

Making Tempe as a Learning Resource for Biotechnology Sub Material to Attract Entrepreneurial Interests of SMA Negeri 1 Tunjungan Blora

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Article Info

Article history:

Received : May 18, 2023

Revised : Jun 19, 2023

Accepted : Jul 22, 2023

Keywords:

Tempe
Learning Resources
Biotechnology
Entrepreneurship.

ABSTRACT

The rapid increase in the population of Indonesia in the era of globalization has caused many problems, one of which is the narrowing of job vacancies. Job opportunities with people looking for work more people looking for work. If someone has an interest in creating their own jobs (entrepreneurship) in accordance with the skills and knowledge they have, there is no need to rely on getting jobs from other people or government agencies. The population in this study were students of class XII in the Natural Sciences Program in the 2010/2011 academic year, consisting of 3 classes. The research was conducted in the even semester of the 2010/2011 academic year. The samples used were class XII IPA 1, XII IPA 2 and XII IPA 3. The research design used was the One Shot Case Study design. Data analysis was carried out using quantitative descriptive and percentage descriptive. The results showed that the interest in entrepreneurship in class XII IPA 1 was 82.86%, class XII IPA 2 was 88.25% and class XII IPA 3 was 80%. The high activity of students during learning activities is in line with good student learning outcomes, namely 100% of students achieving the completion criteria. Teachers show good to very good performance. It is known that both students and teachers are interested in the practical application of making tempeh. The conclusion from this research is that the application of practicum for making tempeh can attract students' interest in entrepreneurship, increase student activity and learning outcomes in learning the biotechnology sub-material.

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1. INTRODUCTION

Along with the rapid increase in the population in Indonesia in the era of globalization and industrialization, it has created many problems, one of which is the narrowing of job vacancies. Job opportunities with people looking for work more people looking for work, so many people do not get a job. Recently, many companies have reduced the number of workers so that unemployment has also increased. If someone has an interest in creating their own jobs (entrepreneurship), that is by working according to the skills and knowledge they have, so they don't have to rely on getting jobs from other people or government agencies. Competition that will increase is something that must be faced.

Entrepreneurship is one of the subjects that can be included in local content subjects (Sudrajat 2011). By teaching entrepreneurship subjects, students explore the abilities that exist within themselves according to the skills they have. Thus the interest in entrepreneurship for students needs to be developed. Entrepreneurial interest is the willingness to work hard and diligently to achieve business progress, to bear all the risks associated with the business being done, the willingness to live frugally, and the willingness to learn from failure.

SMA is an educational institution that prepares students to have the skills and knowledge to achieve something that is expected. SMA equips students with various knowledge, one of which is Biology. Biology subjects study living things and life processes. Biology learning emphasizes learning experiences to understand scientific concepts and processes, which are obtained through direct experience to develop competencies so that students can explore and understand the natural surroundings scientifically so that they can broaden a deeper understanding of themselves and the natural world around them. The definition of biology includes science related to life in the universe. This knowledge can be in the form of facts, concepts, theories and generalizations that explain the symptoms of life (Saptono 2003). Technological development of the biology concepts studied is urgently needed in learning activities so that students can experience the benefits of learning biology both for themselves and for society.

Biotechnology is the utilization of scientific principles by using microorganisms or biological systems (enzymes, cells, microorganisms, plants, animals and humans) to produce products or services for the benefit of humans. In biotechnology, organisms or components of organisms are engineered to produce goods and services to improve human welfare (Syamsuri 2004). In the material on biotechnology, ways of making a product are studied to increase the value of an item. One example is the manufacture of tempeh.

Making tempeh will be applied as a learning resource for biotechnology sub-materials to attract students' interest in entrepreneurship. This activity is intended to provide an opportunity for students to have knowledge and skills which include science process skills and experience in making tempeh. Students will be directly involved in learning activities in the laboratory.

2. METHOD

2.1 Location and Time of Research

This research was conducted in the even semester of the 2010-2011 academic year, which included research preparation and implementation. The place of research is at SMA N 1 Tunjungan, Blora Regency.

