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PROBLEM-BASED LEARNING MODEL AND THE CONCEPT MAP METHOD AT PUBLIC VOCATIONAL SCHOOL STUDENTS: MOTIVATION AND LEARNING OUTCOMES

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ABSTRACT

The study's goal is to get class X APAPL students at public vocational school 3 Berau more interested in learning and help them do better in the Basics of Aquaculture sub-material Types of Aquatic Commodities. The classroom action research method consists of two cycles. Each cycle consists of three stages, namely (a) planning, (b) action/observation, and (c) reflection. In cycles I and II, learning is carried out with the Problem-Based Learning model using the concept map method. This study utilizes both qualitative data from observation sheets and quantitative data from the final test of each cycle. The test results for the students' concept mapping skills were good; the scores went up from 78.77 in cycle I to 80.75 in cycle II. All students who studied scored 70 and above. So it is concluded that the problem-based learning model with the concept map method can improve the motivation and learning outcomes of class X students of public vocational school 3 Berau.

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1. INTRODUCTION

As part of the APAPL Expertise Competency, students in class X at Public Vocational School 3 Berau learn how to classify the types of goods and characteristics of aquatic goods that have high economic value on a local, regional, and international level. One of the basic skills they learn is how to identify sub-material types of high economic aquatic cultivation goods. Mastery of this competency must be truly mastered by students by getting a high score or at least above the minimum completion criteria.

The reality that occurred in the APAPL competency of class X at Public Vocational School 3 Berau was that the scores obtained during the competency test were still low. Of the 28 students in the class, only 5 were declared competent with a score of ≥ 7.00; the average score in the class was only 6.10. During the basic lessons of aquatic cultivation, sub-material types of high economic aquatic cultivation commodities, there

were still many students who were not serious in doing the assignments given by the teacher.

The results of observations during learning activities showed that there were several students who looked lazy, and they studied just to fulfill the assignments given by the teacher. The values produced are also still many that are not feasible and do not meet the indicators of excellent results. The results achieved are not good when the activity of grouping types of commodities is not right, concluding habitats and living media, product markets, and product types that are still not correct and have not been able to find types of aquaculture economic commodities and types of domesticated commodities and have high economic value. Whereas previously students had been given theoretical lessons on types of aquatic commodities that have high economic value (local, regional, and international) and sub-material on types of high economic aquaculture commodities.

This condition is so concerning for researchers that they want to make improvements to the quality of student learning outcomes in competencies with other learning approaches. One of the learning approaches that will be used is the problem-based learning model with the concept map method (Murdiyah et al., 2020; Gao et al., 2022). In this approach, students are given the widest possible opportunity to create material on types of high economic aquaculture commodities according to the student worksheets that have been distributed by the teacher. The implementation is guided by the teacher, and the results are presented in front of the teacher and their friends through online learning (Nursulistyo et al., 2021; Pimdee et al., 2024).

Efforts to improve and enhance the quality of education in schools more professionally are one of the tasks of teachers. Teachers must be able to think and reflect on any shortcomings that have been made in the learning process in order to identify problems in the learning they manage (Nguyen et al., 2022; Chen, 2024). Various efforts that can be made to improve the quality of learning include increasing student activity and creativity, learning discipline, and learning motivation.

The approach using concept maps is considered very helpful in improving critical and creative thinking skills and is a method for developing student motivation and interest (Hu & Hwang, 2024). Increasing motivation can be an encouragement for students to study seriously. In this regard, teachers are required to have the ability to arouse student learning motivation so that they can achieve the expected learning outcomes.

Many factors influence the willingness to make efforts in learning, especially personality, student abilities to learn tasks, stimulants for learning, lesson arrangements, and teacher behavior. The task of educators is to find, arouse, and maintain student motivation to learn and be involved in activities that lead to learning so that student motivation in learning will increase (Hartikainen et al., 2022). Increasing learning motivation and increasing actions to complete learning can improve student learning outcomes.

A learning model is a learning activity that is designed or developed using a certain learning pattern (Dastile et al., 2020; Kumari & Toshniwal, 2021; Joyce & Calhoun,

2024). The learning pattern in question can describe the activities of teachers and students in realizing learning conditions or environmental systems that cause the learning process. The learning pattern explains the characteristics of a series of activities carried out by teachers and students.

Problem-Based Learning (PBL) is a learning approach that uses work world problems as a context for students to learn about critical thinking and problem-solving skills, as well as to obtain essential knowledge and concepts from lecture materials or lesson materials (Ghani et al., 2021; Satriani et al., 2021; Anggraeni et al., 2023; Hasbi & Fitri, 2023). Muzaini et al. (2022) says that problem-based learning is when a problem is turned into a set of learning activities with clear steps for how to do them. This means that before students learn something, they have to find a problem that they are facing in real life or in case studies or scenarios. Problem-Based Learning (PBL) is a learning process that uses contextual problems that occur in the environment (Aslan, 2021). With PBL, you can explore critical thinking and problem-solving skills, acquire essential knowledge and concepts from the subject matter, train high-level thinking, including metacognitive learning, and train students to become independent and self-regulated learners.

