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Abstract. One of purposes of this study was describing the steps of the teaching and learning process if the teacher in the Introduction Probability Theory course wanted to teach about the event probability by using the reflective pedagogical paradigm (RPP) and describing the results achieved by the students. The study consisted of three cycles, but the results would be presented in this paper was limited to the results obtained in the first cycle. Stages conducted by the researcher in the first cycle could be divided into five stages, namely (1) to know the students' context, (2) to plan and provide student learning experiences, (3) to facilitate students in actions, (4) to ask students to make a reflection and (5) to evaluate. The type of research used in this research was descriptive qualitative and quantitative research. The students' learning experience, the students' action, and the students' reflection would be described qualitatively. The student evaluation results would be described quantitatively. The research subject in this study was 38 students taking the introduction probability theory course in class C. From the students' reflection, still quite a lot of students were not complete in writing concepts that they have learned and / or have not been precise in describing the relationships between concepts that they have learned. From the students' evaluation, 85.29% students got score under 7. If examined more deeply, the most difficulty of students were in the mathematical horizontal process. As a result, they had difficulty in performing the mathematical vertical process.

INTRODUCTION

One of the mathematics subjects that which must be taken by students in Mathematics Education in the third semester was the Introduction Probability Theory. This course aims to help students to reinvent the basic concepts in probability theory, and apply these concepts to solve probabilistic problems. This subject was important for them, as it contained a pre-requisite knowledge for the Elementary Statistics course, the Statistical Methods and Practical Methods of Statistics course, and a provision for them to develop teaching and learning process about probability theory for senior high school students and / or vocational school students. The nature of this course is mandatory to pass. It means that if a student wants to pass from this course, then he or she should get minimum C for this course.

From the experience of previous years, there were still many students who have difficulty to understand the material from this course. The most difficulties experienced by students was doing horizontal mathematising, i.e. the translating process from the daily problems to the appropriate mathematical symbol. In general, if a student has been able to translate the word problems into mathematical symbols, then the student would be able to solve the problem. The difficulties faced by the students had a bad impact, i.e. the low graduation rate.

There were two questions that would be answered by the researcher in this paper, namely:
1. What steps developed by the teacher to teach about the probability of the event by using RPP?
2. What were the students' achievements after they followed a teaching and learning process by using RPP?

REFLECTIVE PEDAGOGICAL PARADIGM (RPP)

According to Komunitas Studi dan Pengembang Paradigma Pedagogi Reflektif (PPR) Yogyakarta, pedagogy was the efforts made by teachers in assisting students in their growth and development [2]. 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, the aim of Jesuit education was to form men and women for others [2]. Father Kolvenbach, formulated in more detail that the purpose of education of the Jesuits was to form leaders of ministry, men and women who were competent in their fields, have a conscience that was true, and has a compassion that grew out of love to others [2]. To achieve all core values, the Jesuit university to seek other forms of assistance for students called *cura personalis* approach which means caring for each individual must be consistent with the character and potential of each individual [6].

There were five educational principles in the RPP, namely [5, 6]:

1. Context

   According Preis and Stauder, the context was the things that the teacher need to know about their learners [6]. In preparing the teaching and learning process with the RPP, a teacher needed to recognize with the context of their students, include: the context of individual students, the initial concept and knowledge of the students, the context of the economic, social, political, cultural, and media, the college environment, and educational context in Indonesia [2, 5]. Why recognize the initial concept and knowledge of the students was important for a teacher? According Skemp, a scheme had three functions: (1) integrate existing knowledge; (2) a tool for learning; and (3) make someone understand something [7]. Therefore, if a teacher knew about the initial concept and knowledge of their students, then the teacher was expected to create appropriate learning path for their students, and plan the appropriate scaffolding for their students.

2. Experience

   On the experience elements, the teacher need to create situations that could make the students to gather and remember their experience. These experience used by them to sift the facts, feelings, values, understanding, and intuition that knew by them and to make a connection with what they were learning [2]. According to Preis and Stauder, the experience was the best effort that could be done by the teacher in using all the students' potential to achieve the learning objectives [6].

3. Reflection

   In the reflection element, students were helped to dig their experiences owned by the students in-depth and extensive, and to take the meaning for their personal life, and others [5]. In the reflection, memory, understanding, imagination and feeling were used to grasp the basic meaning and values from the material being studied by them [2]. According to Preis and Stauder, a reflection was the efforts done by the teacher that made their learners to explore their experiences in greater depth [6].