2.2 Population and Research Sample

This study used a quasi-experimental design. The population in this study were all students of class XII IPA SMA N 1 Tunjungan, Blora Regency, in the academic year 2010-2011, totaling 105 students divided into 3 classes. In this study all students of class XII IPA SMA N 1 Tunjungan will be used as the treatment class. This is because one of the characteristics of a quasi-experimental design is not using a control class.

2.3 Research design

The research design used was a One-Shot case study design, namely applying a certain treatment to a group of subjects and then measuring the dependent variable (Arikunto 2006).

The One-shot case study design pattern is as follows:

$$X \longrightarrow O$$

Information:

X: treatment or treatment

O: results of observations after treatment (treatment)

This study was planned to consist of 3 meetings, the first meeting was for practicum making tempeh, the second meeting was for discussion and presentation and the third meeting was for evaluation.

2.4 Research procedure

The research steps carried out include the preparation stage and the implementation stage.

2.4.1 Preparation phase

At the beginning of the study, preliminary observations were made of biology learning at SMA N 1 Tunjungan Blora using observation and interview techniques. Observations were made to

find out the condition of the school and the way biology was taught by biology teachers. Interviews were conducted to find out the learning methods that have been implemented so far at SMA N 1 Tunjungan Blora.

2.4.2 implementation stage

The implementation phase consists of Planning (RPP (Learning Implementation Plan), LKS (Student Worksheet), LDS (Student Discussion Sheet), Making student response questionnaires, Making observation sheets), Making Evaluation Questions, Testing Problems, Analysis of Test Results (Validity, Reliability, Difficulty level of questions).

2.5 Data and Data Collection Methods

Data is obtained by searching for data sources and the type of data used. How to collect data with questionnaires, observation sheets and evaluation tests.

2.6 Data analysis method

Analysis of student learning outcomes data, Analysis of student interest questionnaires for entrepreneurship, Analysis of student and teacher response data to learning, Analysis of student activity data in learning, Analysis of teacher performance data in the learning process.

3. RESULTS AND DISCUSSION

3.1 Research results

Learning by applying the practicum method was carried out at SMA Negeri 1 Tunjungan Blora class XII IPA in May and obtained various kinds of data. These data are the main data and supporting data. The main data includes data about students' interest in entrepreneurship. Supporting data includes data on student learning outcomes, data on student activities, data on student responses to learning, data on teacher responses to learning, and data on teacher performance observations.

3.1.1 Student Interest Data for Entrepreneurship

Student interest data for entrepreneurship is used to determine how much interest students have for entrepreneurship. The data is taken by using a questionnaire. Student interest questionnaire sheets for entrepreneurship are given after students participate in learning activities. There are two types of questionnaires used, namely open questionnaires and closed questionnaires. The results of the closed student interest questionnaire analysis are presented in Table 1.

Table 1. Student interest in entrepreneurship.

Class	XII IPA 1			XII IPA 2			XII IPA 3		
	Neutral	Tall	Very high	Neutral	Tall	Very high	Neutral	Tall	Very high
Score (%)	17,14	74,29	8.57	11.77	76,48	11.77	20	71,43	8.57
Frequency	6	26	3	4	26	4	7	25	3

Based on Table 1 it is known that most of the three classes have an interest in entrepreneurship after participating in learning with the application of tempe making practicum. But there are still a small number of students who think neutral.

The results of the analysis of student interest questionnaires for open entrepreneurship are presented in Table 2.

Table 2. Examples of open questionnaire answers about students' interest in entrepreneurship

No	Question	Answer
1	Are you happy when you make tempeh?	Yes, because I know how to make tempeh
2	Are you interested in starting a business to make tempeh from soybeans?	Yes, because by starting a business to make tempeh, I can learn to be independent to meet my own needs
3	Can you achieve your desired goals with entrepreneurship?	Yes, because my goal is to become a successful and independent person
4	What can you give to the community and the surrounding environment by doing entrepreneurship	Increase people's income, namely by buying soybean harvest and reducing unemployment

Based on the data above, it is known that students are able to inoculate tempeh yeast into ripe soybean seeds, are happy when making tempeh, are interested in doing entrepreneurship to

achieve the desired goals and know the benefits of doing entrepreneurship for the community and the surrounding environment.

