LEARNING PROCESS OF BIOLOGY THROUGH

by Suratmi Suratmi

LEARNING PROCESS OF BIOLOGY THROUGH THE GUIDED DISCOVERY LEARNING BASED ON LOCAL EXCELLENCE ON THE SUBCONCEPT OF EUBACTERIA ROLE IN LIFE

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Abstract

The purposes of this study were to determine learning process of biology through the guided discovery learning based local excellence on subconcepts eubacteria role in life and to determine the skills of the students process through the guided discovery learning based local excellence. The method used was a descriptive method. The population in this research was class of X of SMAN 13 Tangerang District. The sampling technique used in this study was purposive sampling. The sample was the class X.A of SMAN 13 Tangerang District consisted of 46 students. The data were collected by observations, questionnaires and skills process of science test. The results of this study showed that student responses during learning activities using guided discovery learning based local excellence on subconcepts eubacteria role in life was good with a percentage of 77.34%. The skills process of the students belong to the good categories with an average percentage of 82.52%.

Key Words: guided discovery learning, Eubacteria, local excellence

1. Introduction

Biology learning process in school requires a variety of learning experiences to understand the concept and process of science. Biology is not just rote learning or remembering it. However, in the implementation, there are stil teacher who teach biology by memorizing the information. It makes the student only accomodate what the teacher said without knowing the true meaning of the learning process. Method's selection done by monotonous teachers lead to the lack of student's ivolvement to discover the concept based on their own thoughs in the learning process. The biology learning process was just eventually see the final result without seeing the process that lead to the student's ignorance.

One of the learning model that involves student's activeness to find the concept it self is a guided discovery learning model. In guided discovery learning

model, students are encouraged to be able to find the problems related to the subject matter, so the students can be actively involved in the learning process. In addition, in that learning model, teaching materials presented are not in the final form, but the students are required to perform various activities such as organizing problems, collecting the data, solving the problem, communicating and forming a new concept. So the teacher is only as the facilitator who creates active, creative and fun learning (Hamalik, 2010). By giving an opportunity to students for being a problem solver makes the students will search more for the information related to the problems.

In general, the learning model by using guided discovery learning model only requires students to find solution for the problems related to the subject matter without concerning them selves with the envirement. Eventhough many problem can be solved from the envirement around them related to the subject matter. For example is the problem of using the local excellence as learning resources. The local excellence is all of the thing which are the characteristics of one area, includings the economy, culture, information and communication technology, ecology and many other (Ahmadi et al., 2012:). There are a lot of local excellences that can be utilized in the learning process, espesially in the Banten province.

Banten province has the potential in the mining, plantation, agricultural, tourism, culinary and industrial (Sulasno, 2008). One of the potential that can be developed into the local excellence is in plantation sector. One of the leading commodity plantation developed in Banten province is coconut palm with the productivity around 696.60 kg/ha in 2011 (Dishutbun, 2012). There are coconut palm plantation in almost all cities and district in Banten province. One of example is in the Tangerang distric. Coconut palm production in Tangerang district from 2008 to 2012 is aporoximatelt 5700 tons/ year (BKPM, 2015). The coconut palm is taken as example of an existing potential plantation in Banten province. Coconut can be used as nata de coco as learning application for biology in the subconcept of Eubacteria role in human life.

Based on the introduction above, the reseachers aims are to apply the biology learning on the subconcept of Eubacteria role in human life by using guided

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discovery learning based on local excellence in SMAN 13 Kabupaten Tangerang and measure the student's science process skill after doing the learning process by using guided discovery learning based on local excellnce.

2. Theoritical Background

Discovery learning is a learning model that involves the students actively in learning process and the teachers act as facilitators, it means that the teachers role play is guiding the learning process and helpinh to find out the knowledge, for example is by giving problems to students to solved by experiment (Syah, 2010). Hamalik (2010) stated that in the guided discovery learning model, students act as scientist conducting experiment through his own mental process. The student acts as scientis, so the result obtained by the student will be durable in memory and are not easily forgotten because the students participate in all learning activities. Discovery learning model in learning process provides the opportunity for students to find out their own information through the problems or issues that are given by the teacher to be solved through discovery or experiment which will be provide information such as new concepts or principles (Suryosubroto, 2002).

