Project based learning application to develop entrepreneurship of pre-service teachers

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Abstract. The aim of this study is to investigate the effect of Project Based Learning through innovative food preservative practices on entrepreneurship attitude and entrepreneurship motivation of preservice teacher. The research used quasi experimental method. Sample was taken by cluster random sampling, where the experiment group were treated by Project Based Learning through practice in laboratory and the control group used conventional practice method. Data obtained from post-test using questionnaire of entrepreneurship attitude and entrepreneurship motivation scale. The results showed that the level of entrepreneurial attitude of the experimental class are in the good category and the entrepreneurship motivation are in the high category. Hypothesis testing using independent t test showed a significant difference between the experiment group and the control class. Implementation of Project Based Learning through the practice of preservative of foodstuff, requires students to be actively involved learning so that students have expertise in the field of utilization of food preservative technology that can be a business opportunity. It can develop entrepreneurial attitude and student entrepreneur motivation.

1. Introduction
Leading human resource will improve the nation’s growth in the fields of knowledge, technology, and economy. The growth of economy is supported by the conducive atmosphere for improving entrepreneurship among people [1, 2].

Higher Education is a place to educate students to possess intellectual ability and sufficient skills to support their lives in the future. Curriculum in Higher Education must refer to the learning outcomes; it is an internalization and accumulation of knowledge, skills, attitudes, and competencies in a certain scientific knowledge and skill [3].

Laboratory work (practicum) is a method that facilitates various skills including the skill for planning, the skill for problem finding, the skill for collecting and processing information, the skill for interpreting, and the skill for communicating [4]. Results from a field observation revealed that one of the subjects that conduct the practicum is Food and Agriculture Technology subject. Practicum is conducted by following certain instructions prepared by the lecturer. This is a kind of clarification towards existing concepts without involving the students in the planning for practicum and designing the experiments. Thus, this leads to the students’ low motivated and attitudes for entrepreneurship.

On food preservatives, practicum is conducted by applying the existing preservative technique in society. The students are not challenged to make innovations on the food preservative technique, especially those which use natural resources existed in the environment. The food preservatives has a
huge potential to be developed into innovative technology which can be applied in the society, especially
to lessen the detriment of the crop when in storage.

For fulfilling the gaps from aforementioned problems, Project-Based Learning (PjBL) is considered
as the learning models which facilitates students’ activities to think creatively and make innovations.
Thus, the present study dealt with the application of Project-Based Learning (PjBL) to develop students’
entrepreneurship. This learning model is an authentic learning model in which the learners plan,
implement, and evaluate the project in the real life [5, 6]. Therefore, the implementation of the Project
Based Learning model in practicum of food preservative demands the students to be actively involved
in the learning so that they can possess the skill in the field of food preservative technology as a chance
for entrepreneurship in the future. This can improve the students’ entrepreneurial attitudes and
motivation

2. Method
The present research was conducted in Universitas Galuh Ciamis started in November 2017 and ended
in February 2018. The subject of the research is a group of preservice teacher students of Biology
Department of the seventh semester in the academic year of 2017-2018. The sample of the research was
selected by using cluster random sampling. The sample for the research were one experiment class
consisting of 25 students and one control class consisting of 24 students.

The purpose of the present research is to investigate the entrepreneurial attitudes and motivation of
the students who were taught by the implementation of PjBL practicum-based of food preservative
innovation. Quasi-experimental method was employed. The research design used in the present research
was non-equivalent control group design [7]. The treatment given to the students was practicum-based
PjBL model of food preservative innovation towards the students’ entrepreneurial attitudes and
motivation to the experimental class and the conventional practicum model of food preservative to the
control class.

The data for the present research was collected by using Non-test technique. The entrepreneurial
attitudes were measured by administering a questionnaire, meanwhile the entrepreneurial motivation
was measured by using motivation scale. The questionnaire consisted of 25 statements, which contained
positive and negative statements. The instrument used Likert Scale 1-4 ranging from Extremely Disagree
(ED) to Extremely Agree (EA) and dismissed the neutral point [8]. After administering the
questionnaire, it was arranged before being used. It has passed the validity and reliability test.

In the present quantitative study, the data analysis worked with some several steps. First, in data
grouping, the researcher applied random sampling for deciding research participants. To do so,
variables, data tabulation, data presentation of each variable were also counted using inferential statistics
to answer research problems, both null and proposed hypotheses. Further, to indicate the result of the
treatment, the t - test independent sample employing SPSS 20 for Windows was conducted to test the
hypothesis of the difference of the average grade of the entrepreneurial attitudes between the
Experiment Class and Control Class, which has previously passed the pre-test namely normality test and
homogeneity test.

