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**SPATIAL QUOTIENT IMPROVEMENT THROUGH THE DEVELOPMENT
 OF BRAINSTORMING LEARNING METHOD BASED ON SOFTWARE
 GRAPHMATICA RESEARCH OPERATION LINEAR PROGRAM**

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Abstract

The aim of this research and development was to know the effect of the brainstorming model based on software graphmatica on spatial quotient research operation linear program. Graphmatica is a tool that plans calculations with numbers and calculus facilities. Combining cartesian chart functions, relationships and equations, parameters, polarization and ordinary differential equations, has about 999 graphs. In addition Graphmatica also has the ability to break the sequence of numbers and display tangent, integral and clear lines. This tool can be applied from secondary school to college. Spatial intelligence is the ability to think someone mengimajinasikan an object in the form of images and space. The development of this product uses a literature study to strengthen the development of a product. This educational product is in the form of Brainstorming learning method and software (software) Graphmatica. Through this stage will examine the scope of Brainstorming and Software Graphmatica methods, the breadth of use, supporting conditions for the product to be used or implemented optimally, and its advantages and limitations. A literature study is also needed to determine the most appropriate steps in the development of the product. In the results of the linear program exam as much as 19 muhammadiyah university students showed good learning outcomes after applying the development of software product graphmatica. This shows that there is an influence in the development of graphmatica software products with the brainstorming model of linear program learning outcomes.

Keywords: Spatial Quotient, Brainstorming, Software Graphmatica

1. Introduction

In the era of globalization, each country is competing to develop its own potential and resources through strengthening and developing the science of mathematics. Susilo (2012) states that mathematics is a science that has an important role and occupies a core position in the world of science. Operations Research is one of the courses that has a strategic role and is very useful in its application to solve problems related to the world economy, banking, industry and so forth. Based on observations made by researchers, showed that students in studying this material more dititkberatkan on the process of memorizing steps pengerjaannya without understanding more deeply what the benefits of this course if really implemented to solve the problem significantly.

One cause of this is the learning process is still applying the conventional learning method in which the learning process is more dominant one way. Students still partially understand the application of the Operations Research with the subject matter of the Linear Program in the real world. In addition, the students have not been introduced to the development of technology-based learning methods to facilitate their application from a problem to the completion process. Application of learning combined with the use of tools in the form of technology (software) will greatly help students to be able to understand the concept of the material as a whole, because in principle the development of technology-based learning methods made in accordance with the original concept and displayed in an easy to understand.

The hope is that when students are really faced with real problems, the concept will be applied in accordance with the material that has been studied. Graphmatica is a graphical software maker created by k soft, Inc. Graphmatica software has advantages in knowing the position (image) of an equation or linear inequality, quadratic function etc. and its size is relatively small (under one megabyte) and easy to use. Salamat (2013) states that Graphmatica Software can improve students' understanding and learning outcomes in mathematics subjects. The author hopes with the implementation of Graphmatica Software on the learning process will be able to improve the spatial intelligence (spatial quotient) students in learning the subject of linear programming.

1.1 Learning achievement

According to D. Gunarso Singih (2004: 17) learning achievement is the maximum results achieved after



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