MODEL OF SCIENTIFIC LEARNING APPROACH PROJECT BASED LEARNING (PJBL) BASED ON PRACTICUM FOR STUDENTS BIOLOGY TEACHER CANDIDATE

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MODEL OF SCIENTIFIC LEARNING APPROACH PROJECT BASED LEARNING (PJBL) BASED ON PRACTICUM FOR STUDENTS BIOLOGY TEACHER CANDIDATE

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Abstract: Learning that utilizes practicum activities as a scientific approach is still less noticed among the Education Institution of Education Personnel. Learning devices designed with the scientific approach model integrate integrated cognitive, psychomotor and affective competencies. The objectives of developing this learning device model are: 1) Identifying the potential results of traditional cooking oil purification practicum (using coconut pulp, bagasse, and straw adsorbent) for the actualization of cognitive, psychomotor, and affective competencies within the scientific approach and 2) Develop PjBL scientific approach learning model based on traditional used cooking oil purification (using coconut pulp, bagasse and straw adsorbent). This development uses a learning development model with a constructivist approach with R2D2 work patterns (Reflective, Recursive, Design, and Development). The results obtained from this development plan include 1. The material structure and science process skills of students from the traditional cooking oil purification practicum in the form of cognitive, psychomotor, and affective competencies, and 2) PjBL is scientific approach learning device model based on traditionally used cooking oil purification practices for prospective biology teacher students.

Keywords: learning tools, scientific approach, PjBL, practicum

INTRODUCTION

The change in the 21st-century learning paradigm that underlies the learning process at school by using the 2013 curriculum, making the scientific approach as the basis for developing learning in all subjects in school. This fact cannot be separated from the readiness of the Education Institution of Education Personnel in preparing educators or teachers. This means that learning in universities are faced with challenges so that as much as possible can provide learning experiences for students in mastering scientific skills to actualize the scientific approach.

The fundamental change of the learning process in school using the 2013 curriculum is located in four processes, namely learning directed to encourage students to be able to: (1) find out, (2) formulate problems (ask), (3) analytical (decision making), and (4) cooperation and collaboration in solving problems. These four competencies can be built into students through the role of teachers in the classroom. The problem is that learning tools, especially those in the form of innovative learning designs have not been

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developed in many universities, including practicum-based learning designs that design as Project Based Learning which is one of the scientific approach models.

Basically in Project Based Learning (PjBL) is a learning model that uses projects/activities as the core of learning. Students do exploration, assessment, interpretation, synthesis, and information to produce various forms of learning outcomes. Project-based learning is a learning model that uses problems as a first step in collecting and integrating new knowledge based on their experiences in real activities. In PjBL it starts with the existence of projects/activities as the core of learning, so to design PjBL learning science activities are needed, namely in this context is the lecture on "Food Nutrition and Biochemistry" for Biology Education students. The activity in question is "Practicum of Traditional Refined Oil Purification".

A review of the concept of used cooking oil in relation to refining used cooking oil is usually carried out using membrane filter technology as was done by Sasmito and Kaseno (2004) or traditionally such as adsorption with adsorbent materials. According to Aji and Hidayat (2011), adsorbents can absorb dyes in oil, colloidal suspensions and oil degradation results. Many materials have been studied and can be used as adsorbents to purify used cooking oil such as Aji and Hidayat (2011) which utilize activated carbon and bentonite to obtain oil with an acid number of 0.78. While Ramdja, Febrina, and Krisdianto (2010) use bagasse as an adsorbent so that free fatty acid content in used cooking oil is down to 0.0999%.

In practice, the refining of used cooking oil by using several adsorbents containing cellulose will obtain different results data regarding physical-chemical characterization. Cellulose naturally has a porous structure that is expected to adsorb harmful compounds and can improve the quality of used cooking oil (Rahayu, et al: 2014). Some adsorption media used in this study were coconut pulp, bagasse, and straw. The adsorbent media has cellulose content which is expected to absorb dyes and harmful compounds in used cooking oil so that it can improve the quality of cooking oil after refining. The use of this adsorption media is also one solution to reduce urban solid waste. Through practicum activities "Traditional Refined Oil Purification", it is expected that in the first year of research can be obtained data to be identified into the planning of practicum-based learning tools.

