The Implementation of Brainstorming Method as Effort to Improve Motivation and Study Result of Students on Linear Program Course in Mathematics Education of Riau University

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Abstract : The kind of this research is a Classroon Action Research. The purpose of this research is to increase the motivation and study result of students in Mathematics Education study program FKIP UNRI who follow the Linear Program course by applying the Implementation of Brainstorming method. Learning is carried out by applying the implementation of the Brainstorming method through five stages: (1) providing information and motivation (orientation); (2) identification (analysis); (3) classification (synthesis); (4) verification and (5) conclusion (agreement). The subject of this research 40 students which follow was conducted in two cycles, from cycle I to cycle II. The results show that there was an increase of students'learning motivation almost in all indicators. The percentage of students who scored 'very good', increasing from 10% to 20% and the percentage of students who scored 'good', increasing from 20% to 27.5%. The percentage of students who scored 'good enough' and 'deficient' decreased respectively from 32.5% to 25% and from 27.5% to 17.5%. While the percentage of students who scored "very deficient" is permanent.

Keywords*: Brainstorming* method, learning motivation, study result of Linear Program Course

1. Introduction

The Linear Program course is a obligatory subject in Mathematics Education Study Program of FKIP UNRI. This course basically discusses the optimal allocation of resources from limited resources to fulfill a goal (objectives). For example, how to combine a limited number of resources such as labor, material, machinery, soil, fertilizer, water to obtain maximum output. Linear Program Issues is a matter of determining the amount of each variable value in such a way that the value of the objective function or linear objective function becomes the optimum (maximum or minimum) by taking into account the limitations of the existing limits that must be expressed in linear inequalities.

Based on the experience of researchers teaching this subject, many students have difficulties in making mathematical models of Linear Program problems, determining what needs to be considered to be able to complete the objective function, determining the method that is most appropriate to solve a given problem. The problem of linear programming can be solved in many ways, only if the selection of the settlement method is not correct it will be difficult to

solve within the stipulated time, thus impacting the low test scores. Therefore it is necessary to find a solution to overcome this problem, namely students are able to solve linear program problems with the right method.

Students will not be interested and serious in participating in learning without motivation [1]. This places motivation in an important position in the learning process. Motivation itself is interpreted as a process to activate the motives to be an act or behavior to meet the needs and achievement of goals, or circumstances and readiness in the individual that encourages his behavior to do something in achieving these goals [8]. The indicators of a student who has learning motivation according to [6], [4] and [3] are (1) Strong willingness to do; (2) Perseverance in doing mathematical tasks; (3) Tenacious in the face of difficulties; (4) Showing interest in mathematics; (5) Can maintain his opinion, and (6) Desire to succeed in learning mathematics.

Researcher's observations on the learning motivation of the Linear Program students of the Mathematics Education Study Program FKIP UNRI were seen when the lecturer explained the learning material on the blackboard accompanied by an example of the problem, the lecturer included students to solve the given questions, but not all students paid attention to the lecturer explanation and wanted to join involved in solving problems. This indicates the lack of enthusiasm of students in learning the Linear Program so that motivational indicators that show interest in mathematics learning are less visible in all students. When the lecturer gave a practice question to students, some of them did not really work on the exercise, instead there were those who joked with friends next to him. Willingness to do not look so. When the lecturer approached and rebuked the students who did not do it, then they would work on the given training questions. This means students learn after coercion from lecturers. There are also those who just wait for other students to finish working and then copy the answers. Students who are not diligent in completing the given task, when faced with difficult questions seem easily discouraged, do not show tenacity to solve the problem. Only a small part of the students really did the problem and showed their desire to succeed in the Linear Program learning. After the exercise time is up, the lecturer appoints the student to write the answer to the question on the board, but the one appointed by the lecturer is not willing to go forward, indicating that the students do not have courage to express their opinion.

In the learning process, the lecturer actually has made efforts to improve the learning motivation of the Linear Program by providing a variety of learning methods, namely by forming study groups, students themselves who choose their group friends. Another effort was made to increase student motivation to provide additional value to students who wanted to do the exercises in front of the class, collect assignments on time, but the effort did not get the expected results.