4. Action

   In the action element, students were helped to do good actions which were at the mind level or the physical activity level after they reflected on their learning experience [6]. According to Paul, an action might be a changing attitude that was better than before, and a real action which was directed out of themselves that could be seen and felt by others [5]. According Preis and Stauder, the action was the effort made by the teacher encouraged their students to move from knowledge into a concrete action [6].

5. Evaluation

   The evaluation element could help the teacher to understand that the element of experience, reflection, and action has been available well in the teaching learning process or not. The purpose of the evaluation was to look thoroughly whether the learning process with the RPP has occurred or not and whether the learning process could help students to develop their competence, conscience, and compassion for others or not. The evaluation was also to see whether the scaffolding provided by the teacher during the learning could develop the students or not [5]. According Preis and Stauder, evaluation was an attempt used by the teacher to assess the learners progress in competence, conscience, and compassion for others [6].

RESEARCH METHODOLOGY

In a qualitative study, researchers sought to describe a phenomenon that occurs in a natural situation and not make a quantification of the phenomenon [3, 4]. This research was classified in qualitative research, because in this study the researchers sought to describe a phenomenon that occurs in a natural situation and not make a quantification of

the phenomenon. The natural phenomenon that seeks described in this study was the student learning experiences, and the actions performed by students. The study also the quantitative research, because in this study, the researcher quantified the results achieved by the students in the reflection and evaluation process.

According to Miles and Huberman, there were three steps to analysis the qualitative data, namely: (1) data reduction, (2) data presentation, and (3) making conclusion and data verification. [4]. In this study, the researcher used data analysis steps developed by Miles and Huberman to analyze qualitative data obtained by the researcher in this study.

The subject of this research was all the students taking the Introduction Probability Theory course on Class C. The researcher chose this class because the researcher taught this class. There were 38 students who were the subject of this research consisted of seven men and 31 women.

The study consisted of three cycles. Each cycle consists of five main elements, namely context, experience, action, reflection, and evaluation. The learning process in the first cycle talked about the counting principle, permutation and combination, the problems relating to the counting principle, permutation and combination, experiment, sample space and events, the notion of the probability of the event and the definition of the axiomatic probability, the probability properties, independent and conditional events, and the conditional probability. The learning process in the second cycle talked about random variables. The learning process in the third cycle talked about the binomial distribution, the Poisson distribution, and the normal distribution. In this paper, the researcher would only be limited exposure about the learning process that occurred in the first cycle along with the results achieved by the students in the first cycle.

RESULTS AND DISCUSSION

The learning process that occurred in the first cycle was as follows:
1. Experience:
   a. Students were required to solve the two cases. The first case related to the addition principle and the second case related to the multiplication principle. The first case was as follows: two judges of the mathematics Olympic would be chosen from four candidates. Three judges of the physics olympiad would be selected from six candidates. How many ways that could be done to choose mathematics or physics olympiad jury. The second case was as the follows: how many ways that could be done to pick a jury for the mathematics olympiad and the physics olympiad [8].
   b. One student was asked to write down his or her solution that he or she had made for the first case.
   c. One other student was asked to write down his or her solution that he or she had made for the second case.
   d. The other students were asked to scrutinize the student answers.
   e. The teacher conducted the classroom discussion and directed students to reach the conclusions that were as follows:
      1) The Addition Principle [8]:
         If the object A_1 could be selected according n_1 ways, the object A_2 could be selected according n_2 ways, etc., so that the object A_k could be be selected according n_k ways, then the number of ways to select objects A_1, or A_2, ..., or A_k was $n_1 + n_2 + \cdots + n_k = \sum_{i=1}^{k} n_i$.
      2) The Multiplication Principle [8]:
         If a process could be formed from n_1 different ways, followed by a subsequent process could be formed from n_2 different ways, followed n_3 different ways, through the k process could be formed n_k different ways, then the number of ways to establish such procedures was $n_1 \times n_2 \times \ldots \times n_k = \prod_{i=1}^{k} n_i$.
2. Action:
   a. Students were given the task to solve the two cases on the addition and multiplication principle of. The first case was as follows: the teacher would make a study group consisting of four students from eight boys and four girls. How many study groups that may be established by the teacher if within each group there were at least two boys. The second case was as follows: there were eight students selected by committee from 40 students would be nominated as chairman, vice chairman, secretary and treasurer of the student council. How many possibilities stewardship council could be formed [8].
   b. Students were asked to collect the duties to be assessed by the teacher.
   c. One student was asked to write down his or her solution that he or she had made for the first case.
   d. One other student was asked to write down the solution that he or she had made for the second case.
   e. Others were asked to criticize the student answers.
   f. The teacher provided reinforcement to the answers written by two students.

g. The results obtained by the students of this task was presented in the following table:

TABLE 1.