Learning with a scientific approach based on practicum includes observing activities (to identify the things you want to know), formulating questions, formulating hypotheses, trying to collect data with various techniques, associating, analyzing / processing data and drawing conclusions and communicating the results of obtaining knowledge, the skills and attitudes of these steps can be continued to create activities. A set of practicum activities are designed with the PjBL model.

According to Barron quoted by Zubaidah, et al. (2014: 85) PjBL is a constructive approach to learning to deepen learning with a research-based approach to problems and questions that are weighted, real, and relevant for their lives. Project-based learning is a learning model that uses projects/activities as the core of learning. Students do

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exploration, assessment, interpretation, synthesis, and information to produce various forms of learning outcomes.

Project-based learning is a learning model that uses problems as an initial step in collecting and integrating new knowledge based on their experiences in real activities. Through PjBL, the inquiry process begins by raising a guiding question and guiding students in a collaborative project that integrates various subjects (material) in the curriculum. PjBL is an in-depth investigation of a real-world topic.

PjBL as part of the scientific approach in its implementation requires scientific skills. Scientific facts about the success of the scientific approach to learning are reported by Mulyono, et al. (2012), that learning tools with scientific approaches to fermentation technology based on environmental problems know, namely: includes syllabus, RPP, teaching materials, student discussion sheets (LDPD), and scientific skill assessment sheets. The results of the analysis show that learning tools are very valid, effective, and practically applied.

From the results of research conducted by Taconis, Ferguson-Hessler, and Broekkamp (2000: 442), analyzing two methods namely quantitative methods and qualitative systematic methods regarding science learning using problem-solving, concluded that: A few of the independent variables were found to characterize effective problem-solving techniques. Attention to the structure and function (the schemata) effective treatments all gave to the knowledge base, while attention to the knowledge of strategy and problem-solving practices turned out to have little effect. As for learning conditions, both providing the learners with guidelines and criteria, they can use their own problem-solving processes and products, and provide immediate feedback to those who were found to be important in acquiring the acquisition of problem-solving skills. The Group does not work as guidelines and feedback.

The meaning that can be obtained is that some independent variables found effective strategy characteristics to teach science in problem-solving. Effective treatments all pay attention to the structure and function (schemata) of the knowledge base. Whereas by paying attention to the knowledge of the strategies and problem-solving practices it turns out to have little effect. As for the learning conditions, both those that equip students with work guide guidelines and criteria, they can use it in assessing the process of problem-solving and learning outcomes, and being direct feedback to their findings become an important prerequisite for the acquisition of problem-solving skills. Working groups do not cause positive effects unless combined with other variables, such as guidelines and feedback.

The research above provides information in the context of work, various subjects learning to work in groups without guidance with it does not provide a positive contribution to the ability of subjects to learn in solving problems. Thus, in the PjBL learning design, students will be more effective in working on their projects to solve problems if they are equipped with work guidelines from the project they are working on.

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Research objectives include: 1) identifying the potential results of traditional cooking oil purification practicum (using coconut pulp, bagasse and straw adsorbent) for the actualization of cognitive, psychomotor, and affective competencies through the scientific approach, and 2) developing a scientific approach based learning model the practicum uses PjBL for the traditional cooking oil use (using coconut pulp, bagasse, and straw adsorbent).

The benefits obtained from this study include: 1) from the material substance aspect can be compiled actualization of cognitive, psychomotor, and affective competencies from practical activities of used cooking oil purification, and 2) from aspects of teaching materials can be obtained PjBL learning device model from used cooking oil purification practicum.

APPROACH & RESEARCH METHOD

The design of the development of learning tools, in this context the core activities of science are the practicum of traditional cooking oil purification. Furthermore, from the process and results of the practicum, it was developed in PjBL learning design. The procedure for developing the learning design used is the Constructivist Instructional Design (C-ID) model of Willis (1995: 2000) as quoted by Mustaji (2000: 1-5). C-ID is a learning development model with a constructivist approach with R2D2 work patterns (Reflective, Recursive, Design, and Development). In general, it can be described as follows:

Define focus is done by forming a participatory development team, namely: (1) creating and supporting participation teams, (2) doing progressive problem solving, and (3) developing prerequisite or contextual understanding.

Design and development focus is an inseparable unity because it is related to the prerequisite development and progressive problem solving, namely: (1) choosing the environment, (2) choosing the product and media format, (3) determining the assessment format, and (4) designing and developing products.

Dissemination focus. As with the model of learning design systems in general, the focus of dissemination consists of 4 activities, namely (1) evaluation, (2) final product, (3) diffusion, and (4) adoption. At this stage, it needs to be emphasized that development products may only be suitable for the local context, not for all learning contexts.