The concept maps are tools or methods that teachers can use to find out what students already know (Li et al., 2021; Almulla et al., 2021). Almulla's idea is based on Ausubel's learning theory. Ausubel strongly emphasizes that teachers need to know the concepts that students already have so that meaningful learning can take place. In meaningful learning, new knowledge must be linked to relevant concepts that already exist in the cognitive structure (brain) of students (Bryce & Blown, 2024). Without relevant concepts in the cognitive structure, new knowledge is memorization.

Using the problem-based learning model and the concept map method should help students be more creative, motivated, and serious when working on high-value tasks (Gao et al., 2022; Alt et al., 2023). This will help them learn how to group different types of aquaculture goods in the best way possible. Researchers chose the competency of high-economic commodity types in this subject because this material is the basis for students to be more familiar with the types of aquaculture commodities.

An assessment of learning outcomes using the concept map approach is basically an assessment of competency standards that include aspects of knowledge, skills, attitudes, and the suitability of implementation time (Okojie et al., 2022; Fonseca et al., 2024). The components of the concept map that are assessed consist of planning, process implementation, assignment collection, and culmination (presentation). Students are declared competent if they meet the minimum standards required in the indicators of each basic competency. Determination of value achievement refers to the guidelines for assessing and reporting the learning outcomes of vocational high school students.

One of the basic skills that students at Public Vocational School 3 Berau Brackish Water and Marine Fisheries Agribusiness Expertise learn is how to group different types of goods and characteristics of aquatic goods that have high economic value (local, regional, and international), along with information on different types of high-economic aquatic cultivation goods. In accordance with the K-13 learning syllabus at Public

Vocational School 3 Berau, this competency is given to grade X students in the odd semester for 3 (three) meetings. Each meeting is 4 hours of virtual face-to-face.

Students engage in learning activities that involve categorizing various aquatic commodities according to their purpose in aquatic cultivation, as well as grouping them based on their product orientation and type. The stages of the activity are 1) reading carefully and thoroughly on the distributed student worksheets (SW), 2) searching for materials from various sources such as student teaching material textbooks, modules, Google search, and offline and online videos such as YouTube shows, 3) completing all series of assignments listed on the student worksheets, and 4) presenting or presenting the results of the work. Competency assessment involves observing group discussions and evaluating student work results at the end of the activity process. From the learning process above, it is possible that the competencies of high economic commodity types are delivered using the concept map method.

2. METHOD

This type of research is classified as Classroom Action Research (CAR) because it aims to improve the quality of classroom learning both in the process and learning outcomes. This study uses descriptive qualitative and descriptive quantitative data presentation. According to Mertler (2009), there are four stages that are commonly passed through in action research, namely planning, implementing actions, observation, and reflection. The research was conducted in class X in the Brackish Water and Marine Fisheries Agribusiness Competence (APAPL) of Public Vocational School 3 Berau, with 28 students.

Planning is an activity in preparing learning plan devices and determining the focus of events that need special attention to be observed and then making observation instruments to help record facts that occur during the action. The implementation of the action is carried out by carrying out learning activities in accordance with the learning plan that has been prepared. Observations are made by researchers at the time of the action to see the teacher's performance in carrying out learning activities and their impact on student activities during the learning process using observation sheets. Reflection is carried out to analyze the level of success and failure that occurs in learning activities. The results of the reflection are material for compiling the next learning plan.

The data sources of this research that have been carried out are from students and teachers in the form of actions, documents, and types of data used in this study, namely qualitative and quantitative data. Qualitative data is used in the form of words, actions, photos, or images, which are written data sources. There are numbers that show statistical information, like the average answers to the questionnaire and the test scores for each cycle. These numbers show whether learning motivation and outcomes improved or decreased from the pre-cycle/early cycle to cycle I and cycle II. Data collection techniques and monitoring tools used in this study are observation, interviews, questionnaires or surveys, and learning documentation such as learning plans, student worksheets (SW), value lists, photos, and field notes during activities.

3. RESULTS AND DISCUSSION

Results

The results of this study were obtained from pre-cycle actions/initial practical tests in cycle 1 and cycle II. The results of the study were in the form of test scores that showed student learning outcomes and observation results obtained through a questionnaire about student learning motivation. The implementation of the pre-cycle was carried out to obtain data on student interests and motivations in learning activities. This is important to know as a basis for carrying out actions. The data collection technique at this pre-cycle stage used a questionnaire. In the questionnaire, there were eight questions with three answer choices: yes, knowing; not knowing enough; and not knowing. The questionnaire was distributed to respondents (students) through the online learning class application Zoom Meet and WhatsApp.