Based on the analysis above, researchers found learning problems that needed to be improved. The problem is how to teach students to create learning motivation so that the emergence of student interest in the Linear Program learning causes a sense of need in learning and understanding the material presented and the courage to express opinions.

One of the methods to increase student learning motivation is by applying Brainstorming method. Brainstorming method is a learning method that is carried out in groups whose students have different background of knowledge and experience. This method is used in activities to gather as many statements as possible about needs, ideas, opinions, and answers about various thought alternatives for dealing with problems [7]

This method is right to use because in a short period of time ideas, opinions and innovative answers can be collected, provided there is no criticism that hinders the spontaneity of student statements. It should be noted that the use of this method will be appropriate if there is a situation of mutual recognition among students [7]. This method can be used in mathematics learning, because each student can express creative ideas in solving problems. In addition, this method stimulates students to express opinions [7]. With the learning using brainstorming methods, students will feel motivated to learn the Linear Program. Linear Program is a subject learned in the fourth semester with 7 subjects, which discuss the problems of daily life using certain methods. Therefore, the subject matter studied is in line with the stages of brainstorming method where the lecturer explains the problem to be discussed and invites students to be able to come up with ideas, ideas, opinions on the given problem solving. Ideas, ideas, and opinions will be easily issued because some of these subjects have been studied in high school.

Thus, the formulation of the problem in this study are: Does the application of Brainstorming method increase the motivation and learning outcomes of Linear Program students of Mathematics Education Study Program FKIP UNRI 2017/2018 Academic Year. While the purpose of this research is: to increase motivation and learning outcomes of Linear Program students of Mathematics Education Study Program FKIP UNRI through the application of Brainstorming method.

The learning motivation referred to in this article is in line with the opinion of [4], [6] is the encouragement both internally and externally which changes the energy in the students to move learning behavior so that the desired mathematics learning objectives can be achieved. While the learning outcomes referred to in this study are in line with the opinions of [2], [6] and [7] are competencies and abilities expressed in the form of grades possessed by students after taking the midterm (UTS) and semester final examination (UAS) by applying the Brainstorming methods.

Linear Program courses held by the method through five stages according to [5], are: (1) giving information and motivation (orientation); (2) identification (analysis); (3) classification (synthesis); (4) verification and (5) conclusion (agreement). At the orientation stage, the lecturer explains the problems faced and the background and invites active students to contribute their thoughts. At the identification stage, students are asked to give as many ideas as possible. All ideas entered are accommodated, written and not criticized. Group leaders and participants may only ask to ask for an explanation. This is so that students' creativity is not hampered. At the classification stage (Synthesis), all ideas and input from students are written, after which they are classified based on the criteria made and agreed upon by the group. Classification can be based on other structures / factors. At the verification stage, group members together look back at the ideas that have been classified. Every idea is tested for relevance to the problem. If there is the same idea taken one of them and an irrelevant idea can be crossed out. Arguments can be asked to the idea giver. At the conclusion stage (Agreement), the lecturer / group leader and other students try to conclude the alternative points of the problem solving that are approved. After all are satisfied, the last agreement is taken on how to solve the problem that is considered the most appropriate solving.

Based on the description of the Brainstorming method above the stages of research activities carried out through the following steps:
1. The lecturer presents the problem that will be discussed by students and their background and invites active students to contribute their thoughts.

2. The Lecturer organizes students in groups. Ask students to give as many ideas as possible. All ideas entered are accommodated, written and not criticized. Group leaders and participants may only ask to ask for an explanation. This is so that student creativity is not hampered.
3. All ideas and input from students that have been written are then classified based on the criteria that have been made and agreed upon by the group. Classification can be based on other structures / factors.
4. Students in groups together look back at the ideas that have been classified. Every idea is tested for relevance to the problem. If there is the same idea taken one of them and an irrelevant idea can be crossed out. Arguments can be asked to the idea giver.
5. In the conclusions (agreement) stage, the lecturers / group leaders and other students try to summarize the agreed alternative problem solving points. After all are satisfied, the last agreement is taken on how to solve the problem that is considered the most appropriate solving.

