Analysis of Problems Related to the Development of Learning Devices on Biotechnology Materials by Utilizing Mandai as the Potential of the East Kalimantan Region

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Abstract. Learning tools are certain or several preparation which provided by educators or teachers both as individual or group so that the implementation and evaluation of learning can be conducted sistematically and gained the expected result. The use of regional potential in learning has been recommended based on the curriculum of 2013. The development of learning tools using the regional potention besides supporting the program of the goal learning achievement, it is also increase the environmental awareness. The aim of this study is finding the obstacle in learning tools by Biology teachers of East Borneo in utilizing the regional potential, especially in Biotechnology. The obtained result have been analyzed by descriptively qualitative which found as follow. First, there is no teacher who made learning tools based on regional potential which originated from East Borneo on Biotechnology subject. The second is the lack of student understanding in interpreting the regional potential learning tools from their regional, due to the limit of reference related to the regional learning based on East Borneo, therefore creativity is needed against the development of regional potential based-learning tools. Mandai is one of Biotechnology products that can be used for the process of Biotechnology tools development in order to motivated the student or participant in learning process as the original product of its regional potential.

Keywords: Learning tools · Regional potential · Biotechnology · Mandai · East Kalimantan

1 Introduction

Education is a conscious and planned attempt to create a learning atmosphere and learning process so that the students can actively develop their potential to have spiritual strength, self-control, intelligence, morals, and skills needed by themselves, society, nation and state [1]. To gain a good learning outcomes in the sector of knowledge, proper learning planning is needed. It includes on organizing the design and learning tools. In the preparation of the tools, the most basic thing is the arragement of lesson design. The well-planned learning tools have an important role in guiding the flow of

T. D. Larasati et al. (Eds.): ICTROPS 2022, ABSR 31, pp. 10–15, 2023.
https://doi.org/10.2991/978-94-6463-180-7_3

learning process. Learning planning is implemented in a series of learning tools. Learning tools meant as something or several preparations prepared by educators or teachers both as individuals and groups so that the implementation and evaluation of learning can be conducted systematically and obtained the expected results [2].

The Ministry of National Education, 2003 stated that the National Education System the curriculum at all levels and types of education was developed with the principle of diversification according to the education unit, regional potential, and students. Therefore, the development of the learning process in high school also needs to commit the potential of the region and must be matched with students the characteristics. Several researches suggested to use the regional potential in the current learning process. Because the use of regional potential beside supporting the learning achievement programs, it can also increase the environmental awareness [3]. With regional potential-based learning, indirectly the resources in the area can be improved and encouraged the conservation and rehabilitation programs for the preservation of endemic flora and fauna in the area [4].

As it quoted in Sindo News, East Kalimantan Province (Kaltim) is one of the second largest provinces after Papua. East Kalimantan has the potential of abundant natural resources, most of them have not been utilized optimally. In Rahayu, E.S. 2000 stated that one of the traditional fermented products originated from Kalimantan is Mandai. Mandai is known as a special food from South and East Kalimantan that can be used as a side dish which comes from dami cempedak (*Artocarpus integer*). Mandai Cempedak [5] is produced by utilizing salt as a selective medium for the growth of LAB (Lactic Acid Bacteria). Traditionally, Mandai cempedak skin is used as an ingredient for vegetables and side dishes fried with flour.

The existence of this local potential can be used as learning resources that can be designed in a learning tool, especially in learning biology. Based on the research [2] teachers in Samarinda City have not yet developed a regional potential-based biology learning. Therefore, this study aimed to discover the problems of learning tools by the regional biology teachers in East Kalimantan by utilizing regional potential, especially in Biotechnology material.

2 Methods

This research is only limited on the analysis of assessment needs that comes from the results of initial observations. The data collection techniques in this study used the instrument analysis needed by teachers which is using google forms and interviews. To discover the fact in the real situation related to the learning process that has been implemented so far. The researcher explored the teachers' knowledge about learning activities, regional potential-based learning tools, especially on biotechnology material, student understanding, and the learning tools development in SMP/MTs Grade 9 and SMA/MA Class XII semester II. The teachers interviewed various schools in East Kalimantan who were randomly selected, those are WR Soepratman Christian High School, IT Al Hidayah High School, Sabilarrasyad MA Samarinda, 2 Bengalon Vocational High School, Granada IT High School, Sabilarrasyad MTs, Al Azhar MTs M said, SMP N 2 Intu Lingau West Kutai, MTs Muhammadiyah 1, SMK Negeri 1 Bongan. The

Table 1. Data Collection Instrument

Subject	Instrument	Observed Data
Teacher	Questionnaire	The knowledge of teacher towards regional potential-based learning tools
Teacher	Questionnaire	The benefit of regional potential in learning Biotechnology by teachers
Teacher	Questionnaire	The references used by the teachers
Teacher	Questionnaire	The important of developing regional potential-based learning tools of Biotechnology in the school

respondents are from all biology teachers who were selected to provide the information about the learning process from each schools. The research instrument is a questionnaire. While, the data from the questionnaires completed by the respondents would be analyzed descriptively qualitative (Table 1).

