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Improving student entrepreneurship and life skills through project-based learning models of organic fertilizer

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Abstract

This research aims to realize the implementation increase enterpreunership and lifeskill of the students by kascing organic waste as experiment method experiment technic in subject Evaluation and Conservation of Farm Resource Geography Education Department. This research is carried out February until July 2022 at Geography Education Department. Data that got to outcome of the research by student and the lecture. The activity of research devided for four cycle, consist of planning, action, experiment and reflection. Result that got to show that increase value of the students by the cycle. By using the Project Based Learning (PjBL) model every student in group can identify and analysis the result from field research.

Keywords: Student entrepreneurship; Student Life Skills; Organic Fertilizer; Learn Model.

1. Introduction

Today, farmers and the community have realized that the use of inorganic fertilizers causes many problems, especially for health, so they have started to switch from using inorganic fertilizers to organic fertilizers. Even entrepreneurs engaged in agribusiness are actively using organic fertilizers for various types of plants, so we Learn about organic vegetables and organic fruits. Even in developed countries the use of organic fertilizers has been done for a long time, because they realize that the use of inorganic fertilizers is very dangerous for health.

One of the objectives of the Agricultural Geography course is to equip students with regards to tillage and maintaining soil fertility both physically, biologically, chemically and soil physics as well as increasing agricultural yields by using various types of organic fertilizers available.

The learning methods used so far are lectures, questions and answers, discussions, personal assignments and group assignments. This method is well enough to be applied to this course, but it is necessary to develop teaching methods to improve the quality of graduates of the Agricultural Geography course and improve the entrepreneurial nature and life skills of students. As an implementation, students actively participate in learning through the experimental method of making organic vermicompost fertilizer from household waste through group assignments.

The purposes of this research is that students who graduate from the Agricultural Geography course at FIS Unimed have life skills to improve entrepreneurial skills in making vermicompost organic fertilizer from household waste.

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According to [1], vermicompost is the result of fragmentation of organic matter by physical and chemical activity of earthworms mixed with the excrement they secrete which is rich in microbial living cells. Research [2], showed that in the decomposition process, earthworms have a higher ability compared to other soil organisms. According to [3], [4] organic fertilizer can be produced from worms which contain elements such as N, P, K, Ca, Mg, S and other nutrients that plants can need. According to [5], [6] the decomposition of organic matter with the help of earthworms can be 3-5 times faster than the decomposition without the help of earthworms. Of the available organic waste for the cultivation of earthworms can produce as much as 40 percent fertilizer. The cooperation between earthworms and micro-organisms has the effect of a good decomposition process.

According to [7], [8] the use of organic vermicompost for plants is also known as organic farming. Organic agriculture is defined as a comprehensive and integrated agricultural production system that naturally optimizes the health and productivity of agro-ecosystems to produce quality and sustainable food.

A better learning method is a method of placing students on an active side in the learning process, according to [9], [10] that the learning process passively through verbal acceptance by reading, listening, and viewing pictures is only able to achieve an absorption rate of around 30%. The absorption rate will increase to 50% by way of learning through visual reception. Absorption rate can be increased again by means of participation which results can reach 70%. Through active learning by doing presentations, real simulations and doing direct work can achieve absorption of learning outcomes of 90%.

According to [11], [12] explained that PjBL is a learning unit that is process-focused, relatively timely, problem-focused, and meaningful by combining concepts and practices. Meanwhile, according to [13]. The project-based learning model (PjBL) is one that involves project work and guides students to design, solve problems, and create opportunities to work independently.

According to [14], the Project Based Learning (PjBL) learning model can be used as a learning model to develop students' abilities in planning, communicating, solving problems, and making the right decisions about the problems they face. According to [15], [16] Project Based Learning (PjBL) is a learning activity that uses projects as a learning process to acquire attitudes, knowledge, and skill competencies.

2. Research methods

The research was conducted from February to July 2022 at the Geography Education Department. The location of the field practice activities in the Sungai Dua area, Tanjung Rejo Village, Percut Sei Tuan District, Deli Serdang Regency. While the location of plant identification is in the Laboratory of the Department of Biology FMIPA. Data collection techniques were in the form of tests and observations by 15 students of the Geography Education Department. The research began with the preparatory stage where the research team determined the allocation of implementation time, tasks and action implementation techniques, including the research team's tasks, as well as the preparation of the instruments to be used. Then develop an agreed implementation plan where the research is planned to consist of two cycles which will be carried out for one semester from February 2022 to July 2022. Then in February research activities will be carried out which are divided into 4 cycles. Each cycle includes activities: (1) Planning, (2) Action, (3) experimentation and (4) Reflection.

