CONSTRUCTIVISM APPROACH APPLYING NUMERICAL METHODS LEARNING OF STUDENT OF MATHEMATICS EDUCATION DEPARTMENT OF EDUCATION FACULTY OF RIAU UNIVERSITY

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Abstract. This research aims to improve learning process of numerical methods of student of Mathematics Education Department of Education Faculty of Riau University in 2011/2012 Odd semester. The studied variabels were (1) the students activity in learning process; (2) the students learning outcomes in the end of each cycle; (3) the students perception about lecturer teaching skill. This research did in three cycles with 23 students of participants. Based on data analysis result obtained that (1) in learning, the students activity was the longer the better; (2) the average of students outcomes was 77.565 in the end of first cycle, in the end of second cycles, its decreased to 77.217; but its increased to 86.9565 in the third cycles; the final value of students was 82.60% of A grade and 17.40% of B grade after calculated with task value in the end of semester; and (3) student who followed numerical methods learning gave very positive reaction about constructivism approach applying and the average of lecturer teaching skill was 3.725 in very good category.

Keywords: contructivism approach, learning process, activity, learning outcomes, perception

Introduction

To improve learning quality, the lecturer as facilitaor and motivator must be capable to create dinamic condition. The lecturer must lead learning process as students centre so the student can construct their knowledge alone.

Numerical methods must be learned by students at Mathematics Education Departement of Education Faculty of Riau University. This course is advanced course that lead the students to increase capability of reflective thinking (critic and creative) and sistematic reasoning to solve a problems. To solve a problems with numerical methods we must design a programs with using computer. Accourding to curriculum what used at Mathematics Education Departement of Education Faculty of Riau University that the course of numerical methods include (1) Error: error (definitions, sources, examples), propagation of error, and summation, (2) Root Finding: the bisection method, false position method, Newton-Raphson method, secant method, and modification Newton-Raphson method for polinomial, (3) Linear Equations Systems: upper-triangular linear systems, gaussian elimination and pivoting, triangular factorization (Doolitle, Crout, and Cholesky), iterative methods for linear systems (Yacobi and Gauss-Seidel), (4)

Numerical Interpolation: linear interpolation and quadrat interpolation, polynomial interpolation, error in polinomial interpolation, and lagrange interpolation, (5) Numerical Integration: the Trapezoidal and Simpson rules, and Gauss-Legendre integration.

In numerical methods learning, the students werenot capable to construct their knowledge based the first capability and the lecturer guide them more and more so the result of learning process is still low. The students were not capable to analyze a problems and not capable to design a programs using computer. This realize indicated quality of learning process of numerical methods were not good. One of princip in educational psychology is the lecturer must be capable to lead the students so the students can construct their knowledge alone.

On this research the researcher applied constructivism approach on numerical methods learning. On constructivism approach is applied learning of top-down is more than bottom-up. On learning of top-down, the students are given the complex and autentic duties. The duties are not only a partial or simple but complex (Nur, 2000).

The theory of constructivism is meaning as learning generative, the students construct their knowledges based the lower knowledges. The constructivism approach have some general concepts :

a. The students must be active to construct their knowledge based the lower knowledge.
b. The students must lead their concept alone.
c. The students must relate a new concept and a last concept.
d. The students can compare between a new information with a first information.
e. Unbalance is a factor of main motivation in learning
f. Subject matter must be interesting so increase students interest.

In research by Herlina (2003) about constructivism approach applying at physics Department of Education Faculty of Lampung University is explained (1) after applied constructivism approach for series, complex numbers, matrix, determine, and linear equations, there are changes of students concept so students concept are more better, (2) students activities are better is compare before and students creativities are improved.

In research by Armis (2008) is included that constructivism approach applying can increase students activities in differensial equations learning process at students of Mathematics Education Department of Education Faculty of Riau University.

In this research , the lecturer lead subject matter, some examples and give the duty that must be done by students in a little group. The lecturer use LCD in learning process so the students can look at all of problems what they will do. After that, the students are lead to solve the problems and design programs using computer of basic programs. Furthermore, the student present their duty in front of class as justification of their duty. On this occasion, the lecturer and the students discuss together so all of students understand it. For example, to solve a problems about ''to

determine a root by bisection methods". The lecturer give the students a problems and an example of computer programs. The students are given a duty to investigate correctness of programs and correct together so really the students understand. Furthermore, the students are given the duty to solve a problems and to design a programs.

