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Implementation of Project-based Learning in Diet Therapy Study

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ABSTRACT
Project-based learning is project-based learning that involves students in the process of design, problem-solving, decision-making, or investigative activities, as well as providing opportunities for students to work autonomously within a certain period and create results in the form of products. This study aims to describe student activities in the implementation of project-based learning in the Diet therapy course. The research subjects were students who took the diet therapy course at the Culinary Study Program, Department of Family Welfare, Universitas Negeri Padang. The steps taken in the diet therapy course are the division of work groups, the introduction or observation of clients, which includes client characteristics, the client's nutritional adequacy rate, recommended and not recommended foods for clients, and carrying out activities that include the process of preparing menus, calculating content nutrition from the prepared menu, and the processing and presentation of food. Data analysis used descriptive statistics from the results of student activities on diet therapy processes and projects. The average value of student process activities is 78.20 and the average value of student final assignments is 79.87. This shows that students attend lectures quite well and produce projects in the form of daily diet menus that are arranged according to the recommended nutritional adequacy and according to the competencies to be achieved.

Keywords: *Diet therapy, PjBL.*

1. INTRODUCTION

The learning process in the 21st century requires students to be able to think creatively, innovatively, and be competitive. Therefore, universities currently need to equip their graduates with hard skills, namely cognitive knowledge and professional skills, as well as soft skills such as the ability to apply their knowledge and collaborate [1][2]. To make it happen, we need the right learning model.

The learning model has many variations, such as Problem-Based Introduction (PBI), Problem-Based Learning (PBL), Project-Based Learning (PjBL), and others [3]. Project-based learning (PjBL) is seen as a promising approach to building skills needed in the 21st century because, in the process, PjBL encourages students to think critically and practice problem-solving skills, teamwork, and leadership [4]–[6].

PjBL is quite different from traditional teaching methods, the educator acts as a facilitator and the learning process is collaborative and practice-oriented in the real world [7]. PjBL is an inquiry-based instructional method where the involvement of students is needed in the knowledge construction process by asking them to complete meaningful projects and develop real-world products [8]. These products can be in the form of theses, reports, or design drafts [9]. PjBL can also be interpreted as a learning strategy that requires students to build their own knowledge and practice new understandings obtained through various forms of representation [10].

Previous research has shown a significant relationship between the PjBL method and collaborative learning, iterative learning, and authentic learning, which in turn provokes student involvement [11]. PjBL allows students to focus on completing projects while at the same time achieving learning objectives or concepts [12]. Thus, students will not only understand the concept but can also utilize it to create practical solutions to a problem. This can reduce or even eliminate the gap between what students learn at university and what they need at work [13]. Students will be faced with problems or issues that are closely related to real-life case studies.

During the exploratory process, they will also learn the content and transversal skills required for teamwork, project completion, and problem-solving [14].

In this article, the author tries to describe the PjBL process that is applied in a diet therapy course. This course is one of the compulsory courses given to students of the Culinary Study Program, Department of Family Welfare at Padang State University in semester 6. The course includes several studies of diet therapy material, including understanding the concept of diet, the material on general diets for various groups of ages, physiological conditions (normal, pregnant women, lactating women), diets for special activities (athletes and heavy workers), and diets for people with infectious and degenerative diseases. The final student project given is to design a daily diet menu according to conditions, calculate its nutritional content, processing and serve food according to the diet menu that has been designed for each group.

Based on the explanation above, in this study, the authors will describe the process and learning outcomes of the diet therapy course, which is carried out through project-based learning.

2. METHODS

This research was conducted at Padang State University in the diet therapy course. The research population was students of the Culinary Study Program, Department of Family Welfare, Faculty of Tourism and Hospitality, Universitas Negeri Padang. This research is a descriptive study that describes the process conditions and PjBL learning outcomes. The research results are presented using descriptive statistics. The data in this study are from lectures in the form of student processes and final projects.

Learning consists of 16 meetings, at each meeting, students need to achieve competence in making the final project and the competencies that they need to acquire during lectures. The instruments used in the learning process consist of modules, learning videos, discussion materials, and assignments. Each task is designed to direct students to their project, namely compiling a general and special diet menu for people with infectious or degenerative diseases, calculating the nutritional content of the menu, and preparing and serving dishes according to the diet menu that has been designed.

Project-based learning is the main theme of this diet therapy course. The first to fourth meetings are theoretical meetings. Lecturers and students discuss project-based learning, its advantages and disadvantages, and the final project to be worked on.