3. Results

The Agricultural Geography course lasts for one semester with 16 (sixteen) meetings. The results of the implementation of the research that has been carried out are as follows:

3.1. In Cycle I carried out

3.1.1. Preparation phase

The lecturer/research team explained the procedures/systematics carried out in the field to groups of students who had been divided into 3 (three) groups and explained the forms of critical land problems and how to overcome them, the diversity of plant species on degraded lands, and how to make vermicompost organic fertilizer of various types different food.

3.1.2. Implementation of Activities

At this stage the Research Team implements and applies the contents of the design. Each group made observations in the field, the data taken were pH and macronutrients and types of vegetation and the lecturer directed the research.

3.1.3. Observation Stage/Action observation

Lecturers/Research Team made observations of groups of students who actively collaborated in groups during field practice. The data collected in this observation stage is used as qualitative data with indicators of activeness in learning in the field

3.1.4. Action Reflection Stage

After the implementation phase is completed, it is continued by evaluating the results of temporary observations in the field through observation sheets filled in by the group to find out the achievement indicators of success and the obstacles experienced.

- The results of the assessment from Cycle I for group I were 1 person's A score, 2 people's B score and 3 people's C score. The number of students in group I was 5 people and the average number of group scores was 81.43.
- The results of the assessment from Cycle I for group II, the value of A was 1 person, the value of B was 2 people and the value of C was 2 people. The number of students in group II was 5 people and the group's average value was 79.29.
- The results of the assessment from Cycle I for group III, the value of A was 1 person, the value of B was 1 person and the value of C was 3 people. The number of students in group III was 5 people and the group's average value was 79.76.

3.2. In cycle II carried out

3.2.1. Preparation phase

At this stage the Lecturer/Research Team explains to students the results of observing the types of vegetation and soil samples obtained from field practice so that the soil analysis can be more valid will be analyzed at the USU Laboratory.

Activity Implementation Stage

At this stage, representatives of each group identified soil samples at the USU Soil Laboratory, which were supervised by an assistant laboratory assistant. Lecturers/Research Team accompany the learning process and observe student activity. Furthermore, group representatives share knowledge with fellow group members in the lecture hall and in the laboratory room and together.

Observation/Observation Action

At this stage the course lecturer (Research Team) observes students who are following the identification process in the laboratory. The data collected in this observation stage is used as qualitative data with indicators of activeness in learning to solve problems obtained from the results of field practice.

Action Reflection

From the reflection results in Cycle II, it shows that the activity of student groups in the learning process has led to experimental techniques. This can be seen from the students being able to build cooperation and participate in the learning process activities and be on time in doing and carrying out the assignments given.

- The results of the assessment from Cycle II for group I were 3 people with B scores, 2 people with C scores. The number of students in group I was 5 people and the average number of group scores was 82.62.
- The results of the assessment from Cycle II for group II, there were 3 people with B scores, and 2 people with C scores. The number of students in group II was 5 people and the group's average value was 82.5.
- The results of the assessment from Cycle II for group III, the value of B was 4 people and the value of C was 1 person. The number of students in group III was 5 people and the group's average value was 83.58.

3.3. In cycle 3 carried out

3.3.1. Preparation phase

The supporting lecturer (Research Team) made a lesson plan based on the reflection results in the second cycle. through providing motivation to groups to be more active in learning, more intensively guiding groups that have difficulties in completing field practice reports by analyzing the results of identification and providing guidance on the Project Based Learning (PJBL) learning model.

3.3.2. Activity Implementation Stage

Student groups solve the identification results and analyze them by considering the environmental factors that influence them through the use of e-learning media. The use of e-learning media by students by utilizing the Geography Education Department's laboratory. Students in a group help each other to master the problems that have been solved through e-learning media and then field practice reports are developed into scientific work by student groups and the results are presented in class.

3.3.3. Observation/Observation

At this stage the course lecturer (Research Team) observes students carrying out the process of making field practice reports into scientific work and making presentations to be accountable for the results of scientific work in front of other groups through question and answer and discussion.

