ICEE-2

Implementation of Bioentrepreneurship Learning Using Comics to Improve Creative Thinking Skill on the Sub Concepts of Angiosperms for High School Students

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Abstract. Bioenterpreneurship learning by using comics is one of the contextual learning and can train creative thinking skill students. Therefore this study aims to determine the creative thinking skill students of bioentrepreneurship learning using comics. This research is a quantitative study with a quasi-experimental method of non-equivalent pretest-posttest control group design. The instruments used for data collection include observation sheets, pre-test post-test, and student response questionnaires. The results showed that the creative thinking skill abilities of the experimental class students improved better than the control class and the responses of students in the experimental class were included in the strong criteria. Based on the results of the study it can be concluded that learning bioenterprenership using comics increase creative thinking skill abilities students.

Keywords: contextual learning, bioenterpreneurship learning, creative thinking skill

INTRODUCTION ~ Baharuddin (2012) state that learning process is a series of activities that occur in the nerve center of individual learning. Learning process takes place abstractly, because it occurs mentally and can't be observed if there is a change in behavior from someone different from before. Changes behavior in learning is terms of knowledge, affective, and psychomotor. Learning biology same thing happen too, which is known to have material is abstract so that students have difficulty projecting learning into their concrete thoughts.

Biology learning will be better if it is delivered not only by teaching learning material. Sudjana (2009) state that learning activities are defined when the learning process involves students and makes students active. But the habits in current learning, namely learning in the classroom tend to be oriented to teacher-centered learning (teacher centered), where students get less opportunity to explore their abilities and skills by the intelligence they have.

Modified biology learning should be done. Learning will also encourage students to be more active and enthusiastic in learning (student centered). Student learning outcomes will indirectly affect. Direct or contextual learning can require students to play an active role in the learning process.

Improved student learning outcomes that are passed through the contextual process can be done in biology learning with entrepreneurship approach. Zaenuddin (2016) provides the view that improving student learning outcomes should be carried out in view of developments and progress in all fields. Developments and progress in all fields greatly affect competition in terms of work that is compatible with formal education. Improved learning can be done by creative educators who package learning.

Bioentrepreneurship learning not only correlates with real life but can also encourage students to solve problems but can also improve creative thinking skills.

Learning with the implementation of bioenterpreneurship, students are also required to have the ability to think creatively. Creative thinking here is terms of generating creative ideas that can be poured into products and can improve student learning outcomes. Creative thinking is carried out in this study so that it can be seen the differences in improvement before and after the implementation of bioenterpreneurship learning.

Several studies on bioentrepreneurship learning have resulted from positive responses. Kristanti et al. (2012) stated that bioentrepreneurship learning is effectively applied to learning activities and can increase student learning interest. Fitriah (2016) Bioentrepreneurship learning can improve life skills and entrepreneurial interests. Fitriah (2012) Bioentrepreneurship learning can improve science process skills, entrepreneurial interests and student learning outcomes.

Dewi et al. (2010) stated that the characteristics of devices developed using contextual approaches and observation methods to explore, assign, and make products with waste-based materials have trained the students‟ ability to expose and inform products. Adlim et al. (2014) in their research related to contextual teaching and learning (CTL), can produce students who enthusiastically explain their business, especially after knowing their development in the capitalist era. These learning activities are bioentrepreneurship or entrepreneurial learning activities.

Bioentrepreneurship learning will be effective because it will involve students in a group discussion for example when carrying out a product of manufacturing tasks. Discussion of students in small groups can activate all group members in learning activities, especially when using teaching materials such as bioentrepreneurship comics that are interesting, so the enthusiasm of students to learn is increasing, and this will increase student creativity and becomes difficult to shape. Considering the importance of shaping student creativity and increasing student motivation, it is necessary to have the appropriate learning style.

Interesting teaching materials can encourage students to be more interested in learning. For example, teaching materials that have entrepreneurial characteristics with a more attractive appearance, for example, are associated with comics. Comic teaching materials can improve the learning outcomes of biology (Nurlatipah et al., 2015; Danaswari & Roviati, 2013). Deveci and Cepni (2017) states that entrepreneurial characteristics must be owned by students in the 21st century. Therefore, bioenterepreneurship learning by using comics can create contextual learning.

The source of learning in the form of comics is one of the things that can encourage students to respond to more active in learning. The addition of learning resources in the form of comics which are arranged uniquely and also related to the concept of entrepreneurship is the renewal and originality of this research. As a vehicle for implementing bioenterepreneurship learning by using comics associated with entrepreneurship, it is applied to the field of Biology studies in the sub-concept of the Angiosperms.

Based on the description above and considering the importance of efforts to improve creative thingking skill and active learning outcomes, the purpose of this study is to examine assess students creative thingking skill abilities and find out the responses of students who apply to learn with bioentrepreneurship using comics in the Sub Concepts of Angiosperms.