3.1.2 Student Activity Data During Learning

Student activities observed in learning biotechnology materials are activities in practicum activities and discussions which include interactions between students and students, students with teachers and students with learning resources. Student activity data is used to determine the value of student activity during learning. The results of the analysis of student activities can be seen in Table 3.

Table 3. Student Activity

No	Criteria	Class					
		XII IPA 1		XII IPA 2		XII IPA 3	
		pert. 1	pert. 2	pert. 1	pert. 2	pert. 1	pert. 2
1	∑ Very high	7	16	27	17	4	2
2	% Very high	20	45,71	79,41	50	11.43	5,71
3	∑ Tall	28	19	7	17	31	33
4	% Tall	80	54,29	20.59	50	88.57	94,29

Based on Table 3 it is known that student activity at each meeting shows very high and high criteria. The level of student activity in learning is determined based on the number of students who get very high and high criteria, then the percentage is calculated and confirmed with the assessment criteria. The first meeting of class XII IPA 1 20% of students achieve very high criteria and 80% of students achieve high criteria.

3.1.3 Data on Student Learning Outcomes

Data on student learning outcomes were obtained from the sum of the LDS scores for meetings 1 and 2, assignment scores, report scores and evaluation scores divided by 5 (five). After the analysis is carried out, the results of student learning are obtained in the form of final grades. Data on student learning outcomes is presented in Table 4.

Table 4. Student learning outcomes

No	Achievement	Class		
		XII IPA 1	XII IPA 2	XII IPA 3
1	∑ complete	35	34	35
2	% complete	100	100	100
3	∑ Not Completed	0	0	0
4	% Unfinished	0	0	0

The results of the calculation of student learning outcomes for class XII IPA 1, XII IPA 2, and XII IPA 3 are 100% of students completing their studies. These results indicate that all students have scores that have reached the expected KKM of 75.

3.1.4 Data on Student Responses to Learning

Student response questionnaires are used to find out how students respond or think about the learning that has been implemented. Student response data was obtained by analyzing student response questionnaire sheets given at the end of the learning activity. The results of the analysis of student responses are presented in Table 5.

Table 5. Student responses during learning activities

No	Response	Class		
		XII IPA 1	XII IPA 2	XII IPA 3
1	% Very Positive	71,43	42.85	85.71
2	% Positive	28.57	57,14	14,29
3	% Neutral	0	0	0
4	% negative	0	0	0
5	% Very Negative	0	0	0

Based on the student response questionnaire in Table 5 it is known that all students from the three classes gave very positive and positive responses. This means that all students are happy with the learning that has been carried out, namely by applying the practicum of making tempeh.

3.1.5 Teacher Performance Observation Results Data

Data from observations of teacher performance in this study include all teacher activities during the learning process that are linked to the lesson plan that has been prepared. Teacher performance observation data serves as research supporting data. This data is used to determine the extent to which the teacher implements the lesson plan that has been compiled into the actual

practice of implementing learning. Teacher performance observed during the learning process includes performance in practicum activities and discussions starting from opening the lesson to closing the lesson. The results of the teacher performance analysis are presented in Table 6.

Table 6. Teacher performance in learning activities

Class	XII IPA 1		XII IPA 2		XII IPA 3	
meeting to	1	2	1	2	1	2
Score (%)	85.71	92.85	71.43	64.29	78.57	85.71
Criteria	Very good	Very good	Good	Good	Good	Very good

The teacher performance data above is analyzed per meeting with unequal scoring. Table 6 shows that the teacher's performance in the three classes, namely XII IPA 1, XII IPA 2, and XII IPA 3, achieved very good or good criteria at each meeting. The results of the data analysis show that during learning the teacher has good or very good performance.

