DEVELOPMENT OF PROJECT BASED LEARNING TASK MODELS FOR ANALYTICAL CHEMISTRY ONLINE TUTORIALS IN FOOD TECHNOLOGY PROGRAM UNIVERSITAS TERBUKA

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Abstract

So far, online tutorial assignments only cover questions that require theoretical completion. In the concept of learning Analytical Chemistry which requires the achievement of competence in mastering the basic concepts of methods and tools in carrying out chemical analysis, this is not sufficient. This study aims to explain the development of a project-based learning (PjBL) model for tutorial assignments in online tutorial learning assistance session for the Analytical Chemistry course in Food Technology study program. Developing methods carried out by the provision of structured assignments including practical nstructions then instructions for the preparation of detailed activities have been done. Materials have been founded from natural ingredients in the food category that are commonly encountered in everyday life, namely the extraction of Virgin Coconut Oil (VCO) from coconuts. The media for delivering these activities is documentation in the form of photos or videos. From this structured real practice, students are proven to be able to carry out VCO extraction projects independently with an average accuracy level of above 90%. Not only the level of accuracy, but some students are also able to calculate the percentage of VCO yield obtained from whole coconuts. The distribution of grades is also maximal when compared to theoretical assignments. From this real experience, students are expected to be able to gain knowledge not only limited to theory but also knowledge from real things that they have done themselves. Thus, from the experience of all the five senses will produce in-depth knowledge for each individual student.

Keywords: Development, tutorial assignment, project-based learning

1 INTRODUCTION

Knowledge about chemistry is generally abstract, calculating, and conceptual. Understanding the concepts in chemistry learning plays a key role in learning chemistry, so it's not enough to just memorize them. The relationship between concepts and each other must be mastered to facilitate understanding so that when a concept fails or is misunderstood, it will have an impact on the subsequent understanding process (Azizah & Cahyono, 2019). Open University students tend to experience difficulties when studying chemistry. This is proven by the learning evaluation results being less than the expected passing score. This is most likely due to the abstract nature of the objects studied in chemistry, the chemical

material, which is not easy to understand, or the image of chemistry learning which is not good (filled with fear, tension, ultimately students get bored, and many problems or problems are not solved (Juwairiah, 2013). Therefore, it is necessary to implement a learning model that uses methods that involve students more, are applicable, contemporary, and can hone students' skills and understanding of chemistry concepts.

One of the assessments in online tutorial learning assistance at the Open University is the assignment component. Assignments are given to students three times during the online tutorial session, namely in sessions 3, 5, and 7 of the online tutorials. In the Analytical Chemistry class (PANG4207) students are expected to be able to fulfill the learning outcomes, namely being able to recognize and use several separation techniques and principles as well as how to increase the efficiency of the separation process being studied. Thus, students will be able to carry out various chemical analyzes using an understanding of techniques and the basics of non-instrumental separation. Learning outcomes that reach the "doing" stage really require strategies in their implementation, especially as the Analytical Chemistry course is a purely theoretical course in the implementation of its online tutorials. PANG4207 is not a type of course that is held practically or practicum. This is certainly a challenge in teaching this course and realizing these learning outcomes.

The thing that hinders an effective chemistry learning system is the lack of direct involvement of students in the learning process. Generally, students only get one-way interaction because practicum activities or learning activities that balance affective and psychomotor aspects have not been carried out according to their function (Anggriani et al., 2019). The essence of Project Based Learning (PjBL) is to direct students to gain direct experience so that they can absorb the meaning of symbols, theoretical concepts, and the benefits of studying chemistry. The symbols and concepts of this theory are generally abstract so that students are rarely interested in chemical theory because they assess its usefulness in everyday life so that their learning evaluation results are low. Implementation of PjBL is like that carried out by (Ratnawati & Praptomo, 2023). The PjBL carried out resulted in 92% of student learning outcomes increasing in the good and very good categories and 8% in the sufficient category. This study aims to explain the development of a project-based learning (PjBL) model for tutorial assignments in online tutorial learning assistance sessions for the Analytical Chemistry course in Food Technology study program.

2 METHODOLOGY

The method used in this research is quasi-experiment or quasi-experiment. Researchers do not have the freedom to manipulate subjects, meaning the assignment of treatment and control groups is random. For example, this test requires two online tutorial classes for the Analytical Chemistry course in the same semester. Both classes received PjBL assignments and conventional assignments were given. This selection of student groups is called an intact group, meaning the class or group is already available. Evaluation of learning outcomes is seen from the results of completing course assignments. Then the average of the two classes is calculated and compared. The research was conducted in the even semester 2022/2023 (2023.1). Data on student learning outcomes was obtained from PjBL assignment scores and theoretical method assignment scores.

3 FINDINGS AND DISCUSSION

Student activities in learning PjBL Analytical Chemistry (PANG4207) are as follows: determining the learning outcomes of the related module, namely students understand the principles and methods of separation by extraction of organic compounds. In order to achieve conceptual understanding learning outcomes, the teacher then presents contextual projects that are close to students' daily lives. The contextual project carried out in this learning is separating pure coconut oil and compiling an assignment activity report. Pure coconut oil (virgin coconut oil, VCO) is an organic compound in the form of vegetable oil extracted from coconut flesh. Pure coconut oil is colorless, at first glance it looks like water, but has the nutritional content, aroma and taste of coconut which is still well maintained. Pure coconut oil has a higher economic value than other types of coconut oil.

3.1 Assignment of PjBL tasks

There are two methods for extracting pure coconut oil, namely the wet method and the dry method. In the PjBL assignment, students are asked to extract pure coconut oil from coconut flesh using the wet method and document each stage carried out in the form of photos or videos.