The guided discovery learning model based on local excellence is an innovative learning model by emphasizing how active learning is which provides greater opportunities for students to develop their knowledge and potential by teaching the skill to investigate and solve the problem in accordance with the characteristic of the region. So that the students can achieve the goal of learning as a preparation to face the future life by referring to the cultural values of the region. Therefore the learners can keep the preservation potential of the region (Wijayanthi et al., 2014).

The implemantation of guided discovery learning based on local excellence in school is aimed at contextual biology learning as biology learning objects are very easily found in the neighbourhood. Teachers should be able to present such objects significantly both in the classroom and structural task outside the classroom. The contextual object can facilitate the students to understand the concept (Mumpuni, 2013: 3). The education stages of local excellence in senior high school

(SMA), the first is determination of themes and type of local excellence. The next stage is intergrating the themes with syllabusband lesson plans, then determinante the competencies of local excellence education that must be mastered by the students (Mumpuni, 2013).

3. Method

The research method used in this research is descriptive method that aims to describe the facts, the chacteristics and the correlation between the investigated phenomenon. The method illustrates the learning process by using guided discovery learning based local excellence and student's science process skill on the subconcept of Eubacteria role in life. The research was conducted in the academic year of 2015/ 2016 at the first semester. The population in this study are the 10th grade students of SMAN 13 Kabupaten Tangerang. The sample of this study were the The 10th grade of class A students of SMAN 13 Kabupaten Tangerang. The sampling in this study is done randomly (simple random sampling).

The data collection technique used in this study is non test and test technique. Non test technique consists of observation sheets and questionnaires, while test technique consists of the description test to measure the science process skill. The data were analyzed by using quantitative descriptive statistical analysis techniques. The analysis technique in this study is analyzing the quantitative data obtained from observation, questionnaries and description test. The data obtained will be calculated by using certain formula to obtain the data in number form which will be converted into percentage which is then interpreted by using the qualitative sentence.

4. Result and Discussion

a. The application of guided discovery learning based on local excellence

Guided discovery learning based on local excellence basically promotes active learning for student by giving opportunity for student to discover and solve the problems. In this study, students are guided to find the problem and solve it by conducting discussions and observations. At the begining of learning, the student groups are asked to find information on local excellence in Banten province by reading the literature from books and internet. The students discuss about local excellence that can be assosiated with the subconcept of Eubacteria role by using existing literature and guidance from teachers. Furthermore, the students are asked to work on the students' worksheet. The answer of the students' worksheet that has been done by each group showed which is generally every group has been able to answer the problem on the worksheet properly. Each group already know the existing plantation is the potential excellence in Banten province. In addition, students learn how to use the existing potential by processing the coconut oil into more valuable product. There are so many products that can be produced from it, because all parts of coconut can be use, which are fibers, shell, and the coconut water. The coconut water can produce some products when current manufacturing process uses the help of bacteria. The resulting product examples are nata de coco by using *Acetobacter xylinum*, bioethanol and virgin coconut oil (VCO) by using *Sacharomycess cereviceae*. However, because of the used of facilities and material is only support for the manufacturing process of nata de coco then the teacher leads the students to make product from coconut water into the nata de coco form. The nata de coco processing requires the help of *Acetobacter xylinum*.

The students' worksheet answer showed that the students are able to built their own knowledge. The knowledge is already gained by applying the manufacturing process of nata de coco making process. All the learning process stages can not be separeted from the teacher's guidance.

The guided discovery learning stage is done in twice meeting. Although it ls just two meeting but the students can attend the learning and mastering the subconcept of Eubacteria role in life well and also built good science process skill. b. The student's science process skill assessment on guided discovery learning based on local excellence

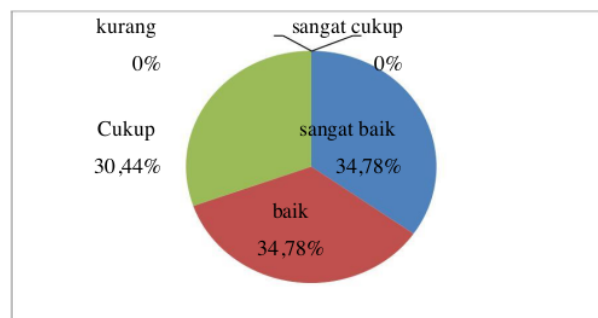The student's science process skill assesment on guided discovery can be seen in figure1 .