At the initial lecture meeting, it was explained about the schedule given to fulfill the final project assignment through a lecture contract. So that students can design their schedules to complete the final project assignment. Furthermore, the supporting lecturer controls the achievement and evaluates the final student project through a discussion process at each meeting. Semester learning plans can be seen in **Table 1**.

The assessment was carried out by two lecturers: a lecturer in the field of expertise in nutrition and a lecturer in the field of culinary expertise. The percentage of each assessment is 50 percent.

Assessment of learning diet therapy is carried out on processes and projects carried out by students using the instruments that have been prepared. The learning process assessment instrument was in the form of observation sheets for active participation in discussions, assignment scores, quizzes (15%), and a post-test (35%). While the project assessment uses the project observation sheet (50%).

All assignments are uploaded by students to e-learning2.unp.ac.id. Quizzes and post-tests are also carried out via the same page in the diet therapy class. In detail, the instruments used can be seen in **Figure 1**.

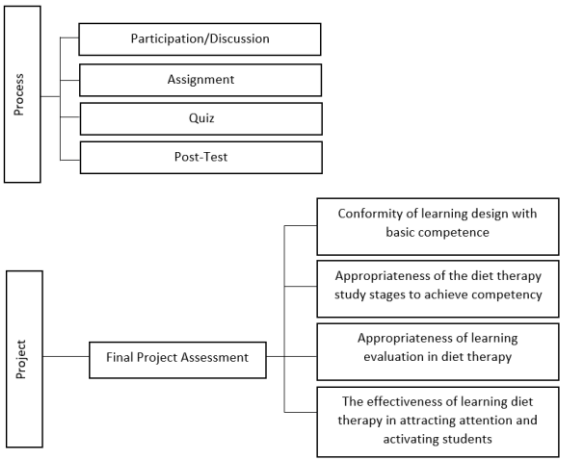

Figure 1 Research Instrument

3. RESULT AND DISCUSSION

The steps taken in the diet therapy course are determining work groups, observing clients, which includes client characteristics, the client's nutritional adequacy rate, recommended and not recommended foods for clients, and carrying out activities that include the process of preparing menus, calculating the nutritional content of prepared menus, and food processing and serving.

Table 1. Semester learning plan for the diet therapy course.

Week	The final ability of each learning stage	Evaluation		Learning methods, Student Assignments,	Learning Materials
		Indicator	Criteria & Technique	Offline	
(1)	(2)	(3)	(4)	(5)	(6)
1-2	Able to explain the concept of diet	Accuracy in explaining the concept of diet	Grading Rubric: Participation and summary of "pre-requisite" material.	Case Method Students are assigned to read and summarize material on the concept of diet.	Diet Concept: Definition, goals, influencing factors, and the role of implementing a diet in terms of various aspects.
3-4	Able to use List of Food Ingredients, List of Ingredients for Exchange, Nutrition Adequacy Rate	Accuracy in using the food composition list, list of substitute food ingredients, and nutritional adequacy scores.	Grading Rubric: Participation and Material Summary "pre-requisite".	Case Method Students are assigned to read and use the List of Composition of Food Ingredients, the List of Substitute Food Ingredients, and the Nutrition Adequacy Rate. Project-Based Learning Students in groups are asked to choose and determine prospective clients and make observations.	List of food composition, list of exchangeable food ingredients, nutritional adequacy rate
5-7	Able to compile menus for general/healthy diets for various groups and calculate their nutritional content.	Accuracy in compiling a menu for a general/healthy diet and calculating its nutritional content.	Grading Rubric: Quiz and Project	Case Method Students are tasked with compiling a menu for a healthy/general diet and calculating its nutritional content.	Menu arrangement for common/healthy diets for various groups and nutritional content
8	Able to prepare and serve dishes for a general/healthy diet	Accuracy in processing and serving food for a general/healthy diet	Grading Rubric: Project	Project-based Learning Students are asked to prepare and serve dishes for a general/healthy diet.	Food dishes for a general/healthy diet
9	Midterm Exam				
10-11	Able to compile menus for special diets and calculate the nutritional content	Accuracy in compiling menus for special diets and calculating the nutritional content	Grading Rubric: Quiz and Project	Case Method Students are assigned to prepare a menu for a special diet and calculate the nutritional content	Menu arrangement for special diets and nutritional content
12	Able to prepare and serve dishes for special diets	Accuracy in processing and serving food for special diets	Grading Rubric: Project	Project-based Learning Students are asked to prepare and serve dishes for special diets	Food dishes for special diets
13-14	Able to compile menus for infectious/degenerative disease diets and calculate their nutritional content.	Accuracy in compiling menus for infectious/degenerative disease diets and calculating the nutritional content	Grading Rubric: Quiz and Project	Case Method Students are tasked with compiling a menu for an infectious/degenerative disease diet and calculating its nutritional content	Menu arrangement for infectious/degenerative disease diet and nutritional content
15	Able to process and serve dishes for an infectious/degenerative disease diet.	Accuracy in processing and serving food for infectious/degenerative disease diets	Grading Rubric: Project	Project-based Learning Students are asked to process and serve dishes for infectious/degenerative disease diets	Food dishes for an infectious/degenerative disease diet
16	Final Exam				