METHOD

This research is a study using quantitative approaches and quasi-experimental methods non-equivalent pre-test post-test control group design. In each class, the experimental and control classes were pre-tested to test the initial knowledge, and post-tests to test the final knowledge. The population in this study were all students of class XI MIPA SMAN 1 Susukan.

The sample consisted of 30 students of class XI MIPA 2 as an experimental class and 30 students in class XI MIPA 1 as a control class. Sampling applied is purposive sampling technique. The sample class is divided into control classes with conventional learning, and experimental classes that apply bio-entrepreneurship learning using comics. The research was conducted from April to May 2017.

Data collection techniques applied tests, and non-tests. The test technique used the comprehension test of the Angiosperm Biology concept, which consists of 40 questions. This dimension was developed into indicators of student understanding, student insight, and improvement of students' cognitive (creative thinking skill) abilities.

There are four aspects of creative thinking used in this study, namely fluency (fluent thinking), flexibility (flexible thinking), originality (original thinking), and elaboration (detailing). There are also indicators of some of these aspects and how student behavior in terms of creative thinking can be measured both in the activities and tests given.

The Biology concept used in this study is the sub concept of angiosperms because this concept is closely related to an entrepreneurial potential around SMAN 1 Susukan.

RESULTS

Creative Thinking Skill Abilities

The average data of the N-gain value of the creative thinking skills of the experimental class and control class

students can be seen in the following figure 1.

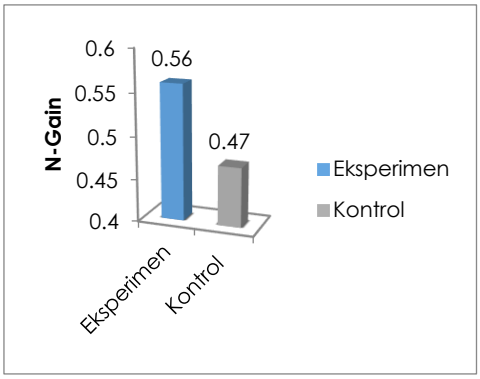

Figure 1. Graph of the average N-Gain value of creative thinking skills (CTS) of experimental and control class students

Figure 1 shows the average value of the N-Gain creative thinking skills of the experimental class and control class students. Both the average N-Gain value of the experimental class and the control class are included in the medium category. The average N-Gain value of the experimental class class is greater than the average value of the N-Gain control class. The average N-gain value of the experimental class was 0.56 and the average N-gain value of the control class was 0.47.

The creative thinking abilities of students is obtained from the results of the pre-test and post-test questions about Biology sub concepts of angiosperms. The difference in the increase in creative thinking abilities value between the experimental class and the control class was tested statistically, with a pre-trial test which included the normality test and the homogeneity test. This prerequisite test consists of a normality test and a homogeneity test. Prerequisite tests are carried out as the initial stage in the statistical test before entering the hypothesis test. The prerequisite test results of cognitive abilities of the experimental class and control class students are explained in Tables 1 and 2.

Table 1. Normality Test for N-Gain Class Experiments and Control Classes

Data	Class	Normality test (*Kolmogorov Smirnov*)	
		Sig	Notes
N-gain	Experiment	0,200	Normal
	Control	0,200	Normal

Table 1 presents the results of the N-Gain data normality test. Based on the results of the normality test of N-Gain data of the experimental class shows that data are normally distributed because the signification value is greater than 0.05 both in the control class and the experimental class. The normality test of the N-Gain data of control class and experiment results in the sig value. 0,200 so that the control class N-Gain data is normally distributed. It can be concluded, based on these data that,

the experimental class N-Gain data and controls are normally distributed. Furthermore, the data were tested for homogeneity, the results of the homogeneity test are presented in Table 2.

Tabel 2. Homogeneity Test of *N-Gain* of Experiment and Control Classes

Data	Class	Homogenity test	
		Sig	Notes
N-gain	Experiment Control	0,902	Normal

The homogeneity test results for N-Gain data show homogeneous data because of the sig value. 0.902> 0.05. Based on the results of the prerequisite test, it is known that the N-Gain data is normally distributed and homogeneous. The N-Gain data prerequisite test results that indicate that the data are normally distributed and homogeneous. The results of different tests are presented in Table 3.

Table 3. The Result of T-Test to differ Experiment and Control Classes

Data	**Different Test**	**Sig. (2-tailed)**	**Notes**
N-Gain	*Independent sample T-Test*	0,016	Significantly Different

Table 3 shows the results of the t-test where the N-Gain experimental class and control class differ significantly. This study uses one-way research, so the results are more decisive, not only is there a difference between the two classes. The experimental class has better creative thinking abilities than the control class so that the significance value and the value of a change to half of 0.05, the value a = 0.025. The significance value is 0.08 and still means that Ho is rejected and Ha is accepted. Based on these data it can be concluded that there are differences in the increase in creative thingking values of students between the experimental class and the control class.