Figure 1. KPS assessment on guided discovery learning based on local excellence

Based on figure 1, the excellence category and good category are at the same percentage value of 34.78%, the results indicate a highly student's role were directly involved in learning process. At each stage of guided discovery learning based on local excellence, the students are always active in discovery process. In the process of the problem in Banten province, students built their own knowledge through the structured questions from the teacher e.g what do you know about bacteria?, mention the bacteria's benefit in daily life!, mention the Banten province's potential in plantation!. These questions make the students have high curiosity about material learning by searcing the answer by the existing literature. At the collecting data stage about the problem, the teacher provides an opportunity for student to conduct discussion to obtain data or information related to regional characteristic that can be assosiated with the subconcept of Eubacteria role. At the collecting data stage for experiment, the teacher gives the students an opportunity to solve the problem by doing activities such as the nata de coco experiment. This activity will show the

student's science process skill aspect. At the formulating problem's information stage, the students are given the opportunitiy to observe the result of the nata de coco product that have been made, discuss with their group to fill out the observation worksheet and process the experiments data of laboratorium activities. At the conclusion stage, the teacher gives the students the opportunity to build conclusion derived from observation and discussion goal which to find a common concept. All the stages of guided discovery learning based on local excellence goes well and it brings the measured KPS aspects. The students are trained to find the concept systematically by appllyig the model, the student's science process skill will be developed so they can solve daily life problems by using their science process skill.

The study is supported by Ibrahim's research result at al (2014) which is states that guided discovery learning based on local excellence can lead to achieve and mastery the concepts with the high performance of the minimun completeness criteria (KKM). In addition, at the learning process, the students are working together in a goup. The cooperation is estabilished when they solve the problem of worksheet through discussion and doing laboratorium activities of the manufacturing process of nata de coco. The students' cooperation and active participation makes the learning run smoothly. The cooperation and active participation was observed by using the observation sheet. The observation sheet's result showed 60.80% of student is included in the good category. The observation sheet's result is supporting the KPS assessment result. This is consistent with Meli's research result et al (2013) which is states that the application of the discovery-inquiry learning provides an oportunity for students to participate actively, increase interest and motivation to learn, and help students find the concept based on the experiment makes the easier learning material to understand.

The student's science process skill assessment with excellent and good category are also obtained for the positive respons of students. This can be seen a positive responses with the aquisition value of 19.57% in excellence category and 80.43% in good category. The guided discovery learning bases on local excellence

gives the students the contextual learning resources and also provides the opportunity to participate directly in learning activities. If the students participate directly then the students will be interested in the learning and the teaching materials will be easy to understand and become meaningful. This is supported by research conducted Ibrahim et al (2014) which is states that diacovery learning by utilizing the student's enviroment to be more contextual would make the more meaningfull learning for students.

In the figure 1 also shows 30.44% of the student's science process skill is in the adequate category. This is based on abservation of 14 student from 46 students during learning process do not pay attention to the teacher's direction so the scores in each science process skill aspects are not optimal. The attention is one of things can be affect the learning outcomes. If the student has good attention to every learning process stages then the result would be good. According to Slamento (2010), the student's attention in learning is one of the factors that can affect to the learning outcomes that will be earned by the student.

The student's science process skill aspects were observed on guided discovery learning based on local excellence are observe, classify, interpret, predict, applying the concept, planning research and communicate.
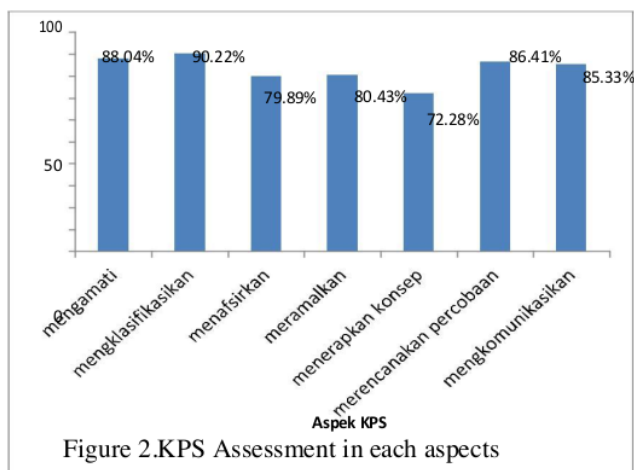

