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# Analysis Of Mathematics Student Error To Solve Problems Of Linear Programs

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***Abstract***

*The goal of this research is to describe the analysis of mathematics students error to solve problem of linear programs. This research belongs to the type of qualitative research with using a descriptive approach. The data collection technique is done by giving tests in the form of linear program story questions and interviews. This study used in fifth semester of the students of mathematics of Pahlawan University. The results showed that the types of conceptual errors are: a) making graphic error solution, b) error in using the concept of a variable that will be used, c) identify what is asked and d) choosing error symbol. Procedural errors are: a) error in choosing the strategy to be used in problem solving, b) error in apply strategy to solve the problem, and c) error in viewing return what is the solution obtained is in accordance with what known and asked. Causative factor students make mistakes in solving program problems linear: a) Students are not accustomed to solving story problems so that students have difficulty transform into a mathematical model b) Students do not understand the concept of symbols inequalities c) Students are less proficient at making graphs including determining the area completion d) Students do not understand the concept of extreme points e) Students are less thorough in performing calculation operations*

***Keywords: Error Analysis, Problem Solving, Linear Programming.***

## INTRODUCTION

In education, one of the most important subjects is mathematics. Mathematics is a means of thinking to develop the ability to think logically, systematically and critically. To realize this ability, the National Council of Teacher of Mathematics (NCTM) (2000) defines five basic mathematical abilities, namely problem solving (problem solving), reasoning and proof (reasoning and proof), communication (communication), connections (connections), and representation (representation). Mathematics is a language used in daily activities to study patterns and relationships and understand and solve problems (Yanala, Uno, & Kaluku, 2021). Mathematics has an important role in dealing with advances in science and technology, because mathematics is one of the basic sciences in mastering science and technology. Mathematical material currently used in the technology field, namely data structures, digital systems, mathematical logic is used as a programming language (LMaure, D. Djong, & B. N. Dosinaeng, 2020). One of the functions of studying mathematics is to develop the skills of counting, measuring, and applying mathematical formulas in real life. Mathematics is one of them to understand mathematical concepts. Mathematical concepts are a prerequisite for understanding further concepts. Understanding is the process of being able to explain and describe something more deeply, while a concept is a thought or idea (Kartika, 2018).

Problem solving ability is very important and must be developed in learning mathematics. However, in reality, this problem solving ability has not been mastered by students. There are still many students who are not optimal in solving problems. Hayat (2010) said that the low problem-solving ability of students in Indonesia is evidenced by the results of tests conducted by two international studies, the Program for International Student Assessment

(PISA) in 2018 and Trends in International Mathematics and Science Study (TIMSS) in 2015. The purpose of PISA is to measure the level of students' ability to use knowledge, their mathematical skills in dealing with everyday problems. The results of a survey conducted by the Program for International Student Assessment 2018 (PISA) stated that Indonesian students' mathematical abilities were in the very low category. Indonesia is ranked 73 out of 79 participating countries. Puspendik (2016) stated that Indonesia only managed to achieve an average score of 379. In addition, the findings from the Trends International Mathematical and Science Study, an international research to measure students' ability in mathematics, showed that Indonesia was still in the bottom line, a mathematics score of 397 put Indonesia in the number 45 out of 50 countries. The survey results are a stimulus that requires efforts to improve mathematics learning, especially students' mathematical problem solving abilities.

One of the compulsory subjects that students of the mathematics study program must take is a linear program, where this material learns about how to maximize or drink something problems with certain restrictive conditions. In studying mathematics, it is not only the ability to count that is needed, but the ability to think, reason, and argue is also needed (Melinda Rismawati, 2018). One's ability to master multiple concepts, allows one to solve problems well. If students' understanding of concepts is good, it will be easier to learn mathematics about solving linear programming problems. In fact, in the field of mathematics learning process is often given theory, case examples, and exercises, less emphasis on mastery of concepts. Students memorize the formula more often than understand the concept. Teachers also have not fully taught with an emphasis on mastery of concepts. If this condition continues, students cannot solve problems at a high level.

So that students are able to master the basic techniques of Linear Algebra and be able to apply them to solve problems, students are required not only to memorize formulas but more than that is to understand concepts correctly in order to be able to apply them to solve problems.