There are problems are in this research :

a. How are students activities in numerical methods learning process?
b. How are students learning outcomes in the end of each cycle?
c. How are students perception about lecturer teaching skill?

This research aims to improve learning process of numerical methods of student of Mathematics Education Department of Education Faculty of Riau University in 2011/2012 Odd semester with using constructivism approach and to ask students perseption about lecturer teaching skill. The result of research is used to choose a strategic of mathematics learning process, specially numerical methods. I hope the result of research give contributionto improve learning process quality at Mathematics Education Department of Education Faculty of Riau University.

Research Methods

Wardani (2003) told that classroom action research is the reseach is done by the teachers in their class via self reflection, to improce themselves so students learning outcome will be increased. Arikunto (2008) told that classroom action research is reflection of learning process in class and make actions to improve it.

Subject of research is the students of Mathematics Education Department of Education Faculty of Riau University in 2011/2012 Odd semester with 23 students of participants. This research did in three cycles.

To collect data of students activities is done observation while learning process. To collect data of students outcomes in each cycle is made essay test. To evaluate lecturer teaching skill is used question list. To analize data of students activities is done qualitative analize. To analyse data of students outcomes in each cycle are done by mean analyse. To analyse data of lecturer teaching skill is used likert scala.

The Result of Research and Discussion

Data analyses of Students activities

Based observation have done during learning process, get data of Students activities :

On the first cycle, learning process had done four times and on one time evaluation. After that is done reflection for the first cycle. On first time, the clever students are still dominate learning process and not discussing with others. The average capability sudents discuss with the others,

and the low students are only silent so to present in front of the class the low student are not active and not understand what presentation. Furthermore, the lecturer lead the students so on step learning process all of students can be active to discuss. On the end of learning process, the lecturer lead the students to conclude the matter together.

Based reflection on the first cycle:

a. All of the students must be active to discuss.
b. The lecturer choose with random to present in front of the class.
c. The student must help their friends in their group.

On the second cycle, the low student is not active to discuss. Furthermore the lecturer lead them so the low student can be active and to present in front of the class. The students are glad and happy in learning process so they have motivation to discuss. On the third cycle, look at students activities have increase more and more.

Data analyses of Students Outcomes

Data analyses of Students Outcomes is explain in table 1.

Table 1 : Students Outcomes

Number	Score	Sum of Students			Percent		
		Tes 1	Tes 2	Tes 3	% Tes 1	% Tes 2	% Tes 3
1.	0,0 - 20,0						
2.	20,1 - 40,0						
3	40,1 - 60,0	6	5		26,09	21,74	
4	60,1 - 80,0	11	14	12	47,82	60,87	52,17
5	80,1 - 100,0	6	4	11	26,09	17,39	47,83

Notice : maximum score 100

The sum of students who get high score tinggi (80,1 – 100,0) increase with significance. Furthermore, mean of students outcome is explain in table 2.

Tabel 2. Mean of Students Outcomes

Mean	Score			Percent		
	Test 1	Test 2	Test 3	% Test 1	% Test 2	% Test 3
Mean	77,565	77,217	86,956	77,565	77,217	86,956

The final value of students was 82.60% of A grade (very good) and 17.40% of B grade (good) after calculated with task value in the end of semester.

Data Analyses of Students Perception

There are three aspects look at lecturer teaching skill, that are Design Quality, Learning Process quality, and Evaluation Quality as on table 3.

Tabel 3. Lecturer Teaching Skill

Number	Learning Process Quality	Mean	Notice
1	Design Quality	3,80	Very good
2	Learning Process Quality	3,545	Very good
3	Evaluation Quality	3,83	Very good
	Mean	3,725	Very good

The students who followed numerical methods learning gave very positive reaction about constructivism approach applying and the average of lecturer teaching skill was 3.725 in very good category.

Conclution

Based data analises and discussion is concluded :

a. Students activities in numerical methods learning process increase after constructivism approach applying
b. Students outcomes in numerical methods learning process increase after constructivism approach applying
c. Really, the students have very good perception about the lecturer Teaching Skill

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