Figure 2.KPS Assessment in each aspects

Based on the figure 2, the average percentage value of the observed student's science process skill on mastery ability is 18.52% which is in good

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category. This suggests that the guided discovery learning developes the student active learning during discovery activities which is to develop the student's science process skill. This was also addressed by Rachyuni (2015) that guided discovery learning model has a positive influence on improvement the student's science process skill. The guided discovery learning model is enable the learners to be involved directly in the learning activities, the organize and confront the problems learning, problem solving ability, and draw the conclusion of studied problems. The highest percentage value of student's science process skill is 90.22% of the classifying aspect while the lowest percentage value of student's scince process skill is 72.28% of the the applying the concept aspect.

The observation skill aspect's percentage is 88.04% with a good category. It can be seen from the student's process skill assessment answer that the students can explain the characteristics of good nata de coco. The students can answer because they are already obeserved the good and the bad characteristics of nata de coco by themselves. The observation skill is also strengthened by the percentage of the observation sheet which value of 87.68% with good category. This is because during the manufacturing process of nata de coco, the students are involved directly in the object observation activities. The students obeserve the change characteristics of nata de coco during the manufacturing process by using the senses which are sense of touch, vision amd smell. The student can observe the good and the bad characteristics of nata de coco by comparing the students' nata de coco with the teacher's nata de coco. The observed characteristics are the white color, spongy texture and fresh scent. The teacher's nata has a milky white color, very chewy and thick texture, the sour aroma but does not stink. The students' nata in each groups has the differences, there are white as milk, yellowish white, and translucent white. The texture was different, there was very chewy, not too chewy and aqueous. There are thick nata and thin nata. There are the differences of aroma (figure 3). The different result of nata de coco such as the color, texture, smell, thickness and the presence of contaminants caused by the accuracy of measuring ingredient and the cleanness of tools and ingredients.
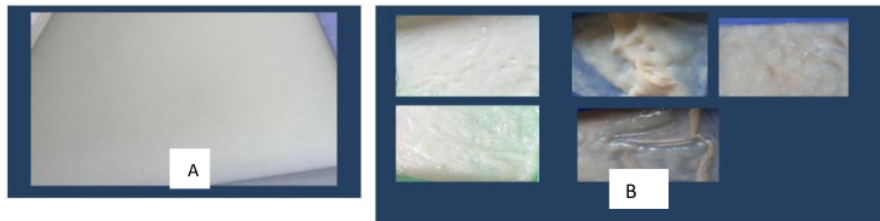
Figure 3. The teacher's nata de coco result (A) and the students' nata de coco result (B)

The teacher and students are directly observing the nata de coco's color by using sensory vision. Furthermore, the studnets are rubbing and pressing the nata de coco to characterized the texture. The more features or characteristics to consider by using various sense makes the students are able to have their own information relevant to the observed object (Usman, 2003).

The classification skill has the highest percentage in amount of 90.22% with an excellence category. It can be seen from the student's answer, that they are able to distinguish the tools and ingredients are used in the manufacturing process of nata de coco although there are tools and ingredients are not used in the manufacture process of nata de coco. The classify skill's percentage is reinforced by the observation sheet which is equal to 89.87% with good category. It shows that the students are very capable in classifying the tray, spoon, pot, plastic buckets, stirring spoon, paper, string ties, stove and filter. While the coconut water, sugar, vinegar, urea/ ZA and bacteria seeds are categorized as the ingredient. At the application process, the students can find the differences and the similarities of tools and ingredients because they are already done the worksheet by the teacher. At the classifiying process, the students are asked to find the function of each ingredient and tool. For example, the function of sugar as a carbon source and ZA as nitrogen source both of them are nutrients for the bacterial growth. So almost of the student in that class can distinguish an object. The classification skill is a skill to sort out various object based on specific characteristics, so we can get the class or similiar groups of questioned object (Dimyati and Mudjiono, 2009).