Based on the questionnaire data, it was obtained that most students did not know the types of aquaculture commodities based on the purpose of aquaculture, based on habitat, based on product orientation and product type, and based on food. This can be seen from the answers that 17 students, or 60.71%, stated that they did not know how to group types of aquaculture commodities, while those who did not know were 5 students, or around 17.86%, and the remaining 21.43%, or 6 students, stated that they knew how to group types of commodities based on habitat. The initial learning practice activities are presented in Table 1 as follows:

Table 1. Initial Practical Test Results

Value	Number of Students	Percentage (%)	Decription
90 -94			
85 - 89			
80 - 84			
75 - 79	2	7,14	Completed
70 - 74	4	14,29	Completed
65 - 69	5	17,86	Completed
60 – 64	10	35,71	Not Yet Completed
55 – 59	5	17,86	Not Yet Completed
50 - 54	2	7,14	Completed

Observation results through questionnaires were distributed to all 28 students. They were given questionnaires after taking lessons on classifying the types and characteristics of aquatic commodities that have high economic value (local, regional, and international). Submaterials classify types of aquatic commodities using conventional methods. The following are the results of the student motivation questionnaire in Table 2 below.

Table 2. Initial Motivation Questionnaire Results

No	Score	Number of Students	Percentage (%)	Motivation Description
1	0 – 10	0	0	Very low
2	11 - 12	0	0	Low
3	21 – 30	20	71,43	Medium
4	31 - 40	8	28,57	High
5	41 - 50	0	0	Very high

The implementation of actions in cycle I, specifically the use of the concept map method, aims to enhance students' skills in grouping various aquaculture commodities based on habitat or living media, thereby enabling them to achieve optimal results. The concept map method is also expected to be able to increase students' interest in learning.

The learning activities in cycle I are divided into three categories: preliminary, core, and closing activities. The preliminary activity is the initial activity before entering the main learning activity. This activity is in the form of apperception, delivery of KD, and learning objectives to be achieved by students. The core activity is the main activity, which includes student activities in grouping types of aquaculture commodities based on habitat or living media with the concept map method. The final activity is the closing activity, which includes reflection and reinforcement activities. All of these activities are carried out with an online learning system using the Zoom meeting and WhatsApp applications. After cycle 1, the learning activity uses the Concept Map model determined by the teacher from the cycle I practical test scores. The following are the results of the Cycle I practical test in Table 3.

Table 3. Results of Cycle I Practical Test

Value	Number of Students	Percentage (%)	Decription
90 - 94			Completed
85 - 89	7	25	Completed
80 - 84	6	21,43	Completed
75 - 79	5	17,86	Completed
70 - 74	2	7,14	Completed
65 - 69	2	7,14	Completed
60 - 64	4	14,28	Not Completed
55 – 59	2	7,14	Not Completed
– 54			

The results of observations collected through questionnaires distributed to all students after taking lessons using the concept map method with learning activities determined by the teacher. The following are the results of the Cycle I motivation questionnaire in Table 4.

Table 4. Results of Cycle I Motivation Questionnaire

No	Score	Number of Students	Percentage (%)	Motivation Description
1	0 – 10	0	0	Very low
2	11 - 12	0	0	Low
3	21 – 30	0	0	Currently
4	31 - 40	25	89,29	Tall
5	41 - 50	3	10,71	Very high

The implementation of actions in cycle II, specifically the use of the concept map method, aims to enhance students' ability to group various aquatic commodities based on their product orientation and product type, potentially yielding more significant results than in cycle I. At this stage, the researcher identified problems that emerged in learning in cycle I and looked for alternative actions to improve students' ability to group

types of aquatic commodities. The researcher planned how to teach people how to group different kinds of aquatic goods based on product orientation and product type using the concept map method. They also made a final test for cycle II. The researcher prepared research instruments in the form of observation sheets and tools to document the activities that took place. The implementation of the Cycle II action activities was in accordance with the lesson plan that had been prepared.

During the discussion activity, students tended to be more active in asking questions or providing answers related to the activity of grouping types of aquatic commodities using the concept map method. Students who were less active in Cycle I are now active and provide positive responses. Following the implementation of the actions in cycle II, which involved learning using the concept map model and selecting their own learning activities, the students have become more active and responsive. The following test score results are presented in Table 5 as follows.