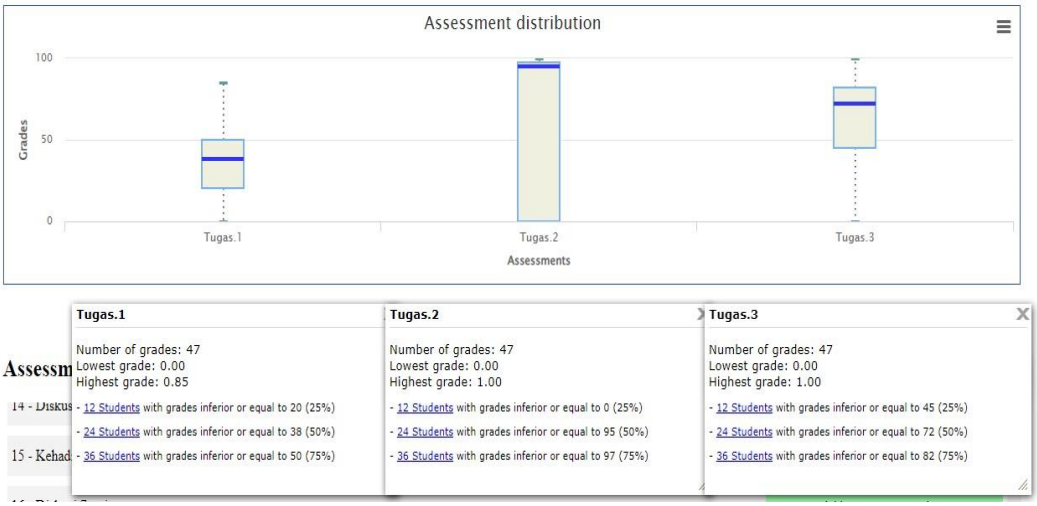
3.2 Monitoring the implementation of PjBL tasks

Monitoring is carried out by providing direction and suggestions on reports and documentation prepared for students. When students experience problems, the tutor can direct them.

3.3 Evaluation of the implementation of PjBL tasks

Evaluation is carried out based on predetermined assignment scoring guidelines, namely based on prepared reports and documentation. The evaluation results of the two classes are shown in Fig.1.

a)



b)

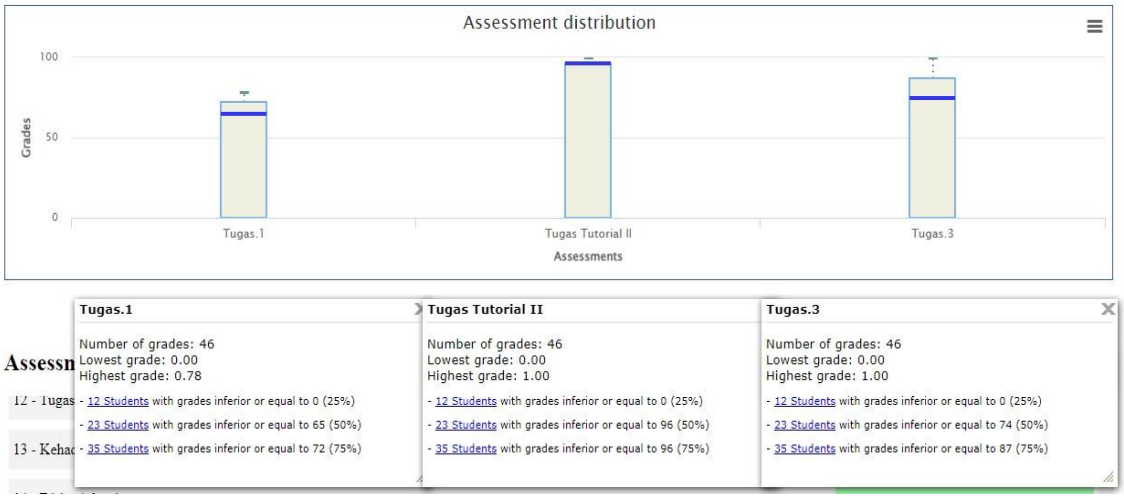


Figure 1. The results of the PjBL task assessment (Task 2) were compared with the theoretical tasks (Tasks 1 and 3)

a) Class 1; b) Class 2

From Fig.1. the results of the PjBL assignment evaluation achieved optimal results, namely almost meeting the maximum value. The more diverse distribution of PjBL assignment evaluation results was since there were students who did not do the PjBL assignments, so the score was 0. This was seen from the two classes observed. However, in class 2 of the conventional theoretical assignment type, there were students who did not do it, so practically the value was 0. This indicates that there is no linear relationship between PjBL and not doing assignments. In PjBL assignments, students can achieve maximum evaluation scores because direct experience makes students better able to master what they have done. This is in accordance with a study conducted by (Sasmono, 2018) which states that learning using the Project Based Learning model can improve learning outcomes with 97% of students reaching the minimum completeness criteria (KKM). Above 90% of the number of students can achieve optimum scores in carrying out VCO extraction. Not only carrying out the extraction process but also calculating the % yield from the coconut milk used.

Chemistry project-based learning (PjBL) has a great opportunity to carry out Research and Development (R&D) research as is done by (Panjaitan, 2022). The product produced is a new product, namely teaching materials in the form of PjBL-based modules on Analytical Chemistry material.

4 CONCLUSION

From this real experience, students are expected to be able to gain knowledge not only limited to theory but also knowledge from real things that they have done themselves. Thus, from the experience of all the five senses will produce in-depth knowledge for each individual student.

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