

Application of pedagogy reflective in statistical methods course and practicum statistical methods

Hongki Julie

Citation: [AIP Conference Proceedings](#) **1867**, 020026 (2017); doi: 10.1063/1.4994429

View online: <http://dx.doi.org/10.1063/1.4994429>

View Table of Contents: <http://aip.scitation.org/toc/apc/1867/1>

Published by the [American Institute of Physics](#)

A promotional banner for AIP Conference Proceedings. The left side features a background of blue ocean waves with the text 'SUMMER SALE!' in large, bold, blue letters. Below this, the AIP logo (the letters 'AIP' in blue with a vertical orange bar) is followed by the text 'Conference Proceedings' in blue. The right side of the banner is a solid yellow triangle pointing left, containing the text '30% OFF ALL PRINT PROCEEDINGS!' in bold black letters. At the bottom of this yellow section, a white box contains the text 'ENTER COUPON CODE SUMMER2017' in black.

SUMMER SALE!

AIP | Conference Proceedings

**30% OFF
ALL PRINT
PROCEEDINGS!**

ENTER COUPON CODE
SUMMER2017

Application of Pedagogy Reflective in Statistical Methods Course and Practicum Statistical Methods

Hongki Julie

Mathematics Education Department, Sanata Dharma University

hongkijulie@yahoo.co.id

Abstract: Subject Elementary Statistics, Statistical Methods and Statistical Methods Practicum aimed to equip students of Mathematics Education about descriptive statistics and inferential statistics. The students' understanding about descriptive and inferential statistics were important for students on Mathematics Education Department, especially for those who took the final task associated with quantitative research. In quantitative research, students were required to be able to present and describe the quantitative data in an appropriate manner, to make conclusions from their quantitative data, and to create relationships between independent and dependent variables were defined in their research. In fact, when students made their final project associated with quantitative research, it was not been rare still met the students making mistakes in the steps of making conclusions and error in choosing the hypothetical testing process. As a result, they got incorrect conclusions. This is a very fatal mistake for those who did the quantitative research.

There were some things gained from the implementation of reflective pedagogy on teaching learning process in Statistical Methods and Statistical Methods Practicum courses, namely:

1. Twenty two students passed in this course and one student did not pass in this course.
2. The value of the most accomplished student was A that was achieved by 18 students.
3. According all students, their critical stance could be developed by them, and they could build a caring for each other through a learning process in this course.
4. All students agreed that through a learning process that they undergo in the course, they can build a caring for each other.

Keywords: reflective pedagogy, context, experience, reflection, action and evaluation.

A. Introduction

The Elementary Statistics, Statistical Methods and Statistical Methods Practicum course aims to equip students of Mathematics Education Department about descriptive statistics and inferential statistics. The knowledge of descriptive and inferential statistics was important for students in Mathematics Education Department, especially for those who took the final task associated with quantitative research. In quantitative research, students were required to be able to present and to describe the quantitative data in an appropriate manner, to make conclusions from the hypothetical testing process, and to create relationships between independent and dependent variables were defined in their research. The ability of students about these things built when students took those courses. Therefore, all three of these courses became compulsory for students of Mathematics Education Department.

In fact, when students made their final project associated with quantitative research, it was not been rare still met the students making mistakes in the steps of making conclusions and error in choosing the hypothesis test process. As a result, they got incorrect conclusions. This was a very fatal mistake for those who did the quantitative research. The fact that many students found also was not aware if the conclusion that they've done was not right. This was happen because students simply mimic the hypothesis test process that was made by the previous students without understanding about why such steps needed to be done and what were the conditions that must be fulfilled such that the procedure could be done. Another cause was the students did not want to link the research process and the data obtained from the research with the material that they've learned in all three of these courses.

The Statistical Methods and Statistical Methods Practicum courses were taken by students in the sixth semester. This means, for those who took this course were already interacting at least for three years. Three years was a short time for students to be able to know each other and familiarize themselves with each other. Thus, the sixth semester students were expected to already be familiar and know each other. But in reality this did not happen. Students still had a tendency to hang out with fellow students from a same school or to have

the same origin and were not overly familiar and getting to know friends who came from different regions or schools.