As the subject of learning is a student of Biology Education Study Program 7th semester. 2017/2018. Data collection techniques are carried out using content analysis methods to identify potential cognitive, psychomotor, and affective competencies. Data analysis was carried out with descriptive interpretation

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RESULTS AND DISCUSSION

a. Practicum Identification as a Scientific

Profile of potential cognitive, affective and psychomotor competencies in used cooking oil purification activities requires a long /long time step, as for the practicum stages identified, namely:

1. Preparation Phase
   (1) Look for the main ingredients, namely used cooking oil (tent and household food stalls) and adsorbents (bagasse and coconut pulp).
   (2) Clean the adsorbent obtained by washing or cleaning and drying in the sun.
   (3) Process the adsorbent that has been dried by cutting it into small pieces in a blender and sieved to obtain a fine size adsorbent material.
   (4) The filter used cooking oil/centrifuge to separate from impurities contained in the used of cooking oil.
2. Implementation Phase / Practicum
   (1) Prepare the tools needed for refining used cooking oil according to practicum guidelines/guidelines.
   (2) Weighing the adsorbent according to the procedure in the practicum instructions and measuring as much cooking oil as the procedure.
   (3) Carry out used cooking oil purification procedures according to treatment.
   (4) Observing the physical properties of used cooking oil using an organoleptic test including color, odor, taste, and viscosity.
   (5) Analyze the chemical properties of refined cooking oil through moisture content test, free fatty acid test, saponification number test, peroxide number test, and iodine number test
3. Data Processing Sta
   (1) Processing the physical and chemical properties of used cooking oil using refined variations of adsorbent.
   (2) Assessing the adsorbent used can affect the physical and chemical properties of used cooking oil so as to improve the quality of the oil.

To carry out practical activities in the course of Food and Nutrition Biochemistry, the students are divided into several groups so that practicum activities can run conductively. When carrying out practicum activities can be identified potential cognitive, affective and psychomotor competencies that are designed in the form of observation sheets as follows:

Table 1. Identification of Material Coverage in Cognitive Practicum of Cooking Oil Purification Practices *)

Knowledge Dimension	Cognitive Process Dimensions					
Knowledge Dimension	Remember	Understand	Apply	Analysis	Evaluate	Create
Factual knowledge	1,2					
conceptual knowledge		2				
procedural knowledge			3,4			3,4

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metacognitive knowledge				5,6	5,6	

*) Description of Material Coverage:
1. Chemical characteristics of the used cooking oil.
2. The role of adsorbent in used cooking oil purification.
3. Making adsorbents.
4. The process of purifying bleached oil with an adsorbent.
5. Analysis of physical properties of used cooking oil purification (color, taste, odor, viscosity).
6. Analysis of the chemical properties of the used cooking oil purification (water content / Ka, iodine number, peroxide number, saponification number, and free fatty acid / ALB).

From the scope of the material above, it can be identified the suitability of cognitive competence according to Kratwhol, *et al* (2001), namely by combining the dimensions of cognitive process competencies and the dimensions of knowledge. The dimensions of the cognitive process include levels from the simplest to the complex, namely: remembering, understanding, applying, analyzing, evaluating, and creating. Whereas in the dimension of knowledge, includes knowledge: factual, conceptual, procedural, and metacognitive

Based on the practicum process of used cooking oil purification using coconut pulp and bagasse adsorbent, psychomotor competencies were identified as basic science skills as follows:

Table 2. Identification of Basic Science (Psychomotor) Skill Competencies of Cooking Oil Purification Practices)

No.	Practicum Activity	Basic Science Skills
1.	Sampling / used cooking oil	1,2,
2	Making adsorbents	1,2,5
3	Weighing and measuring the volume of experimental materials	1,2,5
4.	Used cooking oil purification	1,2,3,5
5.	Analysis of physical properties of used cooking oil purification (color, taste, aroma, viscosity)	1,2,3,4,5,
6.	Analysis of chemical properties of used cooking oil purification (water content / Ka, iodine number, peroxide number, saponification number, and free fatty acid / ALB).	1,2,3,4,5
7.	Recapitulation of observation data	5
8.	Reporting the results of the experiment	3,4
9.	Communicate the results of the experiment	6

*) Basic Science Skills:
1. Observation
2. Measurement
3. Conclude
4. Predict
5. Classify
6. Communicate.

