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Improving Processing Data Skills on Econometrics: Could Cybernetic Learning Theory-Practice Do it?

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***Abstract*— Implementation of cybernetic practice in econometric courses to improve student learning outcomes and data processing skills. This study is a classroom action research with two cycles. Cybernetic learning theory - practice of econometric courses is learning that collaborates on theoretical knowledge and practice with Eviews support, an information technology software. By results: 1) Lecturer activity in cybernetic learning theory - practice increases from cycle 1 to cycle 2; 2) Student activity during cybernetic learning theory - practice also increases; 3) Student learning outcomes after applying cybernetic learning theory - improved practice; 4) data processing of student data during cybernetic learning theory-increased practice. Theory of cybernetic learning-practice on information technology and information should be processed, specifically to build a strong memory of information received by students. Thus, the impact of using Cybernetic-practice learning techniques can improve student learning outcomes and data processing skills.**

Keywords*— *Cybernetic learning theory-practice, student learning outcomes, data processing skills

I. INTRODUCTION

Econometric is a social science that combines methods of economic theory, mathematics, and statistical inference applied to the analysis of economic phenomena. Econometrics in the view of classical methodology have a sequence of models ranging from identifying economic theory, making a mathematical model of theory, specifying the model econometric from theory collecting data, estimating parameters on an econometric model, testing hypotheses, forecasting or parameters, using models for control on policy [1].

Econometrics courses that require more in-depth analysis of data processing make students tend to find difficulties in the learning process. proven by the results of less satisfactory learning, as happened to the students of economics education class A year 2013 in a public university in Surabaya, which is in charge of econometry subject of academic year 2015-2016, which has result of mid test examination (UTS) less satisfactory. Almost 88,1% of student of economics education S1 (undergraduate) class A 2013 have a score of less than 65. Only 5 students have UTS score above 65.

This unsatisfactory mark of UTS, caused since the econometric courses have profound reasoning form the point of econometric theory and data management skill. This is explicit in some materials that require reasoning and data processing skills in econometric courses including: simple linear regression material, multiple linear regression, regression with dummy free variable, panel regression model and regression with autoregressive model and distributed log mode.

From the results of the researchers' initial observations, the learning method is still a direct learning centered on educators/lecturers. Lecturers provide materials and practice the data in one direction. Student only act as passive listeners in the process of teaching and learning activities, both in the explanation of the material and follow the direction of practice of the lecturer. So many of the students who lack on material knowledge and less mastering data practice skills. From these problems, it is necessary that the learning method can generate student activeness in learning and improve the understanding of material and data skills in econometric through the application of cybernetic learning theory practice hopefully is able to answer the problems.

Cybernetic learning theory-practice is a learning that collaborate science and practice with the help of information technology. Where, cybernetic learning theory-practice on econometric courses will combine the provision of theory related to lecture materials and practices that use the help of information technology by software called E-views. Practices carried out on cybernetic learning theory practice will be guided by student worksheet (LKM) in groups. Furthermore, together with the working group, the student will present the result of his work in front of the class. This makes students

able to think algorithmically toward a target of the material being studied, such as the concepts of learning cybernatic itself.

Thus, the application of cybernatic learning model of theory practice are: 1) Lecturers convey the purpose of learning and motivate students in learning to use computer technology. 2) The lecturer explains the subject matter to the students. 3) the lecturers organize the students into study groups. 4) The lecturer presents the information in the form the theory and practice through the LKM. 5) The lecturer guides the learning group in completing the LKM. 6) Lecturers direct students in performing data processing using computer software to understand the concept of econometric courses as a whole. 7) Students discuss the results of data processing in front of the class and serve as a material to explain the detailed knowledge of econometrics. 8) The lecturer rewards the group who has presented the results of the group discussion [2] [3].

Cybernetic learning theory practice is expected to be able to answer the conditions required in the course of econometric. Thus, it is expected that the students of S1 program of economic education have an increase of cognitive value as well as skill in data management with the help of computer software. In this study the intended focus is the mastery of theory and skills to process data on multiple linear regression material and regression with dummy free variable.