From the previous description, the researcher formulated the research questions of this study were as follows:

1. What steps were done by the researcher in the teaching learning process of the Statistical Methods and Statistical Methods Practicum courses using reflective pedagogy?
2. What were the learning outcomes achieved by students after following the teaching learning process?
3. Was a critical attitude of students could be built through the teaching learning process on Statistical Methods and Statistical Methods Practicum courses?
4. Was the student caring for others could be built through the teaching learning process on Statistical Methods and Statistical Methods Practicum courses?

B. Pedagogy Reflective

According to Komunitas Studi dan Pengembang PPR Yogyakarta (2012), pedagogy was the efforts made by teachers in assisting students in their growth and development. Pedagogy was closely related to the beliefs and vision of teachers about a personal ideal figure to be formed through a teaching and learning process.

According to Father Arrupe (in Komunitas Studi dan Pengembang PPR Yogyakarta, 2012), the aim of Jesuit education was to form men and women for others. Father Kolvenbach (in Komunitas Studi dan Pengembang PPR Yogyakarta, 2012), formulated in more detail that the purpose of education of the Jesuits was to form leaders of ministry that modeled in Jesus Christ, men and women who were competent in their fields, have a conscience that was true, and has a concern growing daru love of neighbor.

According Suparno (2015), there were three main elements in the implementation of teaching learning process by using Reflective Pedagogical Paradigm (PPR), which is experience, reflection, and action. In carrying out the three main elements, the lecture assisted by elements of the student context understanding before the teaching learning process was begun, and the evaluation of the student achievement undertaken by the lecture after the teaching learning process was finished.

In preparing the learning process by PPR, a teacher needed to recognize the context of students. The following points should be considered a teacher or lecturer in knowing the context of students: (1) the student context, (2) the concept and initial understanding of students, (3) the economic, social, political, cultural, and media context, (4) university environment, and (5) the educational context in Indonesia (in Komunitas Studi dan Pengembang PPR Yogyakarta, 2012, and Suparno, 2015).

On the element of experience, lecturers needed to create situations that could make the students could gather and remember the experience they had to sift the facts, feelings, values, understanding, and intuition that they had known that relate to what they were learning (in Komunitas Studi dan Pengembang PPR Yogyakarta, 2012),

The efforts of the lecture to get to know the student context will help him or her in designing learning activities that could provide an experience that was consistent with the context that was owned by his or her students. If these two elements were met, then the process of student adaptation in the teaching learning process could be expected to run well. This step was important and in line with the opinion of the following experts:

1. Bruner (in Dahar, 2011: 75), ie the construction of knowledge in a person was done by connecting the new information with the information that already exists within him or her.
2. Bruner, 1977 (in Komalasari, 2010) said that a learning process would take place within the students, if the teacher gave the opportunity for their students to find a concept, theory, rules, or understanding with what they encountered in daily life.
3. Ausubel (in Dahar, 2011: 95), said a person would be learned significantly if he or she could establish a connection between the new information it receives with the relevant concepts that already exist in the cognitive structure of the person.
4. Van de Heuvel-Panhuizen, 2000 (in Suharta, 2001), said when children learned mathematics separate from their daily experiences, the child wolud quickly forget and could not apply mathematics.

5. Vygotsky, 1978 (in Komalasari, 2010: 22) said that a person's knowledge and cognitive development came from social sources outside themselves. Vygotsky emphasized the importance of a person's active role in constructing knowledge.

In the element of reflection, students were helped to dig the student experience in-depth and extensive, and to take meaning for their personal life, and life together (in Suparno, 2015). In reflection, memory, understanding, imagination and feelings were used to grasp the meaning and values of the basic material being studied (in Komunitas Studi dan Pengembang PPR Yogyakarta, 2012).

In the action element, students were helped to do a good action that was still at the level of inward or was already at the level of physical activity after they reflected on their learning experience (in Suparno, 2015). According Suparno (2015), an action might be the attitude self change for the better, and the real action, which was directed out of him or her that could be seen and felt by others.

