

Biology Learning Based on Brain-Based Learning Using Cocoon Finger Puppet

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Abstract

Biology learning by playing, especially using cocoon finger puppet role-playing, is fundamental for students. The article is aimed to know how brain-based learning role-playing by using finger puppet cocoon can increase the student's enthusiasm and learning outcomes in biology. The research occupied two-cycle lesson study. The data were collected by using observation sheet and video recording of the learning activities in the classroom. The result showed that brain-based learning role-playing by using cocoon finger puppet enhanced the students' enthusiasm, excitement and learning outcomes.

Key words: *brain-based learning, cocoon, finger puppet, role-playing.*

1. INTRODUCTION

Biology learning is often regarded as difficult, complex, and boring learning and requires a lot of memorization (Afandi et al., 2012). Many attempts have been made by the educators that learning objectives can be achieved effectively and efficiently and with a pleasant walk. One attempt to do is to use strategies that can optimize the brain's ability to use the right and left, *brain-based learning* (BBL) approach. Nielsen et al. (2013) state that the lateralization of the brain (the functional specialization of the brain) to the left (*left hemisphere*) will affect and language skills, while the right brain hemisphere (*right hemisphere*) will affect visual perception and spatial. BBL is the concept of empowering students' brains. The brain is assumed as a parallel processor that can perform several activities at once. Caine & Caine (1990) suggested 12 BBL fundamental principles, which basically relates to the left and right brain to be trained to work in an optimal way using a variety of activities and pleasant surroundings.

Learning by playing is important in education which can help students develop the skills needed in their life. Learning by using puppet media can stimulate the imagination of students, encouraging to be creative and creating a pleasant interaction

(Greensmith, 2015), as well as stimulating conversation and developing the ability to communicate complex ideas in brief (Vince, 2001). The Reidmiller (2008) investigated the use of puppets in improving the vocabulary of the middle school students with disabilities. In Indonesia, the general puppet media are used in children's learning as Khoir and Hariani (2014) stated about using the puppet media in thematic learning to improve the students' speaking skills in the second grade of elementary school, and Chendrakasih (2015) investigated the influence of *horta* (horticulture) puppet media to the science learning outcomes of the children. In addition, the use of puppets as a medium to educate the public was ever undertaken by Rachmayanti (2013). However, the whole game was occupying an artificial doll made by the teachers. No one has studied the use of a doll made by and for the students in learning. Various kinds of dolls in the lesson, include hand puppets, puppets on a string, shadow puppets, and finger puppets.

Small toy finger puppet is made from flannel. Puppets represent various characters of people, either living or dead from a famous person for a particular contribution in their respective fields (for example Charles Darwin, Louis Armstrong, Pablo Picasso) (Kempster et al., 2014). Small finger puppets are used in the puppet

theater known in Brazil as *mamolengo*. This term comes from the Portuguese *mao molena* which means 'lazy hand'. Puppeteer often creates his own character, paints, and gives each doll clothes, as well as creates a dialogue. The finger puppets are often told a story of the struggle between good and evil (Light, 2010). Finger puppets can also be made from silkworm cocoons, because of the clean white cocoon color and its rounded shape, it can be modified as a finger puppet head.

Silkworm cocoon can be obtained easily in the center of the cultivation of silkworms. The silkworm cocoon cultivation produces much less valuable cocoon waste. Prihatin (2015) stated that the cultivation of silkworm will generate 8.49 to 11.34% cocoon defect. The defect which can not be spun as fibers would break up several times during spinning. The cocoon production in the cultivation of silkworms in Indonesia in 2009 were approximately 19 tons (Rochmawati, 2011). Therefore, much cocoon defect could be utilized. The defect is commonly utilized in the manufacture of *afval*, the silk thread made from the remains of the cocoon that can not be spun. In addition to be a thread, cocoon defect can be used in the manufacture of various souvenir handicrafts, such as brooches, florals, wall-hangings, and cocoon puppet.