Cybernetic learning theory-practice developed by Pask and Scott, originated from a cybernetics framework and attempts to explain learning in living organisms, organisations and machines. Cybernetic Learning takes as its starting point the concept of a self-organising system (SOS) that adapts, habituates and learns. It goes on to describe human-machine and human-human interactive as the synergistic composition of SOSs into a larger whole [3].

Cybernetic leaning has been proven by some researchers who use this concept of learning into their teaching and learning activities. According to Arvyataya, et al (2015), cyberbetic learning with group collaboration in discussing simplex method material using Microsoft Excell-Tora application assistance to FKIP mathematics students of Halu Oleo Kendari University, able to improve learning result [4].

Louis Trudel d Abdeljalil Metioui (2012), with the tittle "a second cybernetic model of scientific concept understanding with pedagogical applications for kinematics", illustrates the application of cybernetic models for teaching the concept of kinematics speed and acceleration. The study offers a second-order cybernetic model of conceptual scientific understanding, as well as choosing the right strategies needed to improve learners understanding [5].

Borislaw Lazarov (2013), with the title " The application of some cybernetic models in building individual educational pathway" explains that the Socratic style between teacher – student interaction should be coherent with the local behavioral environment. Adequate additional didactical analogs of the cybernetic model help to be incorporated into the educational trajectory practices desired by the individual [6].

Based on the exposure above, this study aims: 1) to analyze the activities of lecturers in the implementation of cybernetic learning theory – practice on economics courses in the education program of economy 2013 A class majoring in economic education of a public university in Surabaya, 2) to analyze student activities in the implementation of cybernetic learning theory-practice on econometric courses, 3) to analyze the improvement of student learning outcomes in the implementation of cybernetic learning theory-practice on econometric courses, 4) to analyze the skills of the student data in the implementation of cybernetic learning theory practice on econometric courses.

II. METHODS

This study includes the type of classroom action research. The research was conducted in order to analyze a problem that occured in the field of education, in particular to improve learning outcomes and data processing skills through cybernetic learning theory practice in econometric subjects at the undergraduate students of economic education 2013.

This research use descriptive approach, because the data about teacher and student activities, student responses, as well as learning outcomes and data skills when the application of cybernetic theory-practice in the course of econometric progress will be analyzed descriptively.

Classroom action research procedures according Kemmis and Mc Taggart are: 1) Action plan; 2) Research action; 3) Observation; 4) Reflection [7].

Analysis of learning management is obtained from the observation data sheet of the implementation of learning in the classroom that has been filled by observers used to analyze the implementation of learning by using cybernetic learning theory-practice, analysis is done by interpreting the value of the number in a sentences that contains qualitative data with a scale to determine its implementation using the following formula:

$$\text{Quality} = \frac{\sum \text{Scores all observers}}{\sum \text{All observers}}$$

Criteria range to scores used are as follows [8]:

0,00 – 1,75	: Very less
1,76 – 2,50	: Less
2.51 – 3,25	: Good
3,26 – 4,00	: Very good.

Data of cognitive learning result in the form of the test result prior to being used as a research instrument. The items should be firstly tested to other classes other than classes to be used in the study. The classroom used as an instrument test is a B class of economic education program 2013, where the student's state is heterogeneous and is similar to the class used in this study this step is done to determine the validity and reliability of the problem.

Observation data of student activity during teaching learning activity can be analyzed by percentage (%) of each activity formulated as follows [8]:

$$Activity\ (\%) = \frac{A}{B} \text{ x } 100\%$$

A = The number of times the student activity appears and is observed
B = Total number of activity frequencies

Student learning outcomes are said to be complete when students reach ≥ 75 from a maximum value of 100.

Assessment of the Data processing skill performed by students viewed from the results of the student worksheet that have been done from each topic of learning.