Based on the researcher's experience as a lecturer in linear programming courses, although this material is very closely related to everyday life and has been studied during high school, most students still have difficulty understanding and solving problems related to linear programming. So this results in low student learning outcomes. Of course, this cannot be left alone, considering that students of the mathematics study program are mathematics students who will become educators who will teach this material back to students. So they must have sufficient competence to produce quality students.

## RESEARCH METHODS

This research is a type of research qualitative by using the approach descriptive. Descriptive research is research intended to investigate the state, condition, situation, events, activities, etc. The results are presented in the form of a report research (Arikunto, 2010: 3). As for the will be described in this study is the error analysis of prospective students teacher in solving linear program.

The subjects of this research are all education study program students math in progress linear programming course which amounts to 35 students. While the sample are 3 students the most make mistakes and communicate. This research consists of two kinds. *Firstly*, the main instrument is the researcher themselves, because the researchers themselves directly related to the subject research and not represented to people other. *Seconly*, the auxiliary instrument consisting of: 2 linear programming questions (maximum questions and minimum questions) and interviews. order test it is feasible and valid to use In this research, validation is held

content and language by two experts, namely two lecturers mathematics from Pahlawan University. The interview was conducted for get the reason directly why do students do error.

Research subjects are given a test solve linear programming problems and given time to finish it. Then the subject research interviewed based on results her job. Interview is also expected can give new information that is possible not obtained in the written test, because it can only what students think is not written down, this will probably also revealed in the interview. To test the validity of the data, this research uses triangulation time, namely by checking the degree trust multiple data sources obtained at different times and obtained at different times.

Thus, this data collection was carried out at least twice with tasks that different but the content of the task is the same. Then analyze all the data carried out in the following stages:

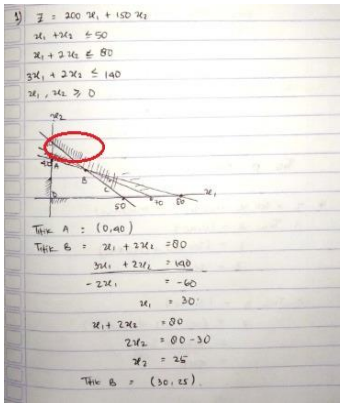
1) Data reduction, the steps that carried out in reducing the data in this research is to collect the results subject's work, transcribing the results interview, recheck the results the transcript by listening return the results of the interview with the subject related.
2) Presentation of data, data that has been reduced then classified and identified so that it is possible researchers to draw conclusions.
3) Drawing Conclusion, from conclusion. student error analysis is obtained teacher candidates in problem solving linear program.

## RESULTS AND DISCUSSION

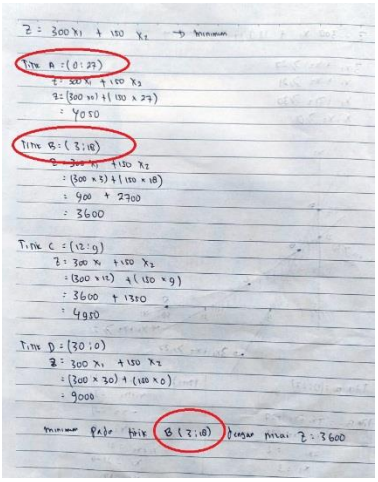
Based on the written results and interviews with all three subjects obtained data analysis as follows:

1. Conceptual error

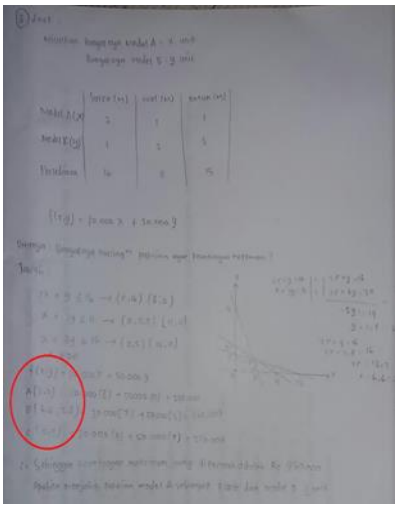
a) making graphic error solution



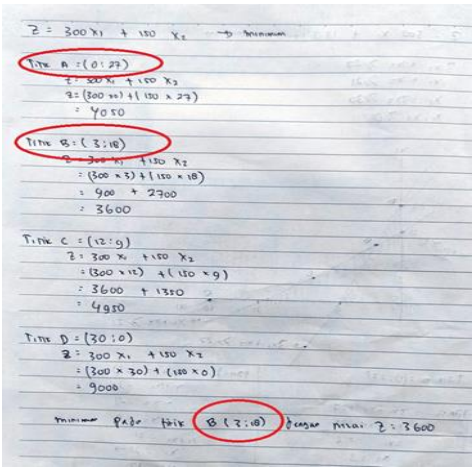
b) error in using the concept of a variable that will be used