Cocoon puppet has a huge potential to be developed into a medium of learning, because it can be formed into a wide variety of characters based on the subject being taught. Each student in the class can participate in learning to make and play cocoon dolls. Learning methods that are considered appropriate for the use of a cocoon finger puppet media is role-playing method. Role-playing was originated from psychodrama that can be used to help students understand the subtle aspects of literature, social sciences, and even some aspects of science or mathematics. Furthermore, role-playing can help them

become more interested and involve in not only learning the material but also learning to integrate knowledge into action, to tackle down the problem, to explore alternatives, and to find new and creative solutions (Draciun, 2010). In another study, role-playing can encourage a deeper understanding of the materials developing communication and collaborative skills (Jackson and Walters, 2000 in Howes and Cruz, 2009). From the above discussion, it appears that the role-playing is a fun method and can activate the students.

The purpose of this study is to determine the role of role-playing by using the brain-based learning cocoon finger puppets to enhance the vocational student's enthusiasm and learning outcomes. In addition, through a lesson study, it is expected to find the strengths and weaknesses of the use of the new strategy in Vocational Education.

2. METHOD

This research used lesson study for three cycles. Each cycle consists of plan-do-see. The *plan* stage is to manage the lesson plan. The *do* stage is the implementation of learning form that has been planned, and the stage of *see* is the reflection to the form of learning that has been done. The participants in the study were students of class X Cultivation of Tissue Culture 1 of Vocational Senior High School 5 Jember, involving 25 students consisting of 14 male students and 11 female students. The team of lesson study consisted of one teacher model (students) and 4 observers consisting of one lecturer, one teacher, and two students. The data obtained were derived from the scores of daily tests earlier and the scores of the daily tests for the topic about Mushrooms. The data were taken from the observation written in the field notes, data documentation, and written tests. The data were analyzed qualitatively to describe the learning conditions, and quantitatively to

calculate the condition of the increase in student learning outcomes.

The steps of learning by using the BBL syntax on the activities of the introduction are:

(1) *Pre-Exposure*: The teacher and the students do the ice-breaking by doing brain gym to make the learners concentrate fully to accept the subject matter and do apperception, where the teacher asks back about fermentation which is done by fungi; (2) *Preparation*: The teacher raises motivation and curiosity of students by asking "Why should mushrooms be put into a separate kingdom?". Furthermore, the teacher explains the learning objectives.

The steps in the main activity are set as follows: (3) *Initiation and Acquisition*: The students get information by looking at the characteristics of mushroom learning videos, mushroom body structure, how to obtain food, and the classification of fungi. The teacher presents the material with the help of LCD projector inserted by some questions and answers; (4) *Elaboration*: The students are asked to observe the oyster, *tempeh* mushroom through the image or video presented by the teacher; (5) *Incubation and Memory Insertion*: The teacher plays the music of relaxation. The students discuss in groups about the videos and materials that have been observed. The next group of presenters featuring role-playing describes each type of fungi by using the cocoon dolls and the other properties. Then, the students made a learning journal about their learning activities; (6) *Verification and Confidence Checking Stage*: The students presented the materials that had been learned to the other students by explaining about the characteristics of fungi.

These are the activities in the closure stage: (7) *Celebration and Integration Stage*: The teacher made a short quiz using a hyperlink method with some funny sound effects. The teacher also gave rewards for the students who answered

correctly. Then, the teacher and the students concluded the learning results together to answer the learning objectives. The students were given some tasks to learn the types of fungi, the characteristics of fungi, and the benefits of fungi. The lesson was closed by singing the song "If you Like Fungi".

3. RESULT AND DISCUSSION RESULT

In cycle one, by using this various media to learn about fungi, the less active students in the conventional method could give their active participation in BBL learning. Moreover, the ice breaking method in the first stage of learning by dancing together, the short evaluation test in the form of hyperlink quiz by using funny sound effects, and the reward giving at the end of the lesson could make the students be more active and happier during the learning process. The most surprising thing for the teacher and the researcher was a passive student who usually sleeps, chats, plays his hand phone a lot and sits at the corner of the classroom was really enthusiastic to observe the object, to discuss the material and to raise his hand when he had to present the group work material.