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Based on the identification of used cooking oil purification experiment activities using coconut pulp and bagasse adsorbent, the nurturant effect of identified psychomotor competencies was in the form of effective (social attitudes) as follows:

Table 3. Identification of Social (Affective) Attitudes of Cooking Oil Purification Practices *)

No.	Practicum Activity	Social Attitude
1.	Sampling / used cooking oil	1,2,3,5
2.	Making adsorbents	4,5
3.	Weighing and measuring the volume of experimental materials	1,4,5
4.	Used cooking oil purification	4,5,6
5.	Analysis of physical properties of used cooking oil purification (color, taste, aroma, viscosity)	1,2,3,4,5
6.	Analysis of chemical properties of used cooking oil purification (water content / Ka, iodine number, peroxide number, saponification number, and free fatty acid / ALB).	1,2,3,4,5
7.	Recapitulation of observation data	4,5
8.	Reporting the results of the experiment	4,5,6
9.	Communicate the results of the experiment	1,2,3,4,5,6

*) Social Attitude Coverage:
1. Honest
2. Discipline
3. Responsible
4. Perseverance
5. Accuracy
6. Cooperation.

b. Practicum-based Scientific Approach Learning Tools

Based on the identification of cognitive, psychomotor, and affective competencies obtained from the experience of used cooking oil purification, PjBL's scientific approach to learning practices based on practicum can be prepared as follows:

Table 4. Framework for Practicum-based Scientific Approach Learning Devices on Nutrition and Biochemistry Topics through Cooking Oil Purification Practicum

Learning Steps	Learning Activities	Developed Competencies		
		Cognitive	Psychomotor	Affective
Observe	Read the concept of: 1. Chemical characteristics of used cooking oil 2. The role of adsorbent is used cooking oil purification. 3. Making adsorbents. 4. The purification process of used cooking oil with an adsorbent. 5. Analysis of physical properties of used cooking oil purification (color, taste, aroma, viscosity). 6. Analysis of chemical properties of used cooking oil purification (water content/Ka, iodine number, peroxide number,	√		

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	saponification number and free fatty acid / ALB).			
Ask	Asking questions about information that is not understood from what is observed or questions to get additional information about what is observed (starting from factual questions to hypothetical questions).	√	√	√
Collect information / experiments	1. Conducting used cooking oil purification experiments. 2. Observing the chemical properties of chemical properties resulting from the purification of used cooking oil (water content/Ka, iodine number, peroxide number, saponification number, and free fatty acid / ALB). 3. Observing the physical properties of the physical properties of used cooking oil purification (color, taste, aroma, viscosity). 4. Conducting used cooking oil purification experiments. 5. Observing the chemical properties of chemical properties resulting from the purification of used cooking oil (water content / Ka, iodine number, peroxide number, saponification number, and free fatty acid / ALB). 6. Observing the physical properties of the physical properties of used cooking oil purification (color, taste, aroma, viscosity).	√	√	√
Associate/process information	1. Processing the information that has been collected, both limited from the results of collecting / experimental activities and the results of observing activities and information gathering activities. 2. Processing of information collected from the nature of adding breadth and depth to information processing that is looking for solutions from various sources that have different opinions to the contrary.	√	√	√
Communicate	Delivering observations, conclusions based on the results of the analysis: Verbally (presentation), Written (practicum report)	√	√	√

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From Table 4, specifically the emphasis on scientific, especially psychomotor competencies is compiled as follows:

Table 5. Development Tools for Psychomotor Competency Evaluation

No	Practical activities	Sub-activity	Description of basic science skills	Option to assess psychomotor aspects
1.	Sampling/ used cooking oil	Bring/collect used cooking oil samples	Students are able to observe: How to collect samples How to clean and wash samples How to dry the sample	Assessment Score No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		Clean and wash samples/ingredients		
		Dry the sample in the sun	Students are able to measure : Sampling How to clean and wash samples How to dry the sample	Assessment Score No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
2	Making adsorbents.	Weighing the adsorbent according to the procedure	Students are able to observe: Measurement of the adsorbent according to a procedure The process of drying the sample under the sun The adsorbent is blended and sieved to produce adsorbent powder	Assessment Score No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		Dry the sample under the sun	Students are able to measure: The weight of coconut pulp adsorbent according to a procedure	Assessment Score No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		The adornment is blended and sieved to produce adsorbent powder	Students are able to classify adsorbents by: Label the practicum date Label the practicum group Give a code label for the variation of coconut pulp adsorbent to be used	Assessment Score No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
3	Weighing and measuring the volume of experimental materials	Measure oil material according to the procedure	Students are able to observe: How to measure oil ingredients according to the procedure How to centrifuge the oil to separate it from dirt How to filter oil to be ready to clear	Assessment Score No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		Centrifuge the oil to separate it from dirt	Students are able to measure: The initial weight of the oil to be used Oil weight after centrifuge The weight of the oil after being filtered and ready for purification	Assessment Score No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		Filter oil to be ready for clarification	Students are able to classify adsorbents by: Label the practicum date	Assessment Score No descriptors are met