3.3.4. Action Reflection

From the reflection results in Cycle III, it shows that student group activities in the learning process have been able to use the Project Based Learning (PjBL) learning model. Students are able to solve with various media and learning activities. This can be seen from students being able to build cooperation in groups in solving learning problems and participating in learning process activities and carrying out assignments according to the guidelines provided.

- The results of the assessment from Cycle III for group I, the value of A was 1 person and the value of B was 4 people. The number of students in group I was 5 people and the group's average value was 86.64.
- The results of the assessment from Cycle III for group II, there were 3 people with A scores and 2 people with B scores. The number of students in group II was 5 people and the group's average value was 88.42.
- The results of the assessment from Cycle III for group III, there were 2 people with A scores and 3 people with B scores. The number of students in group III was 5 people and the group's average value was 89.05.

3.4. In cycle 4 carried out

3.4.1. Preparation phase

Lecturer (Research Team) makes a lesson plan based on the results of reflection in the third cycle by providing motivation to groups to be more active in learning, more intensively guiding groups who experience difficulties in completing field practicum reports by analyzing nutrient levels of vermicompost fertilizer and providing model guidance experimental learning.

3.4.2. Activity Implementation Stage

At this stage, students in a group show mutual assistance to master the problems that have been resolved through discussion and then the field practicum reports are developed into scientific work by student groups. Scientific work of student groups is presented in question and answer forums or discussions among group members. Each group presented the results of the field practice report. At this stage an effective and conducive learning atmosphere is created.

3.4.3. Observation/Observation of action

At this stage students are able to write scientific papers based on their conceptual thinking on problem analysis obtained from field practice and are able to write down cited sources to corroborate the results of their analysis, so that students avoid copying and pasting citations without mentioning the source.

3.4.4. Action Reflection

From the results of reflection on Cycle IV, it shows that student group activities in the learning process have been able to use the experimental technique learning model. Students are able to solve with various media and learning activities.

This can be seen from students being able to build cooperation in groups in solving learning problems and participating in learning process activities and carrying out assignments according to the guidelines provided. This process can be evaluated from the results of scientific writing assignments given by lecturers from the results of field practice carried out by student groups.

The results of the assessment from Cycle IV for group I, all students got an A. The number of students in group I was 5 people and the group's average value was 91.71.

- The results of the assessment from Cycle IV for group II, there were 4 people with A scores and 1 person with B scores. The number of students in group II was 5 people and the group's average value was 92.89.
- The results of the assessment from Cycle IV for group III, all students got an A. The number of students in group III was 5 people and the group's average value was 91.86.
- Based on the acquisition of student scores in the fourth cycle of activities, it was obtained that the average value of the student group was 92.15, which had an increase from cycle II. This shows that the quality of students is increasing from cycle I to cycle IV.

4. Discussion

4.1. Application of Experimental Techniques

Experimental techniques in the development of field practice in this study are learning models that involve students with real problems, so that motivation and curiosity increase. Thus students are expected to develop higher ways of thinking and skills. Students of the Department of Geography Education apply an experimental technique learning model using a scientific thinking approach. The stages carried out by students began with assignments given by the Lecturer/Research Team to carry out field practice activities for vegetation analysis and soil analysis on critical land in Kualabekala. Data taken from the field in the form of soil samples were brought to the laboratory to be identified through a soil laboratory assistant tutorial, then the identification results were analyzed by students using source books to conclude the condition of vegetation and environmental nutrient levels in the study area.

Furthermore, group members were directed by the lecturer to incubate the soil, then only made organic vermicompost fertilizer using household waste, tofu dregs, cabbage, and spinach after that the fertilizer could be applied in the field to be used as fertilizer for plants.

4.2. Improving the Quality of Students Conducting Field Practices

Semester 5 students of the Semester Geography Education Department make organic vermicompost fertilizer to motivate students to be active in carrying out work efficiently and effectively. This is in accordance with the opinion of [17], [18] that educational goals can be emphasized on the mastery of science and technology (science and technology) or oriented towards the application of science and technology, through practicum and practical work. Furthermore, organizing students to carry out field practice activities can give students skills to prove and or find a concept scientifically (scientific inquiry) and appreciate the knowledge and skills they have.