c) identify what is asked

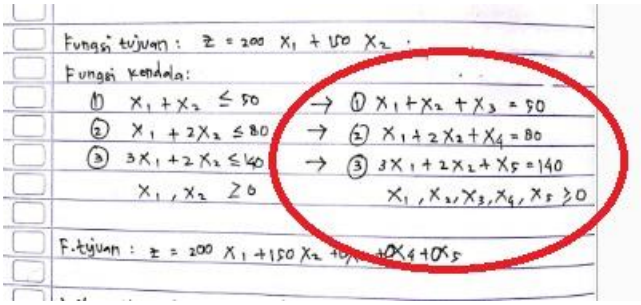


d) choosing error symbol

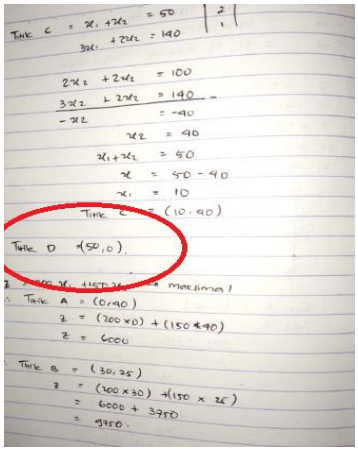


2. Procedural error

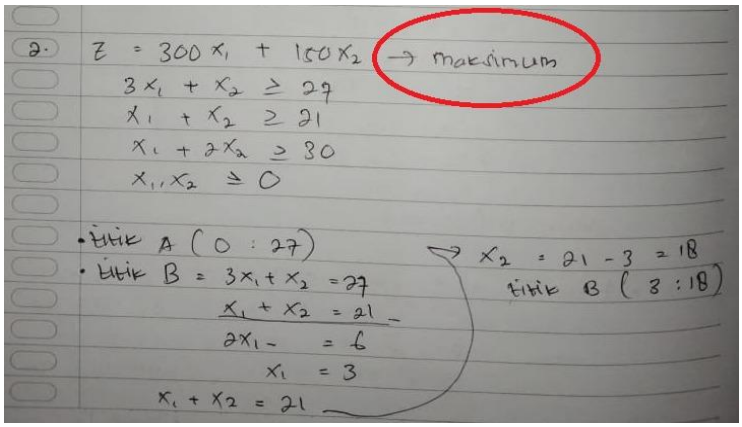
a) error in choosing the strategy to be used in problem solving




b) Error in apply strategy to solve the problem.




c) error in viewing return what is the solution obtained is in accordance with what known and asked.



## CONCLUSION

1. Types of student teacher mistakes math in solving the linear programming problem is:
   a. Conceptual errors include: making graphic error solution, error in using the concept of a variable that will be used, identify what is asked and choosing error symbol
   b. Procedural errors include: error in choosing the strategy to be used in problem solving, error in apply strategy to solve the problem and error in viewing return what is the solution obtained is in accordance with what known and asked.
2. Factors causing student teacher candidates math make mistakes in solve linear programming problems:
   a. Students are not used to it problem solving story so students have difficulty transform into a model mathematics.
   b. Students do not understand inequality symbol concept.
   c. Students are not proficient at making the graph includes specifying the area solution.
   d. Students do not understand extreme point concept
   e. Students are less careful in perform calculation operations.
3. Alternative solutions to overcome teacher student mistakes math in solving linear programming problem:
   a. Lecturers often give practice story questions so that students get used to it create mathematical models.
   b. Lecturers take advantage of the application math like app geogebra so that students can learn how to make graphs, determine the solution area and determine the optimal solution.
   c. Lecturers need to design devices able learning overcoming errors that have been made by students so that the same mistakes can minimized..

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