In the second cycle of the lesson, the result of the Brain-Based Learning had not much difference compared to the first cycle. At the beginning of the lesson, the teacher asked the students to do the brain gym. The brain gym did by the students and the teacher were very exciting. This brain gym consisted of some moves which demanded the students to balance the use of the left and the right brains which were good to use at the beginning of the lesson. The students were so enthusiastic when they did the brain gym, although some of the students could not do it well. In the main activity, the teacher used power point media with some videos of fungi and some quizzes. In the middle of the lesson, the teacher played

a soft classic music to make the students focused to learn the material. In this second cycle, when the teacher taught the students by using the music, the students were more focused compared to the first meeting. In the question and answer method, the students were also more active. The rewards were given for those who answered the quiz or the questions from the teacher. At the end of the lesson, the students were as happy as they were in the first cycle. The BBL lesson made the teaching and learning process in the classroom to be more fun.

The third cycle consisted of the main activities of the research. *Brain-Based Learning* was implemented because in the third cycle the students were so enthusiastic to show a story about fungi material where it had been explained by the teacher before. The students had to make a story and to present the story in front the class. The students were divided into four groups according to the fungi's four divisions. The divisions were as follows *Zygomycota*, *Ascomycota*, *Basidiomycota*, dan *Deuteromycota*. The students were given some media, included a doll made of *Bombyx mori* silkworm's cocoon and the other media which were related to the fungi divisions. Furthermore, the students were given some minutes to discuss a story to the group about the division of fungi that was got by each student. Then, the students presented the story by doing the role play, where every member of the group should go to the front of the class. Every group consisted of eight students. Every student had their own role. The first role was the general fungi division story teller, examples of species, and the last was the advantages and the disadvantages of the fungi division.

The students were very excited and enthusiastic to show their result of discussion in front of the class.

The students presented the learning materials about fungi by using cocoon media in front of the class. They also used a back sound that made the story more interesting. In cycle three, it was proven that the use of cocoon finger puppets could make the students understood and comprehended the lesson given. At the end of the lesson, the teacher gave some rewards for the best three group presenter of fungi story telling finger puppet made of silkworm's cocoon.

The learning result got by the students after the teacher did the final test of fungi material by using BBL and finger puppets media made of cocoon had a significant improvement compared to before (Table 1).

Table 1. The daily test score on fungi topic

The Mean Score of Pre-Cycle	The Mean Score of Cycle 1	The Mean Score of Cycle 2	The Percentage of the Improvement From the Pre-Cycle to Cycle 1	The Percentage of the Improvement From the Pre-Cycle to Cycle 2
51.48 ± 13.80	87.56 ± 6,81	86.80 ± 7.43	80.89 (%)	79.84 (%)

The research showed that there was an improvement on the cognitive learning result as much as 80.89% from the Pre-Cycle to Cycle 1, and the improvement as much as 79.84% from the Pre-Cycle to Cycle 2.

In Fig. 1 below, the percentage of the students who achieved the standard minimum score of the learning was presented. The minimum score was ≥ 75 .