In the evaluation elements, the lecturer expected to be able to see whether the element of experience, reflection, and action was already available in the teaching learning process or not. Evaluation was intended to look thoroughly whether the learning process by PPR has occurred or not and whether through the learning process, students experienced the progress on competence, conscience, and compassion. The evaluation was also to see whether the assistance provided by lecturer to the students during the learning could promote students or not.

C. Research Methodology

This type of research conducted by researcher was the quantitative and qualitative exploration research. Because in this study, the researcher conducted the exploration of the context, the experience, the result of reflection, action, and evaluation of students who become the subject of research. The results of the exploration conducted by the researcher was presented in the form of quantitative and qualitative descriptions.

The subject of this study was all students taking the Statistical Methods and Statistical Methods Practicum course on Class C.

There were several data collection instruments used by researchers, namely:

1. A questionnaire was used to explore the context of students who become subjects in this study.
2. A reflection sheet that was used to explore the results of student reflections on the experience that the subject of research.
3. Some evaluation sheets used to evaluate the competence that has been built by the research subjects after undergoing a process of learning.

In general, the analysis conducted by the researcher were to reduce the data by making the classification of the data obtained by the researcher, to describe data on quantitative and qualitative description, and to make conclusions.

D. Research Results

1. The Description of Teaching and Learning Process

- a. Context

The steps have been done by the lecture in the student context development were as follows:

- 1) The lecturer find student data through the Sanata Dharma Academic Information System (SIA USD). The data were sought by lecturer on SIA USD includes: the student hometown, the student GPA, the student grade on Elementary Statistics course, and how many student who already took this course before.
- 2) Ask the students to answer some questions related to the material that has been explored in previous course relating to the material that would be learned by the student in the Statistical Methods and Practical Methods of Statistics course.
- 3) Ask students to write what the Elementary Statistics material were not yet understood by the students.
- 4) Ask students to write their expectations about how the process of learning and evaluation for this course and their reasons why they require such treatment.

- b. Experience

The steps have been done by the lecture in the student experience development were as follows:

- 1) For confidence interval and hypothesis test procedure in a population and the two populations materials, students were asked to write a paper in groups and present the paper. The contents of the paper was an explanation of how the process of creating the confidence intervals and doing the hypothesis test for a particular condition, two examples of application, and the task for other students associated with the topics discussed, and the answer of the task.
 - 2) For other materials, the process were carried out as follows:
 - a) the lecturer gave a short explanation related to the material the student explored in this lecture.
 - b) students were invited to perform classical discussion to learn more about the materials.
 - c) students were required to resolve cases in accordance with the material explored. Students resolve these cases in groups of 2-3 students. Each time a group discussion, students were asked to form a group whose members were always different from the focus-group members in group discussions before.
 - d) students were asked to complete some problems as a homeworkd. The homework was collected in the next meeting.
- c. Reflection
- The steps have been done by the lecture in the student reflection development were as follows:
- 1) There were moments in which students were asked to create a reflection of the material already have been learned by them by creating concept maps for materials that have been learned by them.
 - 2) There were moments in which students were asked to make a reflection to explore the learning process has been gone through and explore the values of what they had found from the process they experienced.
 - 3) There were moments in which students were asked to make a reflection to explore the extent to which the enforceability of the action planned by it can be implemented.
- d. Action
- The steps have been done by the lecture in the student action development were as follows:
- 1) Once the student completed some cases according to the material explored in groups, some students as representatives of the group write on the board and explain how the process of settlement of the case that they made. Later, other students were asked to observe the process of the completion of the group and several students asked to comment based on observation of the process of settlement of the group. Students were also given the opportunity to ask if there was a settlement process that was not understood by them.
 - 2) Once students have gathered the homework, some students were asked to write on the chalkboard and explain how the process of resolving problems that they created. Later, other students are asked to observe the process of the completion of the group and several students asked to comment based on observation of the process of settlement of the group. Students were also given the opportunity to ask if there was a settlement process that was not understood by them.
- e. Evaluation
- The steps have been done by the lecture in the student evaluation development were as follows:
- 1) To measure the competence aspect of students, the lecture would give some assignments, two times exams, a reflection of the students about the concept map, and one final exam.
 - 2) To measure aspects cosience and compassion, the lecturer would use a self-assessment and assessment of a group, and observation during the teaching learning process.
 - 3) The weighted of evaluation component of this course (look table 1):