3.1 Define work groups

Students are divided into six working groups for each given project. Students are expected to be able to understand the Food Composition List, the list of exchange food ingredients, and nutrition adequacy figures according to age groups, physiological conditions, and health conditions.

3.2 Client observation

In client observation, students are expected to know the characteristics of clients (toddlers, adolescents, seniors, pregnant women, nursing mothers, athletes, unskilled laborers, and clients with infectious and degenerative diseases), common diseases, nutritional adequacy rates, and healthy eating patterns for clients, including recommended and not recommended foods.

3.3 Implementation of activities

In carrying out activities, the lecturer is responsible for monitoring student activities at each meeting. Activities include preparing menus according to client characteristics, calculating nutritional content, and processing and serving food. Discussions were held between lecturers and students so that the final project could go well. At the end of this activity, an assessment of the activities that have been carried out is obtained.

The data analysis in this study is the result of student learning in the diet therapy course. The analysis of learning outcomes is the average result of the student's final project assessment. From the results of processing the value data, the average process value is 78.20 and the average project value is 79.87. This value indicates that the student's performance is quite good. The results of learning observations on the average process and final student projects are in **Table 2**.

The implementation of PjBL in learning is expected to produce students who are skilled in communication and presentation, skilled in managing organization and time, skilled in research and investigation, skilled in self-assessment and reflection, active in group participation and leadership, and have critical thinking skills [15].

The use of the PjBL model in diet therapy courses can encourage activity among student groups. Students participate actively in every lecture meeting. Students critically present the results of the final project, starting from determining the client's nutritional adequacy rate to compiling a diet menu according to the client's characteristics and calculating the nutritional content, as well as processing and serving food. In each presentation made, students are trained to think critically in responding to problems, providing solutions, and providing mutual assessments of other groups.

The application of project-based learning in the diet therapy teaching and learning process conditioned students to complete the final project independently and in groups to overcome existing problems. This is in line with previous research that showed the effectiveness of implementing PjBL as a technique for developing interpersonal communication and teamwork skills in students in tertiary institutions [16].

In addition, the implementation of PjBL also helps students adjust to the work environment in the future. By applying the PjBL method in diet therapy courses, students practice important skills for professional practice, such as determining the client's nutritional adequacy, preparing the right diet menu, calculating nutrient content, and processing and serving food according to the client's characteristics. This is in line

Table 2. The results of process observations in discussions, assignments, and student final projects.

Assignments	Shortcuts	Discussion	Final project score	
			Process	Project
Compile a general diet menu, calculate its nutritional content, and prepare dishes for different ages and physiological conditions.	Students are able to compile a general diet menu, calculate its nutritional content, and prepare dishes for various ages and physiological conditions.	Active	78	80.18
Compile special diet menus, calculate the nutritional content, and prepare dishes for special activities.	Students are able to compile special diet menus, calculate their nutritional content, and prepare dishes for special activities.	Active	79.23	78.54
Compile a diet menu, calculate its nutritional content, and prepare dishes for people with infectious and degenerative diseases.	Students are able to compile a diet menu, calculate its nutritional content, and prepare dishes for people with infectious and degenerative diseases.	Active	77.38	80.88
Average			78.20	79.87

with the characteristics of PjBL, which can provide an overview of real-life problems so that students can connect theory with practice or connect their work with a wider professional situation outside the academic world [17].

The explanation above shows that PjBL learning in diet therapy courses is very well implemented to improve student learning outcomes.

4. CONCLUSION

Diet therapy learning using Project-based learning can work well. The results of the final project in the dietary therapy course have met the effectiveness criteria and achieved basic learning competencies.

AUTHORS' CONTRIBUTIONS

Y commissioned, supervised, and designed diet therapy studies; IR and ML do data collection; IR performs statistical analysis; Y, ANH, IR, and ML interpret the results and prepare a manuscript; Y and ANH critically review the paper. All authors have read and agree to the published version of the manuscript.

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