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			Label the practicum group Give a code label for the oil to be used	Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
4.	Used cooking oil purification.	Weighing the adsorbent and measuring oil according to the procedure	Students are able to observe: How to measure adsorbents and oils according to the procedure Mixing oil and adsorbent, beaten using an orbital shaker for 12-20 hours Separating oil and adsorbents by filtering and centrifuges	Assessment Score No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		Mixing oil and adsorbent, beaten using an orbital shaker for 12-20 hours	Students are able to measure: The weight of the adsorbent will be mixed with oil The volume of oil that will be mixed with oil The volume of oil that has been purified	Assessment Score No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		Separating oil and adsorbents by filtration and centrifugation	Students are able to classify adsorbents by: Label the practicum date Label the practicum group Give a code label for the oil to be used	Assessment Score : No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
5.	Analysis of physical properties of used cooking oil purificatio n (color, odor, flavor, viscosity).	Observe color and thickness	Students are able to observe : The color and viscosity of the oil with the sense of sight The smell and aroma of oil with the sense of smell Taste of oil with taste buds	Assessment Score : No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
			Students are able to measure: The color and viscosity of the oil with the sense of sight The smell and aroma of oil with the sense of smell Taste of oil with taste buds	Assessment Score : No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		Smell	Students are able to conclude: The color and viscosity of the oil with the sense of sight The smell and aroma of oil with the sense of smell Taste of oil with taste buds	Assessment Score : No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
			Students are able to predict: The color and viscosity of the oil with the sense of sight The smell and aroma of oil with the sense of smell Taste of oil with taste buds	Assessment Score : No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		Taste the taste	Students are able to classify: The color and viscosity of the oil with the sense of sight The smell and aroma of oil with the sense of smell Taste of oil with taste buds	Assessment Score : No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled

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6.	Analysis of chemical properties of used cooking oil purification (water content / Ka, iodine number, peroxide number, saponification number, and free fatty acid).	Prepare a reagent for analyzing the chemical properties of used cooking oil (water content, iodine number, peroxide number, saponification number)		Assessment Score : No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		Preparing tools and materials for analyzing the chemical properties of used cooking oil purification (water content, iodine number, peroxide number, saponification number,		Assessment Score : No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		Analyzing the chemical properties of used cooking oil purification (water content, iodine number, peroxide number, saponification number.		Assessment Score : No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
7.	Recapitulation of observation data	Make an observation table.	Students are able to classify: Data from oil purification Physical properties of oil data Data on soil chemical properties	Assessment Score : No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		Enter data according to the physical properties of the oil.		
		Enter data according to the chemical properties of the oil.		
8.	Test results report	Systematic report according to procedures.	Students are able to conclude: systematic report according to procedures The results of the study are in accordance with the hypothesis Conclusions are in accordance with the formulation of the problem	Assessment Score : No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		The results of the study are in accordance with the hypothesis.	Students are able to predict: systematic report according to procedures The results of the study are in accordance with the hypothesis Conclusions are in accordance with the formulation of the problem	Assessment Score : No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		Conclusions are in accordance with the formulation of the problem.		
9.	Communicate the results of the experiment.	Presenting the presentation interestingly.	Students are able to communicate: Interesting presentation Presentation with communicative Presentation in accordance with the trial report	Assessment Score : No descriptors are met Only 1 descriptor is fulfilled 2 descriptors are met All descriptors are fulfilled
		Present the presentation communicatively.		
		Presenting presentations in accordance with the experimental results report.		