Table 5. Results of Cycle II Practical Test

Value	Number of Students	Percentage (%)	Decription
90 – 94			
85 – 89	7	25	Completed
80 – 84	8	28,57	Completed
75 – 79	6	21,43	Completed
70 – 74	2	7,14	Completed
65 – 69	1	3,57	Completed
60 – 64	4	14,29	Not Completed
55 – 59			
50 – 54			

In cycle II, questionnaires were given to all students after concept map-based lessons, and tests were given on learning activities chosen by the students themselves. The results can be seen below in Table 6.

Table 6. Results of Cycle 2 Motivation Questionnaire

No	Score	Number of Students	Percentage (%)	Motivation Description
1	0 – 10	0	0	Very low
2	11 - 12	0	0	Low
3	21 – 30		0	Currently
4	31 - 40	2	7,14	Tall
5	41 - 50	26	92,86	Very high

Tables 7 and 8 show a comparison of how well people learned to group different types of aquatic goods using the concept map method versus traditional learning as the starting point (before the action).

Table 7. Average Value and Percentage of Passing Each Cycle

No	Results	Average Value	Percentage of Completion
1	Beginning	61,78	39,29
2	Cycle 1	78,77	78,57
3	Cycle 2	80,75	85,71

Table 8. Student Learning Motivation Each Cycle

No	Motivation to Learn	Very Low	Low	Currently	High	Very High
1	Beginning	-	-	71,43	28,57	
2	Cycle 1	-	-		89,29	10,71
3	Cycle 2	-	-		7,14	92,86

Discussion

The main points of this classroom action research are how well students could initially group different types of aquatic goods while they were learning and how well the concept map method helped students get better at this. The pre-cycle questionnaire analysis of class X students' experiences at Public Vocational School 3 Berau showed that students still didn't know much about the different types of aquatic goods, so more needed to be done to get them motivated to learn and help them do better in school. The results of the questionnaire analysis also showed that teaching students how to group the different types of aquatic goods had not been done well in class.

It was successful in improving the quality of the process and learning outcomes when learning activities were used to help students learn about different types of aquatic goods using the concept map method. These activities were done twice with class X students at Public Vocational School 3 Berau in the Brackish and APAPL. A more enjoyable learning environment and more enthusiastic students show that the process has improved. The improvement in the quality of learning outcomes can be seen by the increase in scores when grouping types of aquatic commodities from cycles I and II.

Observing the process in the pre-cycle showed that students weren't very interested or motivated in the task of putting different types of aquatic goods into groups. But after the activities in cycle I, students became more interested and motivated in the task of sorting different types of aquatic goods into groups. On average, 89.29% of them were highly motivated, which is 89%, and 10.71% were very highly motivated, which is 11%. Likewise, after the actions were carried out in cycle II, it showed a significant increase, namely high motivation of 7.14% or 7%, very high motivation of 92.86% or 93%.

The implementation of learning to group types of students' aquatic commodities using the concept map method carried out in two cycles obtained positive results. This can be seen from the increase in the score of students' skills in grouping types of aquatic commodities. Based on research on the ability to group types of aquatic commodities of students from cycle I to cycle II, it shows that the ability to group types of aquatic commodities has increased significantly. The average score in the action of cycle I was 78.57% or 79%, while in cycle II it was 85.71% or 86%.

The activity of grouping types of aquatic commodities using the concept map method has succeeded in improving every aspect of the assessment. The success of this concept map method increases interest and motivates students to group types of aquatic commodities so that they can group them based on several criteria. Based on the results of the implementation of actions in cycles I and II, data showed that all aspects of the assessment of grouping types of aquatic commodities among students increased. From

the above discussion of the steps taken and the outcomes, it is clear that all class X students at Public Vocational School 3 Berau were able to use the concept map method to effectively group different types of aquatic goods. The improvement experienced by students in the pre-action to cycle II can be said to have increased significantly.

The concept map method is said to be successful in improving students' ability to group types of aquatic commodities because it is able to improve students' ability to develop students' ideas in grouping types of aquatic commodities. The use of the concept map method in an effort to improve the ability to group types of aquatic commodities among class X students of Public Vocational School 3 Berau is said to be successful because 24 students were able to get a score of 70 or above.

4. CONCLUSION

The study found that using problem-based learning with the concept map method can get class X students more interested in learning and help them do better in their studies of brackish water and marine fisheries agribusiness at Public Vocational School 3 Berau. For example, in cycle I, the average score was 89.29% with a high category and 10.71% with a very high category. In cycle II, the average score was 7.14% with a high category and 92.86% with a very high motivation category. Additionally, using the concept map method can help students learn more about the basic topics of fisheries farming, such as how to classify different types of goods and what makes local, regional, and international aquatic goods of high economic value. This can be seen from the increase in student learning outcomes; namely, in cycle I, the average score was 78.77, and in cycle II, the average score was 80.75.

As a suggestion, the results of this study can be a reference for teachers or educators in choosing a learning model to improve student learning motivation. In addition, further research suggests other materials and a wider scale.

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