The task score	0	0,4	2,4	3	3,4	3,6	4	5	7	9	9,4	9,8	10
The number of students	3	1	1	2	1	1	1	1	1	2	2	1	21

Description: three students received a zero because they were absent when the task was given.

3. Experience:
   a. Students were asked to solve the five cases. The first case was about the permutation, the second case was about the repeated permutation, the third case was about the permutations containing the same element, the fourth case was about the cyclic permutations, and the fifth case was about the combination.
      The first case was the following: how many even numbers consisted of three digits that could be formed from 1, 2, 5, 6, and 7 when each number could only be used one time [8].
      The second case was the following: how many even numbers consisted of three digits that could be formed from 1, 2, 5, 6, and 7 if every number may be used more than once [8].
      The third case was the following: how many letters that could be formed from the word MATEMATIKA [8].
      The fourth case was the following: how many sitting arrangements that could be formed if there were two persons who would be sat on a around table. How many sitting arrangements if there were three persons who would sit? How many sitting arrangements if there were four persons who would sit? How many sitting arrangements if there were five persons who would sit? How many sitting arrangements if there were n persons who would sit? [8]
      The fifth case was as follows: in a meeting attended by two persons, how many handshakes occurred if everyone who have followed the meeting had to shake hands? How many handshakes occurred if the meeting was attended by three persons? How many handshakes occurred if the meeting was attended by four persons? How many handshakes occurred if the meeting was attended by 10 persons? How many handshakes occurred if the meeting was attended by 100 persons? How many handshakes occurred if the meeting was attended by n persons? [8]
   b. Five students were asked to write down their solution that they had made for the first and the fifth case.
   c. The other students were asked to scrutinize the student answers.
   d. The teacher conducted classroom discussions and directed students to reach conclusions about the permutation definition, how to count the number of the permutation, how to count the number of the repeated permutation, how to count the number of the permutations containing the same element, how to count the number of the cyclic permutation, the combination definition, and how to count the number of the combination.
4. Action:
   a. Students were asked to do the exercises as many as 12 questions about the permutation, the permutations containing the same elements, the cyclic permutation, the repeated permutations, the combination, and the partition [8].
   b. Twelve students were asked to write down their answers one by one.
   c. The other students were asked to criticize the student answers.
   d. The teacher provided reinforcement to the answers written by twelve students.
5. Experience:
   a. Students were divided into 11 groups consist of 3 – 4 students.
   b. Each group was asked to throw two coints 100 times and throwing two dice experiment 100 times. They were asked to calculate the probability of each event using relative frequency. When they calculated the probability, they required to use the Excell software. The scores for this task presented on the next table:

TABLE 2.

The task score	0	7	8	10
The number of student	1	4	4	29

 Description: one student receives zero because the student absent when the task was given.

   c. One group was asked to present their result on throwing two coints.
   d. One other group was asked to present their result on throwing two dice experiments.