The interpretation skill's percentage value is 79.89% with a good category. It is based on students' answer which is the less ability to conclude the data provided in tabular form on student's science process skill assessment. Meanwhile in the observation sheet, this aspect's percentage value is 82.61% with good category. At the application process, the students can record some informations of the created nata de coco from the shape, color, texture, thickness and aroma. The obtained datas from the observation sheet are transfered into the table form on the students' worksheet. The interpretation skill of the collected object, reality, event, concept or informatiotion through observation, calculation, research or experiment (Usman, 2003).

The prediction skill's percentage value is 80.43% with a good category. At the answering questions process, the students can find out that the vinegar can be added at the manufacturing process of nata de coco because it can change the pH into 4-4.5. It is the optimum pH of the bacteria growth, if the pH is not appropriate the bacteria growth will be inhibited and the success of the manufacturing process will be influenced. The prediction skill's percentage in the observation sheet is 84.06% with good category. At the manufacturing process of nata de coco, the students have to be able in prediction the event based on the obtained data, for example describes the possibility of poor result. The students know the contamination of fungi and other bacteria by the less cleanliness of the manufacturing process is the factors can be caused the poor quality of nata de coco. The other reasons are the unsystematic process and the inaccurate tools and ingredients. At the observation process of nata de coco product, the students find the contamination of fungi. That cases is accordance with Hamalik's opinion (2009) which is states that the students have to be able to connect the data, fact and information. The students are demanded to have the prediction and anticipation skill of the future activities or events.

The concept application skill has the lowest percentage of the average value of 72.28% with an adequate category. It is because of the answering process about the newspaper actual function. The newspaper actual functions are to cover the tray

and allow the aeration in the covered tray by the newspaper's pores so the bacteria still can get the oxygen and the growth of bacteria can not be inhibited. Generally, the students answers that the bacteria need the air so its covered by the newspaper. However, the percentage value of this aspect in the obeservation sheet is 84.78% with good category. This is because the students are able to perfom all of the parcticum stages systematically which is assessed by the observer. The systematic stages are the students' ability in the manufacturing process of nata de coco systematically with the accurate ingredients. Meanwhile there are 15.22% of students have not been able to do the practicum stage systematically, it can be seen at the practicum process that they can not measure the ingredients accurately which is influence to the result of nata de coco. The students' unsystematic process is because of the less mastery concept. Through the concept application skill, the students are able to explain new events by using their owned concept (Rustaman, 2015).

The research design skill's percentage value is 86.41 % with an excellent category. It can be seen from the students answer on the science process assigmnent. The students are able to fill in the blank chart of the manufacturing process of nata de coco. This data is supported by the data in the observation sheet, that has the percentage value of 85.51%. It can be seen during the practicum, the students are able to prepare the equipments and ingredients for the manufacturing process of nata de coco very well because that is not difficult aspect to be done by each student. The research design skill is the first step to the successfull research. In order to succesfull reasearch and produce the useful and meaningful things, so the research design is needed (Dimyati and Mudjiono, 2002).

The communication skill's percentage value is 85.33% with a good category. It can be seen from the students'a answer at the answering process of questions. Generally, the students are able to create the bar chart based on the narative data form. In addition, the observation sheet is in a good category with the percentage value of 81.88%. After the students complete the stages of manufacturing process they are asked to deliver the information verbaly with discussion in front of the class. The 16.04% of students are less capable in

delivering practicum result and able to communicate the problem solution of student's worksheet. It is because at the discussion process the students are less active. It is assosiated with Usman's opinion (2003) which is states that the communication skill is an ability to convey the aquisition or learning outcomes to other either orally or in writing.

5. Conclusion and Remark

The conclusion of this study is the student's science process skill through guided discovery learning model based on local excellence in overall is well categorized by percentage of the average value of 82.52%. The percentage of the students' questionnaire response toward the guided discovery learning based local excellence is 80.43% with a good category and 19.57% with very good category. The suggestion for the next research is the implementation of guided discovery learning midel based on local excellence on other biology subcobcept in order to develop the exist local excellence in their region.

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