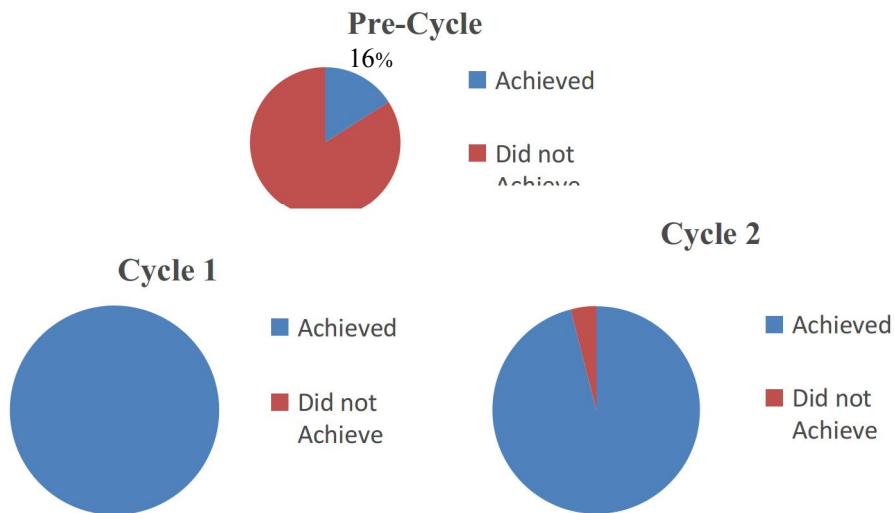


Figure 1. Students who achieved the Minimum Score

In Fig. 1, it was shown that there were high improvements of the achievement percentage from the pre-cycle as much as 16% to 100% in cycle 1 and 96% in cycle 2.

Discussion

The Brain-Based Learning (BBL) model to learn fungi topic is a learning model which can help the students to be more active and more excited. The exciting activities could be seen from the opening through the closing of the lesson. Although BBL learning method seems difficult to apply, but when it was applied, the activity in this learning method was actually “did not need to use their brain”. The activities and the material chosen were easy, clear, and short. The short material would be easy to remember. Moreover, it was done with some fun activities. For example, the model teacher chose *mnemonic*, which let

the students memorize the material by using a song that was already known by the students. The song was “If you Like Fungi” and the lyrics are:

“If you like fungi clap your hands”

“If you like fungi clap your hands”

“Let’s memorize it, the four divisions. If you like fungi clap your hands”

“There are Basidio and Deutero, There are Basidio and Deutero”

“There are Asco and Zygo, There are Asco and Zygo,”

“Those are the four fungi divisions”

According to Jensen (2000), the teacher should not give the material which is more than the ability to save the memory in the *hippocampus* (a part of brain). This part of the brain can save the memory fast but can only save a little memory before they were delivered to the cortex of the big

brain to save them again on the long-term memory. Jensen compared it to a teacher who poured a big glass of milk into a small glass. Of course, the milk would be spoiled.

The physical activities of the students will improve the blood circulation and increase the supply of the oxygen to the brain. In addition, physical activities will also increase the 'good chemical', such as noradrenalin and dopamine. Noradrenalin is a hormone produced by the adrenal gland in the part of the medulla, which is only produced in a state of tense (excitement).

Dopamine, it is known as a *neurotransmitter* that causes a sense of comfort (Jensen, 2003; Junquiera, 2009). Role playing activities using cocoon puppets creates a state of joy and excitement. Adrenalin can be driven by the opportunity to speak in public, the competition in the completion of a quiz, and the deadline for completing a task. Role playing enables students to move, to learn, to imagine, and to laugh. A safe and not stressful learning environment is important in optimizing students' emotions. Townsend (2007) states that students' emotional state affects the level of student learning outcomes. The relaxed and undaunted condition of the students will facilitate the reception of new information.

This study used lesson study as the preferred method to improve student performance. The learning which was designed together will improve the quality of the planning, and afterwards it was also criticized together. It is proven that there is a sharp increase in the daily test scores of pre-cycle and cycle 1 and cycle 2. Vocational high school students who were initially reluctant to study in the classroom, after BBL learning was applied, they became very enthusiastic and eager to learn biology.

The test results in cycle 2 were carried out after the implementation of the BBL. The first test was carried out with the total of questions about 15, consisting of 10

multiple choices and 5 essays. After the test was carried out, it is found that no one should take a remedial test. To consolidate the results, teachers administered the second test with the same material but different questions, namely code A-B. The result showed that students' scores remained the same even higher than the average score. In conclusion, using the BBL can improve the performance and the participation of the students in the classroom.

4. CONCLUSION

Based on the results, it can be concluded that the use of BBL learning using role playing of finger puppets from the cocoon can improve student learning outcomes, the percentage of student learning mastery, and students' activities.

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