4.3. Improving students' ability to apply experimental learning techniques for making organic vermicompost fertilizer

Independently, student groups discuss the results obtained from the field and prove them with theories obtained from various sources on the internet and develop them better. Student activities carry out analysis of nutrient levels from vermicompost fertilizer produced by group collaboration and discussion to create innovative and active learning. Students collect various materials that can support more varied research results.

4.4. Collaboration between the Department of Geography Education and the Department of Soil through the use of the USU Soil Laboratory

From the results of the observations of the Lecturer/Research Team that as a whole it can be said that field practice learning is to identify nutrient levels of organic fertilizers. Learning that is carried out through collaboration between the Department of Geography Education and the Department of Soils is something new and fun for students. This is in accordance with [19], [20] which states that the formation of collaboration or collaboration in learning can provide a form of real practice to students in their respective regions, so that graduates will have attitudes, abilities, and skills in their fields, according to the needs and demands of the curriculum.

4.5. Application of Experimental Learning Models in Agricultural Geography Courses

Experimental techniques in the development of field practicum in this study are learning models that involve students with real problems, so that motivation and curiosity increase. Thus students are expected to be able to develop higher ways of thinking and skills, and in the end they can create various kinds of organic fertilizers and are expected to be able to foster entrepreneurial traits and be able to be creative. Geography Education Department students apply an experimental learning model using a scientific thinking approach. This thinking process is carried out systematically through the stages and process of solving problems based on clear data and facts. The stages carried out by students began with assignments given by the Lecturer/Research Team to carry out field practice activities for initial analysis of soil and vegetation on critical land in Kualabekala, Medan Johor sub-district. Data taken from the field in the form of soil samples were brought to the soil laboratory for nutrient content analysis, then the results would be incubated from ultisol soil taken to conclude the condition of nutrient content and environmental vegetation in the study area.

4.6. Improving the Quality of Students Conducting Vermicompost Organic Fertilizer Practicum

Based on the results of the assessment of student group work from cycle I to cycle IV, field practice learning activities in coastal areas have increased. This can be seen from the student scores from the first cycle, the average student score was 79.43 with a score composition (A = 10%, B = 36.36% and C = 54.54%), in the second cycle, the student average score was 82.9 with a score composition (A = 0% , B = 75% and value C = 25%) and cycle III obtained an average value of 88.03 with a composition of values (A = 35%, B = 65% and C = 0%) and cycle IV obtained an average value of 92.15 with the score composition (A = 95.45 %, B = 4.55 % and C = 0 %) shows the number of students who have high scores is getting higher.

In addition, practicum/practical activities for 3rd semester students of the Department of Geography Education can: 1) foster or increase student observation power, 2) stimulate student curiosity, 3) increase student accuracy, objectivity and honesty, 4) provide learning experiences in in terms of how collaboration and interaction with fellow students in a team work, and 5) can establish close relationships with friends, students and lecturers. This is in accordance with the opinion of [21], [22] that through practicum/field practice activities students can carry out guided, direct and real practice, so that students get hands-on experience and skills.

5. Conclusion

- The application of experimental techniques can develop field practice of nutrient content analysis and analysis of critical land vegetation in Kualabekala, Medan, Johor, in the Agricultural Geography course.
- The development of practicum for making organic vermicompost fertilizer for vegetation analysis on the critical land of Kualabekala, Medan, Johor by a group of students can provide scientific skills, as seen from the increase in the average student score starting in cycle I, cycle II and cycle IV. Students gain knowledge about making organic vermicompost fertilizer from various household wastes.
- The learning atmosphere in experimental techniques applied by student groups in making vermicompost organic fertilizer indirectly fosters the nature of cooperation and sharing of roles so as to create a close sense of togetherness among students.
- Utilization of the USU Department of Soil Laboratory greatly helped students of the Geography Education Department understand the concept of analyzing nutrient levels in soil and nutrient levels in the vermicompost fertilizer produced. Learning that is carried out through collaboration between the Department of Geography Education and the Department of Soils is something new and fun for students.

Compliance with ethical standards

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Disclosure of conflict of interest

In writing this paper, there were 6 (six) authors involved and we agreed to submit it to World Journal of Advanced Research and Reviews.

Statement of informed consent

All data and information presented in this paper is based on the consent of all authors.

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