Table 1. The types and the weighted of evaluation component of this course

| Evaluation | Weighted |
|-----------------------------------------------------------|----------|
| Assigments | 15 % |
| Paper | 15 % |
| Presentation | 15 % |
| First examination | 15 % |
| Second examination | 15 % |
| Final examination | 15 % |
| Reflection about the concept mapping | 5 % |
| A self-assessment, assessment of a group, and observation | 5 % |

2. The Description of Student Context

From the SIA USD investigation, the lecture could get the student context as follows: are as follows:

- a. The student hometown as follow:
 - 1) South Sumatra: 1 student.
 - 2) Lampung: 1 student.
 - 3) West Java: 2 students.
 - 4) Central Java: 5 students.
 - 5) Yogyakarta: 6 students.
 - 6) East Nusa Tenggara : 8 students.
- b. The students' GPA classification as follow:
 - 1) 3.50 - 4.00: 4 students.
 - 2) 3.00 to 3.49: 13 students.
 - 3) 2.50 to 2.99: 3 students.
 - 4) 2.00 to 2.49: 3 students.
- c. The number of student who repeat this course: 4 students.
- d. Beside that data from the SIA USD, the researcher also recognized the student context using a questionnaire with three questions as follows:
 - 1) What difficulties experienced by students when students followed the Elementary Statistics course?
 - 2) What were the most thing that I do not like in the Elementary Statistics teaching learning process?
 - 3) For students who repeat this course, the lecture provide the following question to the students: what was the constraint when I follow this course on the last occasion?

Here was presented a summary of student answers for that three questions:

- 1) The student's answer the first question that they had difficulty in:
 - a) performing the steps of hypothesis testing on parametric and non-parametric statistics.
 - b) formulating the null hypothesis and the alternative hypothesis.
 - c) using the formulas because too many formulas.
 - d) understanding the material and could not understand how to solve a problem that did not exist for example.
 - e) understanding the explanation in the text book, even though I read in the Indonesian text book.
 - f) performing calculations involving large numbers.
 - g) less scrupulous.
 - h) changing the presentation of data from one representation to another representation.
 - i) distinguishing the sample and the population.
 - j) determining the range of data, and the mean of grouped data.
 - k) determining the scale of the data from the data provided.
 - l) determining the class border of the data presented in the form ogif.
 - m) interpreting the matter if the questions given in English.
 - n) using computer applications when solving a problem.
 - o) translating matter in the form of mathematical symbols.
 - p) implementing a concept that I understood in solving problems.
- 2) The students' answer for the second question:

- a) too many formulas to remember.
 - b) too many hypotheses testing processes that need to be studied.
 - c) the question in the examination were not same the question in the exercise.
 - d) the course atmosphere was tense so that there was fear to argue.
 - e) a monotonous teaching and learning process.
 - f) the lecture materials were too much and confusing.
 - g) to analyze the data and to make conclusions from the analysis process.
 - h) a matter of calculation tiered, so if I miscalculate in the early stages, then the calculations in the next stage would be wrong.
 - i) the lecture sound was weekly and the lecture writing was not clear.
 - j) a reference book in English.
 - k) at the end of the course, the material was delivered in a hurry.
 - l) I did not have enough time to learn.
 - m) the solution required precision.
 - n) the lecture questions were confusing.
 - o) the data were given to analyze too many.
 - p) the lecture explanation about the problem solution too quickly.
 - q) I saturated solve problems, but the lecturer still provide additional matter.
- 3) The student answers for the third question:
- a) I did not understand the lecture explanation.
 - b) I repeat this course, because I wanted to go deeper into this subject matter so that I would be helped in the process of data research for thesis writing.
 - c) I always hesitate when solving problems.
 - d) I embarrassed to ask the lecturer. I would ask the lecturer, if he or she walked up to me.
 - e) I seriously lacking in learning.
 - f) the lecture explanation was not clear, so it made me lazy to study
3. The Quantitative Description of Student Outcomes (look table 2)