e. The other students were asked to criticize the student answers.
f. The teacher conducted the classroom discussions and directed students to reach conclusions about the empirically probability definition.
g. The teacher gave a lectured about the axiomatic probability definition and four nature of the probability, namely: (1) $P(\emptyset) = 0$, (2) $P(A^C) = 1 - P(A)$, (3) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$, and (4) If $A \subseteq B$, then $P(A) \leq P(B)$ [8].
h. Students were asked to prove the four properties.
i. Four students were asked to write down their proof.
j. The teacher provided reinforcement to the answers written by four students.
k. Students were required to solve four cases. Two cases were about the conditional probability, and two cases were about two independent event.
l. Four students were asked to write a solution that had made them alternately.
m. The other students were asked to scrutinize the students' answers.
n. The teacher conducted the classroom discussion and directed students to reach conclusions about the conditional event definition, the independent event definition, how to count the conditional probability.
6. Action:
   a. Students were asked to do the exercises as many as 15 questions about how to count the event probability, the conditional probability, and how to count the probability of the two independent events [8].
   b. Fifteen students were asked to write down their answers one by one.
   c. The other students were asked to criticize the student answers.
   d. The teacher provided reinforcement to the answers written by fifteen students.
7. Reflection:
   a. Students were asked to make a reflection about the material already learned by them by creating a concept mapping.
   b. Results of the reflection made by students could be classified into three groups, namely (1) the concept were not complete and relationships between concepts were made not appropriate, (2) the concept were not complete or relationships between concepts were made not appropriate (the example of the student's reflection for the first class could be seen in figure 1), and (3) the concept were complete and relationships between concepts were made appropriate (the example of the student's reflection for the first class could be seen in figure 2)
   c. There were three students who did not made a reflection because they were absent. There were 12 students in the first group, 15 students in the second group, and 8 students in the third group. It meant 27 students who were not complete in writing concepts learned by them and / or have not been precise in describing relationships between concepts learned by them.
8. Evaluation:
   a. There were four questions given to students in the evaluation as follows:
   b. The first question was there were 6 persons who would be queuing up to get into a bus. How many ways that six people could queue into the bus? When the three persons must sequentially influx, how many ways that six people could queue into the bus?
   The indicator for the first question was the student could implement the permutation concept to solve a problem.
   c. The second question was ten persons would go to Kaliurang to take a vacation. They would use three cars. Each car could carry four passengers. What was the probability that the first car carried three passengers, the second car carried three passengers, and the third car carried four passengers?
   The indicator of the second question was the student could implement the combination concept to solve a problem.
   d. The third question was in a prison known $\frac{2}{3}$ of the prisoners was under 25 years old, $\frac{3}{5}$ of the condemned was a man, and $\frac{5}{8}$ of the prisoners was a woman or 25 years old or more. What was the probability of a convict from prison randomly selected this woman and at least 25 years old?
   The indicator of the third question was the student could implement the probabilistic characteristics to solve a problem.
   e. The fourth question was the first box contained 3 white balls and 5 black balls, while the second bag contained 4 white balls and 5 black balls. One ball was drawn from the second box and put into the first box without looking it. What was the probability fetched a black ball from the first box?
   The indicator of the fourth question was the student could implement the conditional probability to solve a problem.

f. The student results achieved in the evaluation as follows:

TABLE 3.

The score test	2,4	3	3,2	3,4	3,6	3,8	4	4,2	4,4	4,6	5	5,4	5,6	5,8
The number of the student	3	1	1	1	5	1	3	3	3	1	4	1	1	1

The score test	7,4	7,8	8	8,2	8,4	8,5	10
The number of the student	1	1	1	1	1	1	3

a. From the results, it appeared that 29 students or 85.29% got the score under 7. If studied more in depth, the greatest difficulty of the students were in the process of mathematical horizontal, ie changing matter in the form of a story into the language of mathematical symbols. As a result, they have difficulty in performing vertical mathematical process, i.e. the process using mathematical concepts to solve problems that have been presented in mathematical symbols.
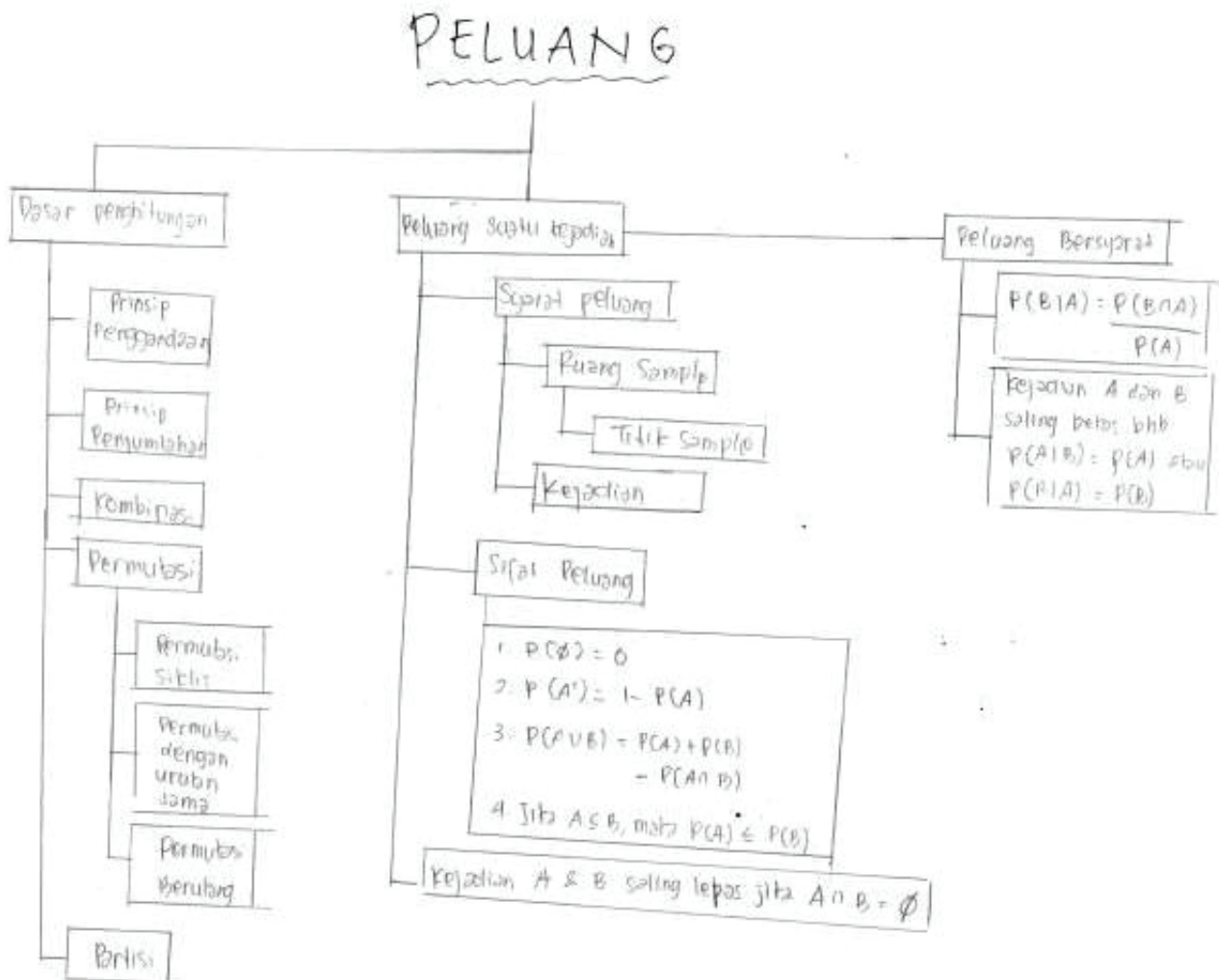