3.2 Discussion

Students' interest in entrepreneurship was taken by using open and closed questionnaires which were given after participating in practicum learning activities for making tempeh. In biology learning, the biotechnology sub-material by applying the practicum method for making tempeh, students learn by doing (learning by doing) as well as learning to be entrepreneurial, namely by selling tempe from the practicum activities that have been carried out. After this activity, students are then given an open questionnaire to be filled in by students by expressing their opinions in writing on the questions that have been made and closed questionnaires are filled in by students by marking (√) on the answer choices desired by students. Littunen (2000) mentions two characteristics of entrepreneurs, namely their creativity and courage in taking risks.

Entrepreneurial interest is a person's interest in carrying out independent business activities with the independence of taking risks. High interest means awareness that entrepreneurship is attached to him so that individuals pay more attention and prefer to carry out entrepreneurial activities. The growth of interest is influenced by the inclusion of sufficient information about the object of interest. According to Yuwono & Partini (2008) there are four things that affect interest in entrepreneurship, namely, starting with changing perceptions about entrepreneurship which is not always synonymous with money capital, but is more dominated by will and enthusiasm in entrepreneurship. This new perception is then followed by an awareness of the many extraordinary potentials within students. The potential that has been realized is then raised through various work plans in undergoing entrepreneurship. The plan starts from the selection of business fields to the realization stage.

Through the student entrepreneurship interest questionnaire given, it can be seen that students' interest in entrepreneurship is making tempeh. Based on the results of data analysis of students' entrepreneurial interest, it is known that students' interest in entrepreneurship after participating in learning activities by applying the practicum method of making tempeh shows the results of high student interest in entrepreneurship. This can be seen in Table 1. The results of the analysis of students' interest in entrepreneurship were in class XII IPA 1 of 82.86%, while class XII IPA 2 was 88.23% and class XII IPA 3 was 80%. This is indicated by the student's desire for entrepreneurship, the pleasure of students for entrepreneurship, the social environment, experiences and supportive attention. According to Nurwakhid (1995:12) interest is closely related to attention, environmental conditions, feelings and will. Interest is basically the acceptance of a relationship between oneself and something outside the person so that the position of interest is not stable, because under certain conditions interest can change, depending on the factors that influence it. There are 3 factors that affect interest in general, namely psychological conditions, physical conditions and environmental conditions.

Based on the results of the analysis of student activity data during the learning process with the application of the practicum method of making tempeh in the biotechnology sub-material, it showed very high results. This is because students are motivated to be directly involved in learning, namely by treating soybeans to be made into tempeh. This can be seen in Table 8, it is known that at the first meeting of class XII IPA 1 20% of students achieved very high criteria and 80% of students achieved high criteria. Class XII IPA 2 79.41% of students achieve very high criteria and 20.59% of students achieve high criteria. Class XII IPA 3 5.71% of students achieve very high criteria and 94.29% of students achieve high criteria.

The practicum activity carried out was in the form of practicum making tempeh, students were seen actively doing practicum activities for making tempeh because they had never been

implemented in learning activities at school before. Tempe making practicum motivates students to study the fermentation process that occurs. This raises and high enthusiasm in students to complete the manufacturing procedure so that it can be successful. Students are said to be successful if the tempe making practicum is carried out to produce tempe as expected. The existence of high interest in students makes students more enthusiastic, more enthusiastic and more active. Students try to work according to the steps of practicum activities and try to get the best results. high interest, Enthusiasm and interest will cause students to become more diligent, thorough and honest. In learning using the practicum method of making tempeh, it can be seen that the activity has increased compared to the learning that is usually applied. This is confirmed by the results of Sholahuddin's research (2008) which states that the optimization of practicum in learning shows that student activity is quite good when viewed from the perspective of involvement in learning both in class and in the laboratory.

Student learning outcomes can be identified through assessment activities. The focus of the assessment is the success of student learning in achieving predetermined competency standards. The results of the assessment are used to evaluate student learning completeness and the effectiveness of the learning process. Therefore the assessment activity is an important activity in the learning process.