3 Result and Discussion

The result of observation towards the teacher regarding to the development of learning tools displayed as follow:

3.1 Discussion

This research is conducted as an initial study in developing the learning tools based on the potential of the East Kalimantan region. In realizing this, certainly the schools

Table 2. Learning Activity and Learning Tools Regional Potential-Based of East Kalimantan

Criteria	Assessment	
	Yes	No
Have you ever used the element of regional potential in the process of Biology/Science learning?	60%	40%
Have you ever used the element of regional potential in Biotechnology material?	50%	50%
What is the element of regional potential which used on Biotechnology material is came from East Kalimantan?	–	100%
Is there any obstacle exist in the implementation of learning tools regional potential-based especially on Biotechnology material that taught by the teachers?	100%	–
Is it need to develop the learning tools based on regional potential of East Kalimantan?	100%	–

Table 3. Students' understanding Regarding to the Regional Potential-Based of East Kalimantan.

Criteria	Assessment	
	Yes	No
Do the students experience any difficulty in understanding the learning based on the regional potential in the class?	90%	10%
Do you give the chance for the students to ask question in the class?	100%	–
Do you know the quality of students understanding about the topic learning of regional potential which delivered by the teachers?	33.3	66.7%

as educational institutions have a very important role. Besides, Biology Science is also intended to introduce the biological environment and the natural surroundings, as well as the introduction of various advantages of the archipelago.

The observation design is intended for students and teachers to fulfill the questionnaires which aimed to show the importance of this research in focusing the condition that is currently happen in the process of teaching and learning activities. The data collection is not only in the form of questionnaires, but also by interviewing teachers. This technique is implied in order to find out the standard of synchronization between the questionnaires and the understanding that occurs in the real situation.

Siswanti stated that the interviews in schools were more focused on the importance of teacher abilities in teaching and learning process so that they would find a solution for the main case of this problem [4]. The data collection in this research using questionnaires in the form of observations and interviews conducted to competent teachers in Biology science lessons in several schools, those are WR Soepratman Christian High School, Al Hidayah IT High School, MA Sabilarrasyad Samarinda, 2 Bengalon Vocational High School, IT High School Granada, MTs Sabilarrasyad, MTs Al Azhar M said, SMP N 2 Intu Lingau West Kutai, MTs Muhammadiyah 1, SMK Negeri 1 Bongan.

The data on Table 2 displayed about the learning activities in the classroom and learning tools showed that 60% of teachers have included the elements of regional potential in learning process. After the interview, the element of the potential of the area is on the material of biodiversity. Indeed, there are 50% who use elements of regional potential as well as biotechnology materials, unfortunately the elements is not originally from East Kalimantan. This is because the lack of references about the potential of the East Kalimantan region in the textbooks. The existed textbooks provide examples of conventional biotechnology making from non-Kalimantan origin, such as making yogurt, making nata de coco, making tape, etc. In fact, there is one Biotechnology product of East Kalimantan that can be included in the process learning biotechnology, the product is known as Mandai. Mandai cempedak is a quite popular local food for the people of East and South Kalimantan. This traditional fermented product can be found almost every time. The traditional fermentation of mandai cempedak has been documented in various studies.

East Kalimantan is one of cempedak producer in Indonesia. Cempedak is generally found in Sumatra, Kalimantan, Sulawesi, and Irian Jaya. The large number of cempedak as harvested fruit makes the people of East and South Kalimantan more creative in utilizing the parts of cempedak that can be consumed directly. One part that is used by the community in general is the inner skin of the cempedak. Mandai Cempedak [5] is produced from the inner skin of the cempedak (Artocarpus champeden) by utilizing salt as a selective medium for LAB growth. Traditionally, Mandai Cempedak is used as an ingredient for vegetables and snacks fried in flour. The common LAB isolated from these 21 products was Lb. plantarum and Leuconostoc sp. have developed a cold fermentation technique with starter cultures for Mandai Cempedak with higher anti-oxidative abilities compared to spontaneous fermentation.

This regional potential of East Kalimantan will certainly support if it is involved in the learning process. As it seen at the Table 3 that 90% of students have difficulties in learning learning based on regional potential. Because so far, learning is conducted to understand the potential of the region that is not originally from their own original region. In fact, as it presented from the table that 100% of teachers have provided opportunities for students to ask questions in the learning process and only 33% of teachers know the ability of students in the learning process based on regional potential in Kalimantan. Several studies suggested using regional potential in the current learning process. Because the use of this area's potential beside supported the learning achievement programs, it can also increase environmental awareness (Marlina, 2015). Indirectly, by the regional potential-based learning, the resources in the area can be promoted and encouraged conservation and rehabilitation programs for the preservation of endemic flora and fauna in the area [4]. Situmorang (2016) stated that there are a lot of local potential that is included in biology learning so that it could give an effect on educators in developing biology as a tool in presenting biological material that is suitable for everyday's life. One of them is the local potential from East Kalimantan.

This learning tool will be developed using the local potential of East Kalimantan so that the teachers and students will gain additional understanding of the regional potential. Futher, able to know more about the characteristics of the area, especially about East Kalimantan, as well as innovating new learning that increases the interest of an area that is the focus on the learning activities in the classroom.

4 Conclusion

Based on the problem analysis that have been carried out by Biology science teachers in East Kalimantan showed that first, there is no teacher who have made regional potential-based learning tools originally from East Kalimantan, especially in Biotechnology materials. The second is the lack of students understanding in interpreting the regional potential-based learning that does not come from their own region, and also the limit references related to East Kalimantan regional potential-based learning. The third is the important of creativity in developing the regional potential-based learning tools in order to motivate the students to participate in the learning process.

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