The average acquisition of N-Gain students' creative thinking skills for each indicator can be seen in the following figure 2.

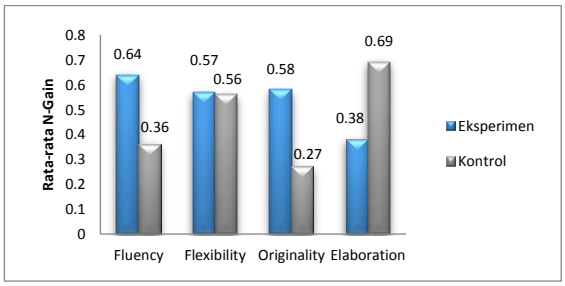

Figure 2. Graph of the average N-Gain of each indicator of creative thinking skills (CTS) of the experimental class and control class students

Figure 2 shows a graph of the average N-Gain of each indicator of the creative thinking skills of the experimental and control class students. Based on these images, it can be seen that the average N-Gain of the experimental class is greater than the average N-Gain of the control class. The indicator of fluency / thinking

smoothly (CTS 1) in the experimental class has the highest value, which is 0.64 with the medium category. The lowest N-Gain value is shown in the CTS 4 indicator (elaboration / detailed thinking) with a value of 0.38 and is included in the medium category.

The N-Gain control class average shows that the CTS 4 indicator (elaboration / detailed thinking) has the highest value, which is 0.69 and belongs to the medium category. The smallest N-Gain value is shown in the KBK 3 indicator originality / original thinking with a value of 0.27 and is included in the low category.

The prerequisite test recapitulation which consists of a normality test and a homogeneity test on the N-Gain data is explained in tables 4 and 5.

Table 4. N-Gain prerequisite test results (normality test) for each CTS indicator (Creative Thinking Skills)

Indicator	Class	Normality test (*Kolmogorov-smirnov*)	
		Sig.	**Notes**
CTS 1	Experiment	0,200	Normal
	Control	0,015	-
CTS 2	Experiment	0,200	Normal
	Control	0,110	Normal
CTS 3	Experiment	0,000	-
	Control	0,010	-
CTS 4	Experiment	0,006	-
	Control	0,012	-

Table 4 shows the results of the N-Gain data prerequisite test for each indicator of creative thinking skills (CTS). The table is known that the N-Gain data from normality test results has a significance value greater than 0.05 on the creative thinking skills indicator (CTS) 2 so that the N-Gain CTS 2 data is normally distributed while for indicators 1, 3 and 4 the normality test shows value less than 0.05 so that it can be said that the N-Gain data has an abnormal distribution. The N-gain homogeneity test for each CTS indicator is obtained as follows:

Table 5. N-Gain prerequisite test results (Homogeneity Test) for each CTS indicator (Creative thinking skills)

Indicator	Class	Homogenity Test	
		Sig.	**Notes**
CTS 1	Experiment Control	0.115	Homogen
CTS 2	Experiment Control	0,052	Homogen
CTS 3	Experiment Control	0,554	Homogen
CTS 4	Eksperimen Control	0,012	-

Homogeneity N-Gain test results show homogeneous data distribution on the indicators of creative thinking skills (CTS) 1, 2, and 3 because the significance value generated is greater than 0.05. Indicator of creative thinking skills (CTS) 4 The resulting

significance value shows less than 0.05 so that the data included in the distribution is not homogeneous.

The pre requisite test results described in tables 4 and 5 then the hypothesis test is performed on the N-Gain data for each CTS indicator. CTS 2 indicator shows the data that is normally distributed and homogeneous so that the hypothesis test conducted is the Independent Sample T Test parametric test or called T test.

CTS Indicators 1, 3, and 4 show data that is not normally distributed and data that is homogeneously distributed on the indicator CTS 1 and 3 but not homogeneous on the CTS indicator 4. So indicators 1, 3, and 4 hypothesis testing is performed with the non-parametric Mann-Whitney U test or U test. The results of the N-Gain data hypothesis test for each indicator are explained in table 6 following.