III. DISCUSSION

A. Activities of lecturers in the implementation of cybernetic learning theory-practice

The success of a learning in college will be largely determined by the management of Lecturers in the learning. Based on the observations of Cybernetic Learning Theory - Practice in Econometric course is done at each stage well. In Cycle 1 of Lecturer management in implementing Cybernetic Learning Theory - Practice has been classified as good with score value 74%. Some lecturer activities that need to be improved in the next cycle include: lecturer activities in grouping students into several groups, guiding group learning in completing the student worksheet, and giving direction to students in data processing through computer application software.

Some shortcomings of lecturer activity on Cybernetic Learning Theory - Practice in cycle 1 has been improved in cycle 2. This is indicated by increasing score of lecturer activity score by 23% with score score 91% (very good criterion). In cycle 2 the lecturers made significant improvements by grouping the students based on the group that had formed at the next meeting. So that students can be grouped conductively and do not require a lot of time in this activity. In guiding the learning group to complete the student worksheet, the lecturers intensively counsel the entire group in the class. And lastly to direct students in processing data using software "Eviews", lecturers do very well. Lecturers provide guidance so that students can read carefully the data processing tutorials in the student worksheet to complete the case study in the student worksheet. From the observation result in the second cycle, there is no need to revise because the result of the management of lecturer activity obtained is said to be very good.

The activities of lecturers in learning Cybernetics Theory - Practice has been conducted during the study in accordance with the rules of Bernard Scott, et. Al [3]. Lecturers will present problems in the group-finished practicum sheet. The learning group will conduct an experiment or procedure in completing the LKM (student worksheets). Lecturers will ask students to provide oral reports on how to solve the LKM problems and to construct the concept of the material being studied.

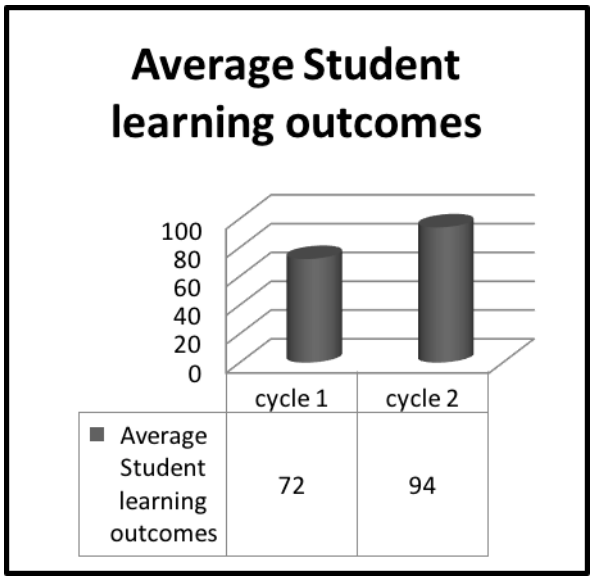
B. Student Activities in the implementation of Cybernetic Learning Theory - Practice

Assessment of student activity is taken from the existing stages in the implementation of cybernetic learning theory-practice. The result of student activity on cycle 1 is active with score of 72%. This is because most students are not yet familiar with cybernetic learning theory-practice. Unfavorable learning conditions proceeded by group formation. Furthermore, in completing the case study in the student worksheet and processing the data in groups. Students look confused and lack of cooperation in completing the student worksheet. Last, the students has not been maximized in discussing the result of data processing in front of the class to explain the detail of knowledge on the material learned at the time.

Student activity has increased in cycle 2 with very active performance. This is because students are able to adjust to cybernetic learning theory-practice. Students have been very active in the learning process form the beginning to the end of learning. Students are more active in doing group collaboration, processing data and explaining the material in front of the class. This is evidenced by the increase in the value of student activity on cycle 2 with a score of 86%. This is motivated by the lecturer's effort to carry out reflection for the point of forming the group up to the guidance of group discussion in front of the class. Thus, the cycle is discontinued in cycle 2 because it meets the criteria of research success.

Increase in student activity in the learning process by using Cybernetic Learning Theory - Practice according to Thomas J. Smith's research. Learning groups with cybernetic strategies are able to achieve increased social interaction of students, among students are critically, able to track and control the sensory feedback provided by his friends in groups [9].

