Determining the hypothesis
   $H_0$: the university entrance selection path has no significant effect on the first-year GPA of Undana mathematics education students.
   Ha: the university entrance selection path has a significant effect on the first-year GPA of Undana mathematics education students.
b) Testing Criteria
   How to compare the value of $F_{count}$ with the value of $F_{table}$ with 95% confidence interval or with constant < 5% as follows:
   If $F_{count} \leq F_{table}$ or sig. > 0.05, then $H_0$ is accepted Ha is rejected
   If $F_{count} > F_{table}$ or sig. ≤ 0.05, then $H_0$ is rejected Ha is accepted

## RESULTS AND DISCUSSION

### Results

The following shows the SPSS output from a simple linear regression analysis test–one categorical independent variable with several categories.

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .211[a] | .044 | .036 | .34136 |

a. Predictors: (Constant), Variabel Dummy SMMU, Variabel Dummy SBMPTN

**ANOVA[a]**

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 1.175 | 2 | .588 | 5.043 | .007[b] |
| | Residual | 25.286 | 217 | .117 | | |
| | Total | 26.461 | 219 | | | |

a. Dependent Variable: IPK Mahasiswa Pendidikan Matematika Tahun Pertama
b. Predictors: (Constant), Variabel Dummy SMMU, Variabel Dummy SBMPTN

**Coefficients[a]**

| Model | | Unstandardized Coefficients B | Unstandardized Coefficients Std. Error | Standardized Coefficients Beta | T | Sig. |
|---|---|---|---|---|---|---|
| 1 | (Constant) | 3.278 | .041 | | 79.777 | .000 |
| | Variabel Dummy SBMPTN | -.127 | .056 | -.177 | -2.278 | .024 |
| | Variabel Dummy SMMU | -.178 | .058 | -.239 | -3.076 | .002 |

a. Dependent Variable: IPK Mahasiswa Pendidikan Matematika Tahun Pertama

Figure 1. SPSS output from a simple linear regression test–one categorical independent variable with several categories.

Based on Figure 1 in the Anova section, it is known that the F value obtained is 5.043 with sig. = 0.007 < 0.05. It means that the university entrance path has a significant effect on the first-year GPA of mathematics education students. In addition, we can use the SPSS output in Figure 1 of the Coefficients section to write the appropriate regression equation for this model and use it to predict **the first-year GPA** scores for any given **university entrance selection path**. In this case, **SNMPTN** is the baseline group determined by the researcher. Therefore, the **Constant** coefficient value of 3,278 represents the predicted average students' first-year GPA of the respondents in that group. Please note that the dummy variable used in this regression model is coded as SBMPTN = 1 and SMMU = 1. It means that we will input one as the value of X in the regression equation.

$$Y = a + bX$$

The predicted scores are as follows:

**GPA** = 3.278 + **(-0.127 x 1)** = **3.151 (SBMPTN)**
**GPA** = 3.278 + **(-0.178 x 1)** = **3.1 (SMMU)**

So, the average GPA of students with SBMPTN entry has 0.127 points lower than the GPA of students with SNMPTN entrance. Likewise, students with SMMU entry pathways' average GPA are 0.178 points lower than the GPA of students with SNMPTN entry pathways.

The linear regression model above calculates the average confidence score for the dependent variable from each dummy variable created. We can check to see if the calculated mean score is correct by using the compare means function. The result of comparing the average means with the **compare means** function should be the same as the way we calculated it above. Calculating the mean score using simple linear regression, with only one independent variable, effectively functions the same as comparing means (www.southampton.ac.uk). Therefore, to check whether our linear regression model is correct or not, the average score for each entry path is calculated using the compare means function. The SPSS compare means function results

show that the average GPA of first-year students with the SNMPTN entrance is 3.2784, the SBNMPTN entrance is 3.1510, and the SMMU entry is 3.1003. The average GPA using a linear regression function and the compare means function for each entry path are the same, so it can be said that the regression model that has been built is correct

The significance value in Figure 1 in the coefficients section shows the difference in the first-year GPA of Undana Mathematics Education students between the categories displayed with SNMPTN as the baseline group. There is a difference in the first-year GPA of Undana mathematics education students between the SBMPTN and SNMPTN entry pathways ($t = -2.278$; $p = 0.024 < 0.05$). From Figure 1, the coefficients section also shows a difference in the first-year GPA of Undana Mathematics Education students between the SMMU and SNMPTN entry paths. ($t = -3.076$; $p = 0.002 < 0.05$)

**Discussion**

Based on the results of the analysis described above, it is found that the variable (X) of the university entrance selection path has a significant effect on the variable (Y) of the first-year GPA of Undana Mathematics Education students. From Figure 1, the average GPA of students with the SBMPTN entrance path has 0.127 points lower than the GPA of students with the SNMPTN entrance path. Likewise, students with SMMU entrance pathways' average GPA is 0.178 points lower than the GPA of students with SNMPTN entrance pathways. In other words, students with the SNMPTN pathway have an average GPA that is higher than the two other university entrance selection pathways.

This research aligns with Munawaroh's (2015) research, which states that entrance pathways influence student achievement in Science Education FKIP Trunojoyo Madura University (UTM) in the Basic Magnetic Electricity course. From the results of hypothesis testing, $H_0$ is rejected, and $H_1$ is accepted with a value significance of 0.002. This value is smaller than the specified significance value of 0.05. However, Munawaroh's research showed that based on the average value of Basic Magnetic Electricity, it could be seen that the highest average score was achieved by students who were accepted by the SBMPTN pathway, which was 73.1803. Followed by the SNMPTN pathway, which was 67.5098, and the lowest was SMMUTM line is 64.3333. It is different from the findings in this study, which found that SNMPTN had a higher achievement (GPA) than the other two pathways.

Fanggidae (2021) classified the factors that affect the academic achievement of mathematics education students at FKIP UNDANA using the *CHAID* method. The data analysis method used in this study is the *CHAID* Classification method, whose algorithm uses the *chi-square* statistical test. Fanggidae found that (1) the classification using the *CHAID* method produces a decision tree diagram that shows the classification results, where two variables are significantly related to student academic achievement, student entry points and the average student exam score. (2) The results of the *CHAID* classification will predict students who have GPA scores with very satisfactory predicates where students who have the highest GPA scores with the highest very satisfactory predicates are students who enter through the SNMPTN path. In contrast, students with GPA scores with the lowest satisfactory predicates enter through the SBMPTN or MANDIRI have an average UN score. The results of Fanggidae's research strengthen the findings of this study where the university entrance selection path affects the first-year GPA of Mathematics Education FKIP Undana students. Fanggidae also found that the SNMPTN entry pathway had a better GPA than the other two pathways.

## CONCLUSION

Based on the results and discussion, it can be concluded that the university entrance path has a significant effect on the first-year GPA of mathematics education students. The F value obtained is 5.043 with sig. = 0.007 < 0.05, so the hypothesis $H_0$ is rejected, and Ha is accepted. In addition, this study also shows that students with SNMPTN entrance pathways have a higher average first-year GPA than students with SBMPTN and SMMU entry pathways.

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