Student learning outcomes with the application of the practicum method for making tempeh were obtained from LDS scores, assignments, reports and evaluation scores. These various types of assessments are taken to obtain portraits of student learning outcomes in accordance with the competencies set out in the curriculum. This is in accordance with the opinion of Majid (2006) which states that in order for the assessment objectives to be achieved properly, the teacher must use various methods and assessment techniques that vary according to the learning objectives and the characteristics of the learning experience they go through.

Based on the analysis of student learning outcomes data it appears that learning with the application of the practicum method of making tempeh shows good results, namely 100% of students in class XII IPA 1, XII IPA 2 and XII IPA 3 have achieved the criteria for completion. Student completeness is also supported by psychological factors of students, including motivation, concentration, reaction, organization, understanding and repetition (Sardiman 2007). However, without the presence of psychological factors, it can slow down the learning process and can even increase the difficulty in teaching.

Data on student learning outcomes with the application of the practicum method for making tempeh shows that student learning outcomes in general increase. The increase in learning outcomes illustrates that the application of the practicum method for making tempeh can improve student learning outcomes in the biotechnology sub-material learning at SMA N 1 Tunjungan Blora. As according to Dimiyati & Mudjiono (2009) that learning outcomes are changes in behavior that are obtained by students after experiencing learning activities. This study shows that there is a change in student activity from passive to more active so that the impact on student learning outcomes also increases.

Student response questionnaires are given at the end of the lesson to find out the feedback given by students to the entire learning process carried out by the teacher. Based on the results of the questionnaire analysis, most of the students stated that they found it easy to learn biology in the biotechnology sub-material. This is shown by the value of student responses to the first question, all classes classically gave very positive responses.

Based on the student response questionnaire, it was found that 71.43% of students in class XII IPA 1, 42.85% of students in class XII IPA 2 and 85.71% of students in class XII IPA 3 gave very positive responses. 28.57% of students in class XII IPA 1, 57.14% of students in class XII IPA 2 and 14.29% of students in class XII IPA 3 gave positive responses. From the results of the questionnaire it is known that students feel interested and not bored with the learning activities that have been carried out. Students can also work together and help each other with a group of friends in understanding the material. This is in line with the opinion of Rustaman (2003) that practicum generates motivation to learn science and practicum can support the subject matter.

The success of a learning process is inseparable from the teacher's role, not only as an educator but also as a motivator and as a facilitator. According to Delfi R & Katarko (2007) system of educational institutions, especially teachers, teaching competence is the main product of the curriculum because curriculum is knowledge, learning experience, learning activities that are organized and planned and developed to meet the intellectual development needs of students. A

learning activity can be said to be successful if the teacher can carry out learning activities in accordance with the prepared lesson plans. Based on the analysis of teacher performance during learning it is known that teachers provide excellent and good performance during the learning process in all classes studied.

Teacher performance analysis uses unequal scoring. This is because each meeting has a different character from other meetings. The character of learning activities in the first meeting is more focused on practicum activities, while the second meeting focuses on observation. Good teacher performance is of course very influential on the ongoing learning process. Good performance indicates that the teacher has provided learning in accordance with the prepared lesson plans. Good teacher performance shows that at every start of learning the teacher always motivates students, conveys learning objectives and explores students' prior knowledge. The beginning of learning is an important capital, because with a good start students will more easily accept the learning given. Furthermore, in core learning the teacher is able to convey the subject matter properly according to the learning material. During practicum the teacher guides students, as well as during observation and discussion activities. The teacher gives the group the opportunity to present the results and provide feedback to the presentation group. At the end of the lesson the teacher guides students to draw conclusions and provides reaffirmation of essential concepts. Before closing the learning activities, the teacher guides students to reflect and the teacher also gives students the opportunity to record things that are needed. Teachers who have optimal performance will be able to manage learning components so as to be able to maximize the quality of learning which will also have an impact on student learning activities and outcomes.

4. CONCLUSION

Based on the results of the research and discussion, it can be concluded that the application of practicum for making tempe by applying two heating times, variations in the shape and packaging of tempe, and the use of local soybeans as the basic ingredient for making tempe can attract students' interest in entrepreneurship and can be used as a source of learning for biotechnology sub-materials to improve student learning outcomes.

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