USE OF SOFTWARE LINDO WITH GUIDED DISCOVERY LEARNING METHOD TO INCREASE THE OTIVATION OF STUDENT LEARNING IN LINEAR PROGRAM COURSE

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Abstract

Mathematics education class of 2013 students at University of Muhammadiyah Jakarta have less motivation to study. This can be inferred from the grades of the students in Linear Algebra Course. Almost all of students got E in linear algebra. Some students not motivated in the explanation of the lecture and they not followed the learning process. The learning process is still centered on the teacher, so the students seem waiting the lecture from the teacher. Therefore, we conduct Classroom Action Research in the Linear Program course to the class of 2013 to improve students' motivation. The Classroom Action Research use guided discovery method assisted Software LINDO. Linear program is a mathematical method of allocating scarce resources to achieve a single goal such as maximizing profits or minimizing cost. Guided discovery method is a development method of Pieget Constructvism theory, that is a learning that emphasizes the importance of students sctivities who are active in constructing his knowledge. In general, software LINDO will provide direct experience for students to formulate, solve and verify a valid formula based on the solution method. In our result, There is an increase 2.82% on students motivation from Cycle I (69.46%) to Cycle II(72.28%), and there is an increase 2.83% from Cycle II (72.28%) to Cycle III (75.11%). The students' motivation in Linear program course has reached 75.11% using this approach. Moreover, the percentage of students' interest of the approach assisted   Software LINDO is 93.75%.

Keywords: Software LINDO, Guided Discovery Learning Methods, Linear Program, Mathematics Education.

INTRODUCTION

L inear Programming is a mathematical method that allocate limited resources to achieve the best outcome such as maximum profit or lowest cost. Linear Programming widely applied to solve the problems in economic, social and military industry. In real life we often use unwitingly the principles of Linear Programming as in building projects, parking lot and so forth. Linear programming subject needs to be given to students of Mathematics education to equip the students in solving various problems in real life as in in economic, social and military industry and so forth.

In a learning process of Linear programming course on college, lecturers should pick and use strategies that involve students actively in learning. For example, students can observe, implement and able to answers question and discuss to a given topic. In the learning process, the lecturers seeking a more conducive atmosphere for learning and more dominant students in learning activities.

Based on our observations in mathematics education student class of 2013 FIP UMJ Cirendeu, we got the fact that there are students who get E on courses in Mathematics, namely Linear Algebra. Some students looked not motivated to pay attention to the explanation of lecturers and not following

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the learning process conducted by lecturers. Learning is still centered on teachers, so students seem waiting for the material.

Guided discovery method is a development method of Constructivism Piaget's Theory i.e a learning that emphasizes the importance of student activities who are active in constructing his own knowledge. This method allows the students to be active in finding concepts of linear programming knowledge with the help of faculty guidance.

Besides the use of appropriate learning methods, motivation to learn is also affected by the media used. In order to achieve the educational goals, it is necessary to note everything that supports the success of the educational program. Among all factors of supporting the success of educational goals, success in the learning process is one of the very dominant factor. In a learning process it is necessary to create a conducive atmosphere so that students are really interested and actively participate in the process. Media is one of the factors that contribute to the success of learning to be a conducive learning atmosphere.

Learning media is very diverse, and almost all useful. Quite a lot of media types and forms that are known, one of which is a computer. Computer is one medium that is still popular among students that can make learning interesting. Solution of linear programming problems with many variables would be easier by using a computer program. Along with the development computer technology, then there is a lot of software that can be used to solve linear programming problems. This software was created to help students to solve their problems or works. For the purposes of solving a linear program there are several special programs.

One of the computer application that can be used to study the linear program is software LINDO (Linear INteractive Discrete Optimizer). This software can solve linear programming problems easily, quickly and accurately even able to resolve the problem of linear programming up to 100 constraints. The main working principle of theLINDO program is to enter a formula, finish and assessing validity and feasibility of a formula based solution. The formula here is a mathematical forms. Linear programming problems were able to be solved by LINDO software program. In general, LINDO software will provide hands on experience to students in learning to formulate, finalize and assessing validity and feasibility of a formula based solution. Thus, the LINDO software support discovery activities and able to motivate students to learn linear programming. Based on the issues presented and some alternative methods, the researchers will use the software LINDO with guided discovery methods in the course of the linear program in this study. In this study, the authors hope LINDO software with guided discovery method can increase motivation to learn the Linear Programming course . Formulation of the problem in this research is (1) How is the attitudes of students towards learning process using the LINDO software guided discovery methods on the Linear Programming Course? How is the motivation of the fifth semester students learning after following the study using LINDO software with guided discovery methods on the Linear Programming course?