From the matrix of evaluation tools for operations, an instrument for assessing practicum-based PjBL scientific learning can be developed. The PjBL framework that can be prepared based on practical activities can be described that project-based learning/lecture is a learning model that uses projects/activities as the core of

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learning. Students do exploration, assessment, interpretation, synthesis, and information to produce various forms of learning outcomes (*Ministry of Education and Culture*, 2014).

PjBL begins with the inquiry process by raising a guiding question and guiding students in a collaborative project that integrates various materials in the curriculum.

The role of lecturers in PjBL as facilitators to get optimal results in accordance with the power of imagination, creation, and innovation of learners. The steps for implementing PjBL can be explained in the following figure:

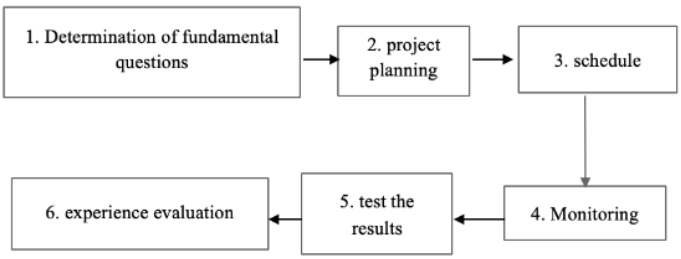

Figure 1. Steps for Implementing PjBL

From the results of this study, namely aspects of the process and product, the contextual use can be detailed in the steps of PjBL as follows:

1. Determination of Fundamental Questions
   Lectures begin with essential questions, which are questions that can assign students to do practical work. In accordance with reality, it can begin with an in-depth investigation and the topics raised are relevant to students, such as: "Are there differences in clarity between the use of coconut pulp and bagasse in used cooking oil purification?"
2. Designing Project Planning
   Planning is done collaboratively between lecturers and students in project completion, such as:
   Making 2 (two) working groups, namely:
   a. Practicum of refining used cooking oil with coconut pulp adsorbent
   b. Practicum of refining used cooking oil with bagasse adsorbent.
   c. Arrange a Schedule
   Lecturers and students prepare a schedule for project completion activities. The steps taken include: (1) creating a project completion timeline, (2) making project completion deadlines, (3) guiding students to plan new ways, (4) guiding students to make ways that are not related to the project, and (5) ask students to make an explanation (reason) about choosing a method.

Table 5. Project Completion Monitoring Sheet

Activity Goals	Monitoring Score			Note
	1	2	3	
Practical preparation stages				

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Stages of the implementation of the purification work				
Stages of data processing practicum results				
Reporting Stages				

Rubric:
Score 1 = Achievement of activities not yet visible.
Score 2 = Activity achievement reaches 70%.
Score 3 = Achievement of activities above 90%.

a. Test Results
   To measure the achievement of competence, an evaluation of the progress of each student during the practicum is carried out, such as:
   1) Test knowledge about cognitive competence.
   2) Perform performance tests on psychomotor competence.
   3) Evaluate students by questionnaire (affective).

b. Evaluating Experience
   At this stage, students are asked to express their experiences during the completion of the project. Lecturers and students develop discussions to improve performance during the lecture process so that eventually a new inquiry is found to answer the problems raised in the first phase of the lecture, such as:
   1) Focus group discussion.
   2) Group presentation.
   3) Classical presentation.

CONCLUSION

Based on the results and discussion of the development of the PjBL scientific approach learning tool based on practical cooking oil purification in the Food Nutrition and Biochemistry course, it can be concluded that:

First, the material structure and science process skills of students from the used cooking oil purification practicum are traditionally: cognitive competencies, including: used chemical characteristics of cooking oil, 2) the role of adsorbents in the use of used cooking oil, 3) making of adsorbents, 4) the process of purifying oil with adsorbent, 5) analysis of physical properties of used cooking oil purification (color, taste, odor, viscosity), and 6) analysis of chemical properties resulting from the purification of used cooking oil (water content / Ka, iodine number, peroxide number, saponification number, and free fatty acid). Psychomotor competence (Basic Science Skills), including 1) observation, 2) measurement, 3) concluding, 4) forecasting, 5) classifying, and 6) communicating. Affective aspects (Social Attitudes), including 1) honesty, 2) discipline, 3) responsibility, 4) perseverance, 5) accuracy, and 6) cooperation.

Second, PjBL scientific approach based learning model based on practicum of traditional cooking oil purification for prospective biology teacher students includes the stages of practicum preparation, implementation of cooking oil purification work, processing of practicum/project results data, and reporting of lab/project results.

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