3. Results and discussion
The summary of the data analysis of the research on the level of the students’ entrepreneurial attitudes
after conducting practicum-based PjBL for food preserving innovation learning can be seen on Table 1.

| Category   | Experiment Class | Control Class |
|------------|------------------|---------------|
|            | Frequency | Percentage | Frequency | Percentage |
| Very Good  | 10        | 40%        | 2         | 8.4%       |
| Good       | 15        | 60%        | 22        | 91.6%      |
| Total      | 25        | 100%       | 24        | 100%       |
The result showed that 40% out of the students in the experiment class’ entrepreneurial attitudes level were categorized very Good, while the rest 60%, were good. Meanwhile, the Control class was spread into 8.4% out of very Good and 91% of Good. The average grade of the Experiment Class was 3.21, it was higher than that of Control Class 2.93.

Moreover, the criteria for the hypothesis testing was t-counted > t table or Sig grade < 0.05; H0 was rejected and H1 was accepted. Meanwhile, the summary of the t test independent sample t-test results is shown on Table 2.

Table 2. Results of t test independent sample of the entrepreneurial attitudes.

| Class     | N   | Mean Difference | T     | Sig. | Acceptance H0 (α = 0.05) | Conclusion          |
|-----------|-----|-----------------|-------|------|--------------------------|---------------------|
| Experiment| 25  | 3.865           | 2.672 | 0.01 | Reject H0                | Significantly Different |
| Control   | 24  |                 |       |      |                          |                     |

Based on the Table 2, the Sig value 0.01 met the criteria of Sig < 0.05. It can be concluded from the result that the entrepreneurial attitudes of the students in Experiment Class and those in Control Class were significantly different.

The summary of the data analysis result of the students’ entrepreneurial motivation level after being treated with the practicum-based PjBL of food preservative innovation learning can be entirely shown on the Table 3.

Table 3. Students’ entrepreneurial motivation.

| Category | Experiment Class | Control Class |
|----------|------------------|---------------|
|          | Frequency        | Percentage    | Frequency | Percentage    |
| High     | 16               | 64%           | 5         | 20.8%        |
| Medium   | 9                | 36%           | 19        | 79.2%        |
| Total    | 25               | 100%          | 24        | 100%         |

Results showed that the students’ entrepreneurial motivation level in the experiment class after being given treatment of the learning were 64% categorized as high while the rest, 36%, categorized as medium. Meanwhile, in the control class, 20.8% of the students were categorized as high and 79.2% were categorized as medium. The average grade of the experiment class was 75.12, categorized as high; that of the control class was 69.75, categorized as medium. The t-test independent sample analyzed by using SPSS 20 for Windows was conducted to test the hypothesis of the difference between the average grade the students’ entrepreneurial motivation and that of the control class which has previously passed the pre-condition test namely normality test and homogeneity test. The hypothesis testing criteria was t counted > t table or Sig value < 0.05, therefore H0 was rejected and H1 was accepted. The summary of the t test Independent Sample are shown on Table 4.

Table 4. Results of the t test independent sample of entrepreneurial motivation.

| Class     | N   | Mean Difference | t     | Sig. | H0 Acceptance (α = 0.05) | Conclusion          |
|-----------|-----|-----------------|-------|------|--------------------------|---------------------|
| Experiment| 25  | 5.370           | 3.705 | 0.001| Reject H0                | Significantly Different |
| Control   | 24  |                 |       |      |                          |                     |

Based on Table 4, it can be seen that the Sig value 0.001 met the criteria of Sig < 0.05. thus, it can be concluded that the entrepreneurial motivation of the experiment class and that of the control class were significantly different.

The practicum-based PjBL model is an authentic learning model in which the students are trained to plan, implement, and evaluate the project to overcome problems in the real life [9-11]. Besides, the
model also results in useful products which are beneficial for daily activity so that the learning becomes more meaningful. The outcome of product assessment of the students’ projects can be seen on Table 5.