Based on literature review, the term motivation comes from the word motive which can be interpreted as the power contained within the individual, which causes the individual acts. The motive is an encouragement directed to meeting the needs of psychic (Sukmadinata, 2007: 61). A motive is a state in the person that encourage individuals to undertake certain activities in order to achieve something of interest. (Suryabrata, 2005: 70). Thus, the motive is not a thing that can be observed, but it is a thing that can be inferred from the existence of something that could be witnessed.

Motivation to learn mathematics is a conscious effort to move it, directing and maintaining behavior so that students are encouraged to do the math learning activities to achieve maximum results mathematics learning. Indicators of motivation to learn that researchers take is (1) Persevering in the face of duty, (2) Tenacious in the face of adversity, (3) Showing interest, (4) Love to work independently, (5) Fast bored with routine tasks, (6) ability to maintain his opinion, (7) Not easy to remove their beliefs and (8) Love to find and troubleshoot problems.

Based on its kind, the media is divided into media audio, visual and audiovisual media. Audio media is amedia that rely on voice capabilities, such as radios, cassette recorders, LPs. Visual media is a media that rely on the sense of sight. There is a visual media that displays a moving image or symbol like a film strip (movie chain), photographs, drawings or paintings, prints. There is also a

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visual medium that displays an image or symbol that moves like a silent movie, cartoon. While the audio-visual media is a media that have an element of sound and picture (Sutikno, 2009: 109).

Media are substantially the human, material or events that establish students conditions so that they able to acquire the knowledge, skills or attitudes. Media is a thing that can bring information and knowledge in the interaction that takes place between researchers and students. In this study, we use a type of visual media, the software LINDO.

LINDO (Linear Interactive Discrete Optimizer) is one of the software computer. The main uses of of this program is to enter the formulation of the linear program quickly, solve it, and set the basic formula repairs or checks on the solution. The main menus on LINDO are File, Edit, Solve, Report, Window, Help. Selection of the main menu of LINDO can be done by pressing Alt + F, Alt + E, Alt + S, Alt + R, Alt + W, Alt + H or highlight it with the mouse and press click on the highlighted icon.
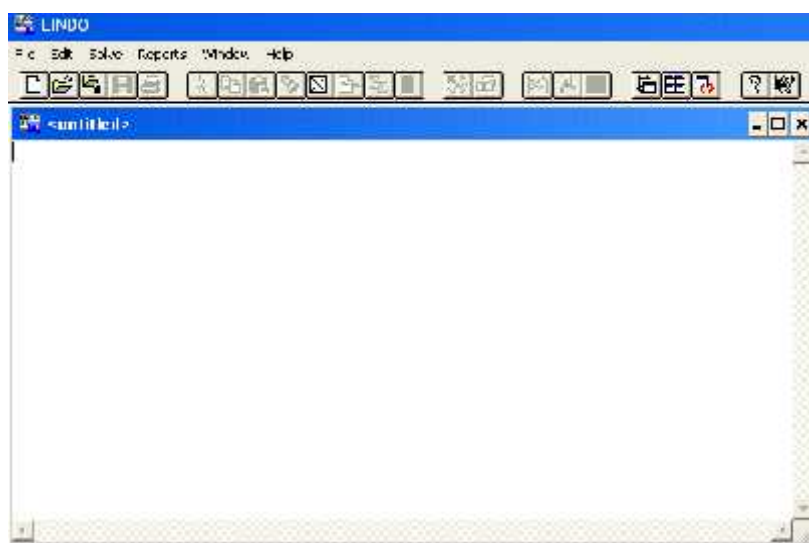

Figure 1 Display of LINDO *Software*

Based on studies of software LINDO and guided discovery methods, it can be concluded that the procedures carried out by the researchers in this study, i.e: a). Formulate and develop problems that will be given to students in the form of LINDO files and Worksheet Students clearly.b).The LINDO files given by researchers will be displayed on each student laptop. Students are asked to compile, process and analyze the data with the help of the guidance of researchers and Worksheet Students. c).Students are asked to prepare a conjecture (forecasts) on the results of their analysis. d). Researchers drive around to control students and give guidance so that the learning in accordance with the direction and goals to be achieved.e).Students were asked to collect a conjecture of their own language. Conjecture inference can be done with the percentage of analytical results. f).Researchers provide an exercises or additional questions to examine whether the findings were true as a means of evaluation.

RESEARCH METHODS

This research is a classroom action research. This Class Action Research is a actions research to improve students' motivation by using statistical software LINDO through guided discovery learning methods in the Linear Programming course. This study design refers to the process of implementation of action research models Kemmis & Taggart with the stages of action plan, actuating, observing and reflecting.