Table 2. Quantitative Description of Student Learning Outcomes

| Paper (15 %) | Prese-ntation (15%) | The average of assign-ments (15%) | The first exami-nation (15%) | The second examina-tion (15%) | Reflection (5%) | Assessment of critical attitude and cooperation (5 %) | The final exami-nation (15%) | Final score | Final |
|--------------|---------------------|-----------------------------------|------------------------------|-------------------------------|-----------------|-------------------------------------------------------|------------------------------|-------------|-------|
| 8,8 | 6,5 | 6,95 | 5 | 8 | 5,5 | 6,5 | 8,57 | 7,28 | A |
| 9,5 | 8,5 | 9,39 | 6,17 | 9,13 | 10 | 8,5 | 8,57 | 8,54 | A |
| 8,8 | 6,5 | 7,18 | 3,67 | 5,75 | 3 | 6,5 | 7,29 | 6,41 | C |
| 9,3 | 7,5 | 9,44 | 8,5 | 10 | 8,5 | 7,5 | 10 | 8,88 | A |
| 9,3 | 7,5 | 8,57 | 5,83 | 7 | 6 | 7,5 | 5,14 | 7,27 | B |
| 9,3 | 7,5 | 9,17 | 4,67 | 9,63 | 8 | 7,5 | 9 | 8,23 | A |
| 9,8 | 8 | 9,70 | 7 | 9,63 | 8,5 | 8 | 7,57 | 8,58 | A |
| 8,1 | 7,5 | 9,67 | 3,67 | 8,88 | 6,5 | 7,5 | 7,86 | 7,55 | B |
| 8,1 | 8,1 | 9,67 | 7,17 | 6,25 | 6,5 | 8,1 | 8,86 | 7,92 | A |
| 9,8 | 8,5 | 9,50 | 9,5 | 9,63 | 9,5 | 8,5 | 7,57 | 9,09 | A |
| 9,8 | 8,5 | 9,63 | 7,17 | 9,63 | 8,5 | 8,5 | 7,43 | 8,68 | A |
| 8,1 | 7,8 | 9,67 | 4,83 | 10 | 10 | 7,8 | 9 | 8,22 | A |
| 8,1 | 7,7 | 9,08 | 4,33 | 9,75 | 8,5 | 7,7 | 8,14 | 7,93 | A |
| 8,1 | 8 | 9,41 | 8,17 | 8,88 | 8,5 | 8 | 8,43 | 8,44 | A |
| 8,1 | 7,7 | 9,21 | 6,67 | 10 | 8,5 | 7,7 | 9,71 | 8,48 | A |
| 9,2 | 8 | 8,34 | 5 | 7,63 | 8,5 | 8 | 9,43 | 7,97 | A |

| | | | | | | | | | |
|-----|-----|------|------|------|-----|-----|------|------|---|
| 9,2 | 7,5 | 8,40 | 4,83 | 10 | 9,5 | 7,5 | 10 | 8,41 | A |
| 8,7 | 8,5 | 8,98 | 6,33 | 9,63 | 8 | 8,5 | 9,71 | 8,55 | A |
| 9,3 | 7,5 | 8,29 | 4 | 8,63 | 9,5 | 7,5 | 9,71 | 8,00 | A |
| 9,5 | 8,5 | 9,19 | 6,83 | 10 | 10 | 8,5 | 4,86 | 8,21 | A |
| 8,7 | 0 | 8,51 | 2,67 | 4,5 | 2 | 0 | 9,86 | 5,29 | D |
| 9,5 | 8 | 9,19 | 8 | 10 | 7,5 | 8 | 7 | 8,50 | A |
| 9,3 | 8 | 8,29 | 4,67 | 9,63 | 9,5 | 8 | 7,86 | 7,81 | B |

4. Description Qualitative Results Student Reflection

Here were the five question of the reflection and summary of the student answers:

a. What kind of things you get after you followed the Statistical Methods classes?

1) Competence:

- a) I knew how to do the hypothesis testing on parametric and non-parametric statistics.
- b) I could use SPSS and Excel software to perform data processing, to analyze data, and to do the hypothesis testing .
- c) I knew that every statement in a study should be tested through the hypothesis testing process.
- d) I learned about how to process and analyze the data in the research that I did to finish my thesis.
- e) I learned about how to do the normality test of the data.
- f) I learned about how to select appropriate testing in a test of a statement based on existing data.
- g) I learned about how I should define the critic areas in the hypothesis testing process.
- h) teaching method that emphasizes doing exercises to make students understand the course material.
- i) I learned about how to apply the mathematics in testing of the statement.
- j) I understand how to formulate the null hypothesis and the alternative hypothesis.
- k) I learned about the relationship between the material that I learned from this lecture.