2. Methodology

This research is a classroom action research with the procedure of each cycle through the stages of planning, action, observation, evaluation and reflection. At the planning stage a research instrument is prepared in the form of learning devices and data collection instruments. Learning tools include lecture contracts, syllabus, learning implementation plans (RPP), teaching materials and student worksheets (MFIs). Data collection instruments in the form of observation sheets of lecturer and student activities, written tests in the form of midterms and semester exams and motivation questionnaires given at the beginning and end of the study. Researchers also divided students into 8 groups with members of 5 student groups. The groups formed are heterogeneous academically and sexually. The implementation of the action refers to the stages of the Brainstorming method through steps: (1) the lecturer presents a description of the subject; (2) the lecturer gives college contracts; (3) students are given a motivation questionnaire and are asked to fill it honestly; (4) lecture participants are divided into 8 groups whose members are 5 people; (5) students in small groups are given problems or tasks and are asked to give as many ideas as possible, all ideas are accommodated, written and not criticized but may be asked for explanations; (6) each group is asked to classify ideas based on criteria that have been made and agreed upon by the group and presented; (7) students in groups together look back at the ideas that have been classified. Every idea is tested for relevance to the problem. If there is the same idea taken one of them and an irrelevant idea can be crossed out. Arguments can be asked to the idea giver; (8) lecturers together with students conclude the alternative points for solving the approved problems. After all are satisfied, the last agreement is taken on how to solve the problem that is considered the most appropriate.

Observers record all student activities and findings during the action. Observation results are useful in reflecting the implementation of actions and designing perfection actions. This research was conducted in two cycles. Cycle I takes place from the first meeting to the eighth meeting (midterm exam) and the second cycle takes place after the midterm to the end of the semester. The subjects of this research were 40 students of the Mathematics Education Study Program who took the Linear Program in 2017/2018 even semester.

Data analysis of student learning motivation is calculated through the following steps: (1) calculating the score of learning motivation for each indicator both initial motivation and final motivation and determining the categories; (2) calculate the average of each indicator both initial and final motivation and determine the categories; (3) compare the mean initial

motivation and final motivation and determine the categories; (4) interpret the motivation data obtained. The action is said to be successful if there is an increase in motivation scores on the results of the initial motivation questionnaire with the results of the final motivation questionnaire.

Data analysis of study result is carried out with the following steps: (1) calculating UTS scores in cycle I and UAS scores in cycle II; (2) presenting data; (3) comparing the learning outcomes of cycle I with cycle II; (4) interpret data. Action is said to be successful if there is an increase in student learning outcomes that get a final grade of 70 from cycle I with cycle II. A score of 70 is based on the B minimum set by the academic regulations of the University of Riau 2017/2018 academic year. The Final Score is obtained from a combination of all bills given, namely: individual assignments (15%), group assignments (20%), UTS (30%) and UAS (35%).

3. Result and Discussion

The course takes 14 face-to-face meetings, one UTS and one UAS. The first meeting was carried out by giving a motivation learning questionnaire consisting of 6 indicators, namely (1) Strong willingness to do; (2) Perseverance in doing mathematical tasks; (3) Tenacious in the face of difficulties; (4) Showing interest in mathematics; (5) can maintain his opinion; and (6) the desire to succeed in learning mathematics. Each indicator consists of several statement items. Of the 6 indicators there are 30 items of statements that must be selected one of the answers that best suits the student's situation by giving a check mark (V) in addition to the agree (S) statement with a score of 5, strongly agree (SS) with a score of 4, doubt with a score of 3; disagree (TS) with a score of 2 and strongly disagree (STS) with a score of 1. After the questionnaire is given, students are asked to fill it honestly without fear because every answer given does not affect the value. This questionnaire was given again at the end of the lecture and then analyzed. Learning motivation questionnaire results can be seen in Table 3.1 below:

Tabel 3.1 The Average of Learning Motivation

No.	Indicator	Average Motivation (Initial)	Category	Average Motivation (Final)	Category
1.	Kuatnya kemauan untuk berbuat	3,95	Good	4,05	Good
2.	Ketekunan dalam mengerjakan tugas	3,97	Good	4,03	Good
3.	Ulet dalam menghadapi kesulitan	3,87	Good	4,00	Good
4.	Menunjukkan minat terhadap matematika	3,86	Good	3,89	Good
5.	Dapat mempertahankan pendapatnya	3,66	Good	4,02	Good
6.	Keinginan untuk berhasil dalam pembelajaran matematika	3,96	Good	3,81	Good

Table 3.1 shows the increase in learning motivation in all indicators, especially indicators that can maintain opinions, are resilient in facing difficulties, diligent in carrying out tasks and strong will to do. In the indicator of the desire to succeed in mathematics learning there is a decline even though it is still in good category.

Students who take UTS in writing with questions in the form of descriptions. The material tested was related to the material from the first meeting. After UTS students return to study, the lecture ends with giving UAS with material after UTS. The score processing results obtained by students at UTS and UAS can be seen in Table 3.1 below.

Table 3.2 The Result of UTS dan UAS

Statistic	UTS	UAS
Average	**63,13**	**69,75**
Standard Deviation	**16,24**	**18,01**

The data above can also be presented in Figure 1 below.

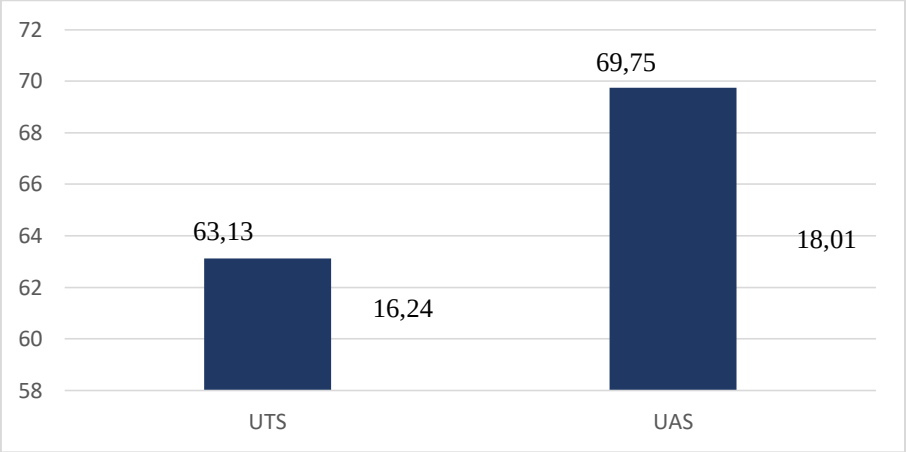

Figure 1. Average and Stadard Deviation of UTS and UAS

Table 3 and Figure 1 show that there is an increase in student learning results in Linear Program courses from cycle I to cycle II through the application of PBM models. Exposure to the data processing results above can also be completed with a percentage of students in each quality category of learning results in Table 3.2 below.

Table 3.3 The Percentage of Amount of of Students in UTS and UAS according to Quality Category

Qualitty Category	Quality Interval	UTS		UAS	
		Amount	%	Amount	%
Very Good	$85 < X \leq 100$	**4**	**10**	**8**	**20**
Good	$70 < X \leq 85$	**8**	**20**	**11**	**27,5**
Good Enough	$55 < X \leq 70$	**13**	**32,5**	**10**	**25**
Deficient	$40 < X \leq 55$	**11**	**27,5**	**7**	**17,5**
Very Deficient	$X \leq 40$	**4**	**10**	**4**	**10**

Table 3.3 shows that the percentage of students who scored ‘very good’, increasing from 10 % to 20 % and the percentage of students who scored ‘good’, increasing from 20 % to 27.5 %. The percentage of students who scored ‘good enough’ and ‘deficient’ decreasing respectively from 32.5 % to 25 % and from 27.5 % to 17.5 %. While the percentage of students who scored “very deficient” is permanent

4. Conclusion

Based on cycle I and cycle II and data analyze, it can be concluded that there is an increasement on motivation and study result of Program Linear course of Students in Mathematics Department FKIP UNRI 2017/3018 Academic Year.

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