FIGURE 1. The example of the student reflection for the second group

FIGURE 2. The example of the student reflection for the third group

Generally, when the teacher teaches the counting principle, combinations, permutations, and probability in high school, the teacher will do the following: (1) the teacher defines the concepts, (2) the teacher gives examples and non examples of concepts (3) the teacher explains the nature of the concepts, (4) the teacher gives examples of problems that can be solved with the concepts and explains how to use the concepts and traits to solve them, and (5) the teacher gives the exercise. The learning process undertaken by the teacher by Gravemeijer is called a mechanistic approach [1]. According to Gravemeijer, in a mechanistic approach, students do not experience both horizontal and vertical mathematizing process [1].

If we re-analyzed the learning process conducted by the researcher, then the patterns undertaken by the researcher in the learning process were as follows: (1) students were given the opportunity to explore a phenomenon through the problem solving, (2) students were given the opportunity to solve problems with their own ways (4) students were given the opportunity to communicate how the problem-solving process was, and (5) the students were given the opportunity to make a conclusion which was the concept that would be constructed by the students through the process of solving the problem. The process undertaken by the researcher in managing learning by Gravemeijer was called the realistic approach [1]. In the learning process with realistic approach, students experience the horizontal and vertical mathematizing process [1].

Students who attended this course experienced a transition from a mechanistic learning process to a realistic learning process. This shift was extreme, as students move away from never experiencing horizontal and vertical mathematical processes when they construct a concept into full-fledged horizontal and vertical mathematical processes when they construct a concept. According to the researcher, this extreme transition that causes the results obtained by students in the evaluation made by the researcher has not been satisfactory.

CONCLUSIONS

The steps that could be developed by the teacher if he or she want to teach about the event probability by using RPP were (a) knowing the initial concept and knowledge of the students about the permutation and combination concept, and about the probability concept, (b) giving experiences and doing actions about the counting principle, permutation and combination, the problems relating to the counting principle, permutation and combination, experiment, sample space and events, the notion of the probability of the event and the definition of the axiomatic

probability, the probability properties, independent and conditional events, and the conditional probability, (c) doing a reflection, and (d) evaluating. Based on the students' reflection, there were 12 students in the first group, 15 students in the second group, and 8 students in the third group. It meant 27 students who were not complete in writing concepts learned by them and / or have not been precise in describing relationships between concepts learned by them. 29 students or 85.29% got the score under 7. If studied more in depth, the greatest difficulty of the students were in the process of mathematical horizontal, i.e. changing matter in the form of a story into the language of mathematical symbols. As a result, they have difficulty in performing vertical mathematical process, ie the process using mathematical concepts to solve problems that have been presented in mathematical symbols.

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