The research was conducted from July to December 2015 at the University of Muhammadiyah Jakarta FIP addressed Jl.KH.Ahmad Dahlan Cirendeu, Ciputat 15419. The research subject is the student of Mathematics Education class 2013 FIP UMJ. The object of this study is the overall process of the application software usage models LINDO with guided discovery methods on the subject of linear programming. This study using a class setting, which is observing the implementation of learning activities of students in learning mathematics. Implementation of research and collection of data obtained during the process of learning activities in the classroom.

The steps after pre Classroom action research consists of several cycles, that is: The First, Cycle 1 : a).Planning. (1) Making Unit of Learning Reference, (2). Preparing laptops and LINDO software that will be used in learning process, (3). Preparing Student Worksheet, (4) Preparing learning motivation questionnaire sheet, (5) Preparing the questionnaires, (6) Preparing a blank sheet for field notes, (7) Preparing the camera. b). Action. After the plan are considered mature and ideal, then we conduct the research plan. The implementation have to perform as good as possible to fit what is already planned. The actions of the research include: (1). Researchers carrying out guided discovery learning methods with the help of software LINDO. (2) Researchers observed an ongoing learning process. (3) Researchers distribute student worksheet to each student in the learning process.c).Observation. In the monitoring, We recording the learning process using field notes. To obtain more objective data, the observation also uses optical devices or electronics, such as digital cameras. d).Reflection. The Reflection is performed after an action and observation. Reflection activity generates the data obtained during the observation, then the data was collected, reduced, analyzed and summarized. Data are in the form of data sheets interview, sheet motivation questionnaire, field notes and data documentation. Results of reflection is used to determine further steps in order to achieve success indicator.

The Second, constitutes of Cycle II ,The second cycle is performed as the first stage in the cycle. The second cycle is made based on a reflection of the first cycle. Activity in the second cycle are intended as improvements to the implementation of the first cycle. If the second cycle has been reached the indicators of success and researchers feel enough, then the next cycle is not necessary. If it has not reached in the second cycle, the Classroom Action Research will be continued in the next cycle through similar stages of the previous cycle until the achievement of indicators of success.

Data collection methods used in this study are as follows: (1) Methods of Observation : In connection with the data collection techniques which are used, then the data collection instruments used in the observation methods include: field notes, interview, and photographs. (2) Questionnaire: A questionnaire which used in this study is a questionnaire motivation learning. so the statements are prepared based on motivational aspects of learning. The technique of questionnaires conducted every end of the cycle and is used to achieve success indicator.

RESULT AND DISCUSSION

The results showed an increase of learning motivation of the student of Mathematics Education class 2013 FIP UMJ on the Linear Programming Course after three cycles carried out with guided discovery learning using LINDO software.

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Table 1 Comparison of Student Learning Motivation Class 2013 FIP UMJ Mathematics Education

No	Indicator	Cycle 1		Cycle 2		Cycle 3	
		%	Info	%	Info	%	Info
1	Persevering in the face of adversity	70,59	Normal	72,06	Normal	75,00	High
2	Tenacious in the face of adversity	75,00	High	78,53	High	80,00	High
3	Showing interest	68,82	Normal	72,65	Normal	75,00	High
4	Love to work independently	66,27	Normal	70,98	Normal	75,29	High
5	Quickly bored with routine tasks	73,53	Normal	73,53	Normal	73,53	Normal
6	ability to maintain his opinion	66,67	Normal	69,41	Normal	72,94	Normal
7	Not easy to remove their beliefs	70,59	Normal	71,76	Normal	73,53	Normal
8	Love to find and troubleshoot problems	63,92	Normal	67,45	Normal	72,94	Normal

Interviews were conducted at the end of each cycle. In the first cycle, there are 2 students who become informants, that is the students who score the lowest and highest questionnaire with with the percentage is $\frac{8,5+7}{2} = 81,25\%$. In the second cycle, there are 2 students who become informants, that is the students who score the lowest and highest questionnaire with with the percentage is $\frac{8,5+1}{2} = 93,75\%$. In the third cycle, there are 2 students who become informants, that is the students who score the lowest and highest questionnaire with with the percentage is $\frac{8,5+1}{2} = 93,75\%$.

CONCLUSIONS AND RECOMMENDATIONS

The motivation of student learning in the course of the linear programming with guided discovery learning methods aided software LINDO has reached 75.11% with a high category. Furthermore, students love to learning guided discovery with LINDO software with the percentage is 93.75% .

After doing this study, researchers have several suggestions to improve learning, that is : The lecturer should do a variety of learning methods in teaching the students so that students are motivated to learn, and the use of mathematical software in learning so that students are more motivated to learn.

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