2) Conscience:

- a) the critical attitude. I woke up this critical attitude through the tasks given to us.
- b) the accuracy in doing something.
- c) the analytical thinking.
- d) Eager to serve students. This I got from the lecture who always teach us with passion and tireless.
- e) Make me become aware that the breadth and richness of knowledge that has been built by man.

3) Compassion: a caring attitude towards others. This concern me awake through the tasks given to our faculty.

b. Did this course help you to build a critical attitude?

All the students said yes.

If your answer was yes, through activity or experience any critical attitude was built in this course? Please, explain!

- 1) The questions were given to our lessons. Because inside solved the problems, we must analyze the data in advance what was known on the matter, and a statement of what would be tested in the matter. After that, we could determine what the process of hypothesis testing was right for me to do.
- 2) When there were differences in the calculation resulting from SPSS and Excel between my result and the friend or lecturer result.
- 3) When using the SPSS software to process and analyze the data, and make conclusions. Because we had to do it properly in accordance with the data held and the statement to be tested, so that the conclusions which we took to be right.
- 4) Completion matter, especially in the process of making conclusions.
- 5) At the discussion time. Since all students were given the opportunity to ask questions or make comments on the work of other students that were written on the board.
- 6) At the lecture explanation time. Because all students were given the opportunity to ask questions or make comments on what was described by the lecture.
- 7) At the time I asked the lecture. If I asked the lecture, the lecture did not give an immediate response. But the the lecture directing me to do something so that I could answer that question by myself.

- 8) Discussion with the lecture. Because the process is a two-way discussion, and when there was a question of us, the lecturer did not give an immediate response, but the lecture asked us to look at certain things that could make us to make answer for our questions.
 - 9) At the presentation time, especially during debriefing sessions with other students or with lecture.
 - 10) At the group discussion time of writing papers.
 - 11) At the time following the presentation of the other groups. Because each student was given the opportunity to ask questions and comment on what was presented by the group.
- c. What were the attitude or spirit that you could get up after attending this course? Through what were activities or experiences that attitude or spirit were built? Please explain!
- 1) discipline. This attitude was built through our homework. In addition, because of the example of the lecture.
 - 2) accuracy. It was built through the entering data process to be processed into SPSS and Excel. The accuracy could developed through our exercises and homework that we had to do. We also get a sample of lecture.
 - 3) Thinking systematically. It was built through the problems that we had to solve.
 - 4) The spirit wanted to know about the truth. This spirit was built through the testing process of a statement that expressed by others based on existing data.
 - 5) Curiosity. It was built through the tasks that must be done by the student, the discussion, the exercises, the paper and the presentation.
 - 6) Reasoning. It could be built through discussing the answers of exercises, homework, or instance.
 - 7) The spirit of learning and passion to always follow the lecture. Because the lecturers always provided practice questions and the homework.
 - 8) The spirit to present my answer for the exercise or the homework. Because other students were given the opportunity to criticize my answer and the lecture provide affirmation for my answers or responses from other students.
 - 9) The attitude of caring for others and passion to keep learning. It was built when I need to find the materials I need to make paper.
 - 10) Never give or not easily discouraged. I could wake up this spirit, because the lecture immediately restore my test file. In addition, the lecture also provided many opportunities to practice using SPSS and Excel.
 - 11) tolerance towards other students. It can be built for their practice questions and homework given by the lecturer.
 - 12) The spirit of doing things. It could be built this spirit through exercises and homework given by the lecture and the feedback from the lecture. In addition, I also learned it from the lecture.
 - 13) attitude was not to underestimate the courses. Because to be able to follow this course, I required to continuously read the notes and resource book, practicing solve problems, and to relearn how to solve a problem.
 - 14) The attitude to make preparations before I stood the class. Because the lecture always ask about the previous material.
- d. After you follow this course, were you assisted to more care with other students?
All the students said yes.
If your answer is yes, through what were activities or experiences your care to others was built? Please explain!
- 1) discussions with the other students who had difficulty in following the course.
 - 2) if there were things that I did not understand, then I would ask other friends, and friends would explain what I did not understand until I understood.
 - 3) help other friends who did not understand.
 - 4) to invite friends to learn together in solving problems and doing homework and exercises.
 - 5) invite friends to learn together to prepare the exam.
 - 6) invite friends to make a discussion group in completing papers and prepare presentations.
 - 7) notifying other friends who did not go on for lectures, exercises, and homework.
 - 8) invite friends to the discussion if I had different answers with him or her.
 - 9) assist seniors who have difficulty analyzing data research.
- e. What were the good practice in this course?