Table 6. Hypothesis test results for N-Gain data for each CTS indicator

Data	Hypotesis test	Sig. (2-tailed)	Asymp. Sig. (2-tailed)	Notes
CTS 1	*Mann-Whitney U*	-	0,001	Significant Different
CTS 2	*Independent sampel T Test*	0,790	-	-
CTS 3	*Mann-Whitney U*	-	0,000	Significant Different
CTS 4	*Mann-Whitney U*	-	0,003	Significant Different

Table 6 shows the results of the N-Gain hypothesis data test for each CTS indicator. Based on table 6, it is known that the significance value of CTS 1 is 0.001. The significance value of CTS 2 is 0.790, the significance value of CTS 3 is 0,000 and the significance value of CTS 4 is 0.003. The data shows that the significance value of the CTS 2 indicator is greater than 0.05, which means that Ho is accepted and Ha is rejected. It can be concluded that there is no significant difference between the experimental class and the control class for the CTS 2. Indicators CTS 1, CTS 3, and CTS 4 indicators have a significance value less than 0.05 which means that Ho is rejected and Ha is accepted. It can be concluded that there is a significant difference in the increase in creative thinking skills between the experimental class and the control class for the indicators of CTS 1, CTS 3 and CTS 4.

DISCUSSION

The results showed the achievement of creative thinking abilities of students in the experimental class was better than the control class. The thinking process of students is formed when students are faced with a problem that is related to the real world or is contextual, besides that learning that is applied includes learning based on the environment and encouraging students

to find their knowledge. By the research of Sukarsih (2016) which is learning to know, find, and live together, it is suitable for environment-based practical learning. Regarding the learning of bioenterepreneurship using comics in the sub concept of Angiospermae, Bula (2012) states that the learning process starts from learning to know, tries to make products (learning to do), and makes products to be successful (learning to be) is effective learning.

The results of this hypothesis test can be concluded that significant differences in the increase in creative thinking skills found in the CTS-1, CTS-3, and CTS-4 indicators are acceptable, while for the CTS-2 indicator is rejected or there is no significant difference in the increase. Students' lack of flexibility indicates that they are less able to view the same information from different points of view and less able to change their approach or thinking. Mursidik et al (2015) state that the flexibility aspect in reative thinking leads to students' ability to solve problems in a variety of different ways of solving. The use of this different method begins with looking at the problem given from a different perspective. Filsaime (2008) argues that this character of flexibility reflects an individual's ability to change his mental devices when circumstances require it, or the tendency to view an issue instantly from various perspectives. Flexibility is the ability to overcome mental obstacles, change the approach to a problem. Don't get caught up in assuming rules or conditions that can't be applied to a problem.

The ability of students to think creatively includes the ability to think expand. In line with the opinion of Damajanti (2006) in Sudarma (2013) that there are three characteristics of people who are able to think expands. First, fluency in generating ideas, and many ideas. People who think expand, have fluency in finding one idea and the other ideas. Second, it has flexibility (flexibility) to use more than one approach. He can move without obstacles, from one approach to another. He can speak from the right angle, then in the next time he can speak from the left corner, or even from the front corner or back corner. Third, it has originality or authenticity. Measuring the authenticity of his thoughts, can be in the form of ideas, ways or products.

Creative thinking skills can be honed through science learning. Science is a family of science that has special characteristics, namely studying natural phenomena that are factual, either in the form of reality or events and causal relationships. Higher reasoning is needed to learn these things (Sulistyowati, 2014). Science education plays an enormous role in training and honing reasoning power to look for causal links, infer, elaborate, and explore values.

Creative Thinking Skills according to Gumiandari (2012) states that in contrast to critical thinking skills, creative thinking uses the right brain hemisphere. Many experts

believe that the ability to use the right and left brain in a balanced way is the key to one's success. Creative thinking skills, namely individual skills in using the process of thinking to produce a new idea, constructive, and good, based on rational concepts, perceptions and individual intuition (Zuchdi, 2008).

The explanation above can be said that the ability to think creatively is a person's ability to give birth to something new, both in the form of ideas and real work that are relatively different from those that have existed before. Something new here does not have to be a completely new result or creation even though the end result might appear as something new, but it can be the result of developing or combining two or more existing concepts.

Bioentrepreneurship learning using comics helps students to be independent and able to train students to get a way out of life's problems. This is by the character of entrepreneurship, namely the way to manage one's own business which can develop one's luck without the arrangement of other parties. Entrepreneurship is a factor and key to economic development in urban areas (Susiana, 2011). It is proven by the results of Alagboso's et al. (2015) study of the biotechnology process of entrepreneurship in Southeast Africa and Brazil due to the existence of environmental factors themselves. About the community, community empowerment strategies through ergo-entrepreneurship training are sufficient if they can do it (Suarsa & Sutajaya, 2015). Based on the description of the results of research on the creative thinking abilities value of students can improved by implementation bioentrepreneurship learning using comics.

CONCLUSION

There is a significant difference of increase in creative thinking skill abilities between classes that use the implementation of bioentrepreneurship using comic and classes that do not use the implementation of bioentrepreneurship learning using comic. This is based on the Independent sample T Test with a value of a = 0.016, thus Ho is rejected and Ha is accepted.

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