C. Result of students learning following the implementation of cybernetic learning theory-practice



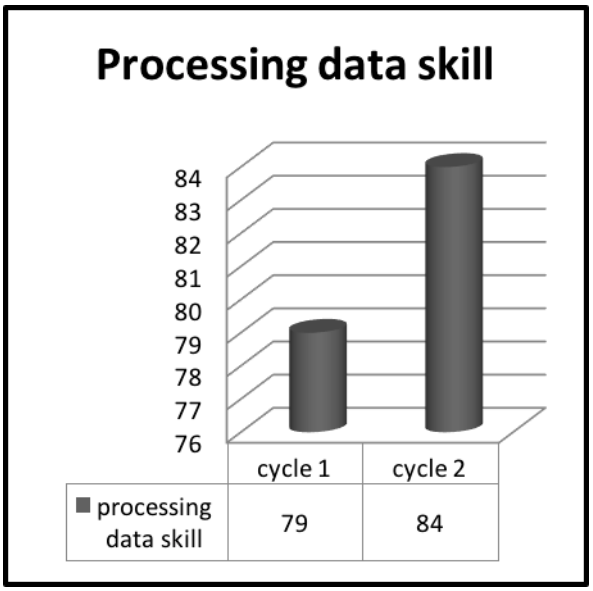
Picture 1. Average student learning outcomes

Based on the graph above can be seen increasing the average value of learning outcomes in cycle 1 and cycle 2. Value obtained at each end of the cycle by holding post test on cycle 1 and cycle 2. This is done to measure students' absorption and comprehension of material that has been discussed. So the average value of posttest learning result of cycle 1 and post test cycle 2 where in cycle 1 is 72 and 94 point in cycle 2. The average of learning result has increased by 32%.

From the result of cycle 2 it can be concluded that the student has achieved the learning result ≥75. This indicates that Cybernetic Learning Theory - Practice has been able to improve student learning outcomes. This is in accordance with Trudel & Métioui (2012) research which says that Cybernetic learning improves students' scientific conceptual understanding [5]. Increase in learning outcomes is because students will work together in solving the problems presented in the LKM. Furthermore, students will solve problems with the help of computer software applications. Finally, students will reconstruct the concept in groups and present it in front of the class.

D. Student data processing skill following the implementation of cybernetic learning theory-practice

Based on the data result of skills if the data on the student worksheet done by students obtained the average and value of skills in the cycle 1 of 79 and cycle 2 of 84. Based on cycle 1 to cycle 2 there is an increase of 6% student processing data skills using software Eviews in econometric courses. This indicates that by using cybernetic learning theory-practice, student can improve the skill in processing the data by using the software.



Picture 2. Processing data skill

This is in line with the research of Arvyatya, et al (2015) Cybernetic Learning with Group Cooperation is able to improve student learning outcomes in the material of simplex method in Mathematics Education Study Program with the help of Microsoft Excell-Tora application [4]. Increase in data acquisition skills obtained by students because they have to solve the problem if the econometrics data in the LKM and process it with the help of computer software applications. From the activity in this learning will be formed softskill ability if student data well.

IV. CONCLUSION

The conclusions of this research are: 1) There is an increase of Lecturer Activity in Cybernetic Learning Theory - Practice from cycle 1 is 74% and cycle 2 is 91%. 2) There is an increase in the value of student activity in learning Cybernetics Theory - Practice that is in cycle 1 of 72% and cycle 2 with a score of 86%. 3) Students' learning outcomes by applying cybernetic learning theory-practice experience improvement is shown by post cycle 1 of 72 and in cycle 2 of 94. 4) improvement of skill happened when the data on the LKM by students obtained the average value of skills in cycle 1 by 79 and cycle 2 of 84. The suggestion of this research is that further research on the development of practicum-based LKM for econometric courses should be carried out, in order to support the learning process of Cybernetic Theory - Practice in Econometrics course.

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