- 1) discipline.
- 2) carefulness.
- 3) the truth of a statement that was a conclusion of a study should be tested by the hypothesis test procedure.
- 4) to be diligent in teaching learning process.
- 5) I could use SPSS to process and analyze the data.
- 6) enthusiastic to stand the class.
- 7) enthusiastic to do the exercise dan the homework.
- 8) I could do well the steps of hypothesis testing.
- 9) perseverance.
- 10) I must read many books.
- 11) I dare to ask if there was not I understand.
- 12) the teacher was a role model for students.
- 13) repeating the exercises that have been done in the classroom.
- 14) provide sufficient time to practice questions.
- 15) make preparation before stand the class.
- 16) critical in response to the presentation of a paper or the exercise or homework answer.
- 17) I could finish my thesis.
- 18) I never give up and keep the spirit in completing my studies.
- 19) help other students who were having difficulty.
- 20) Accustomed to using SPSS and Excel to work on the problems of statistics.
- 21) I was increasingly able to think critically.

E. Conclusions

There are two conclusions to be drawn from the exposure to the above results, namely:

1. All students said this course could help him or her to build a critical attitude. According to them, a critical attitude could be built by them through (a) the problems given by the lecture, (b) differences in the calculation, (c) analyze the data and make conclusions, (d) discussion of exercise or homework, (e) the classical discussion process after the lecture explained something, (f) the discussion process with the lecture, (g) the presentation of papers, (h) a group discussion at the time of making paper, and (i) follow presentations from other groups
2. All students agreed that through a learning process that they underwent in the course, they could build a caring for each other. According to the students, the concern were they get up through (a) discussions with others, (b) the process of helping other friends who did not understand (c) studied together in solving papers, answering exercises, and homework, and preparing presentations and exams (d) notifying other friends who did not attend the course, and (e) assist seniors who have difficulty analyzing data research.

References

- [1] Dahar, Retno Wilis. 2011. *Theories of Teaching and Learning*. Jakarta: Erlangga.
- [2] Komalasari, Kokom. 2010. *Contextual Teaching and Learning: Concepts and Applications*. Bandung: Refika Aditama Press.
- [3] The Community of Study and Developer of The Reflective Pedagogy Paradigm Yogyakarta. 2012. *Reflective Pedagogy Paradigm*. Yogyakarta: Kanisius Press.
- [4] Matlin, Margaret W. 2009. *Cognition*. Seventh Edition. New York: John Wiley&Sons, Inc.
- [5] Morra, Sergio dkk. 2008. *Cognitive Development: Neo-Piagetian Perspectives*. New York: Lawrence Erlbaum Associates.
- [6] Santosa, S. 2000. *The Exercise Book for SPSS*. Jakarta: Elex Media Komputindo Press.
- [7] Suparno, Paul. 1997. *Constructivism in Education*. Yogyakarta: Kanisius Press.
- [8] Suparno, Paul. 2001. *Jean Piaget's Developmental Theory*. Yogyakarta: Kanisius Press.
- [9] Suparno, Paul. 2015. *Teaching and Learning Process in Higher Education with The Pedagogy Reflective Paradigm Stylish*. Yogyakarta: Sanata Dharma University Press.
- [10] Walpole, R. E., Myers, R. H., Myers, S. L., dan Ye K. *Probability and Statistics for Engineers and Scientists*. Boston: Pearson Education Inc.