**Table 5. Product assessment outcome.**

| Kel | Product                                      | Product Assessment |          | Total | Grade | Criteria |
|-----|----------------------------------------------|--------------------|----------|-------|-------|----------|
| 1   | Kecombrang to preserve Cilok                 | Product Organoleptic | 12.00    | 23.00 | 35.00 | 3.33     | Good     |
| 2   | Carrot to preserve meatballs                 |                     | 12.86    | 24.00 | 36.86 | 3.51     | Very Good|
| 3   | Bay leaves to preserve fish                   |                     | 11.43    | 21.00 | 32.43 | 3.09     | Good     |
| 4   | Aloevera to preserve grape                    |                     | 11.29    | 21.00 | 32.29 | 3.07     | Good     |
| 5   | Curanin as a natural preservative for fish    |                     | 12.00    | 23.00 | 35.00 | 3.33     | Good     |
| 6   | Powder Spices as a natural preservative for dendeng |              | 13.14    | 24.00 | 37.14 | 3.54     | Very Good|

PjBL is emphasized in contextual learning through complex activities which involve the students in the investigation, problem solving, and other meaningful tasks; giving the students opportunities to work autonomously in constructing their own knowledge, and producing real products as their final outcome. This can improve the students’ creativity for finding new experience which can encourage them to improve their entrepreneurial attitudes and motivation through real products resulted from their projects.

The measurement of the students’ entrepreneurial attitudes was conducted after the learning process by administering a questionnaire consisting of 25 statements including five indicators, such as the students’ confidence, curiosity, leadership, originality, and future oriented way of thinking. The difference of the entrepreneurial attitudes between the experiment class and the control class can be seen on Figure 1.

**Figure 1. The difference of the entrepreneurial attitudes of experiment class and control class.**

Based on the Figure 1, it can be seen that the entrepreneurial attitudes and the average value of the experiment class’ entrepreneurial attitudes are higher than that of the control class. The statistic analysis result showed that the Sig value 0.01 met the criteria of Sig < 0.05; thus it can be concluded that the students’ entrepreneurial attitudes of the experiment class and the control class were significantly
different. The difference of the students’ entrepreneurial attitudes level of the experiment class and the control class was due to the experiment class employed the practicum-based PjBL which procedures facilitated reasoning activities, critical thinking, and creative thinking in working on project tasks started from planning, monitoring, and evaluating the process so that it could improve the students’ confidence, curiosity, leadership, originality, and future oriented way of thinking. Meanwhile, in the control class, the students conducted practicum by following the practicum procedures provided by the lecturer so that the students were not actively involved; they only conducted the procedures in the practicum instructions.

The students’ activity in the practicum-based PjBL was well-planned and systematic so that the learning process became more effective since the students’ were trained to establish the most suitable task completion strategy for the running project. The project processing encouraged the students to conduct meaningful job since they work on real research instead of merely finding information from books or websites and downloading them. The students started with their own questions, leading to their pursue of the resources and finding answers by testing their own ideas and drawing their own conclusion [5].

The measurement of the students’ entrepreneurial motivation was conducted after the learning process was finished by using the motivation scale consisting of 25 statement items which cover five indicators, namely the desire for achievement, self-efficacy, risk-taking will, and the locus of control internal. The difference of the entrepreneurial level of the experiment class and the control class can be seen on Figure 2.

![Comparison of the Students’ Entrepreneurial Motivation](image)

**Figure 2.** The difference of entrepreneurial motivation of experiment class and control class.

Based on Figure 2, it can be seen that the entrepreneurial motivation of the experiment class was higher than that of the control class. This can be seen from the number of the students and the average grade of entrepreneurial motivation in the experiment class which was higher than that of the control class. The statistics analysis result showed that the Sig value 0.001 met the criteria Sig value < 0.05; thus, it can be concluded that the entrepreneurial motivation of the students in experiment class and the control class were significantly different. The difference of the students entrepreneurial motivation level of the experiment class and the control class was due to the employment of the practicum-based PjBL to the students of the experiment class, which procedures facilitated the student’s activities to explore their own capability through problem solving existing in the project. This is in accordance with the characteristic of PjBL. The activities during the project gave the students opportunity to work autonomously to construct their own learning, which in the end, the students could produce valuable and
realistic works. The students possess the skill in making use of food preservative technology for future benefit. This can improve the students’ entrepreneurial motivation.

4. Conclusion
Results of the present research revealed that the average value of the entrepreneurial attitude level was categorized as High. The hypothesis testing employing the t test independent sample showed the significant difference between the experiment class and the control class. The implementation of the practicum-based Project Based Learning for food preservatives encouraged the students to get involved actively in the learning process so that they possess the expertise in the field of food preservative technology which can be beneficial in the future. This can improve the students’ entrepreneurial attitudes and motivation.

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