JBER 2 (1) (2021) 1 - 7

Journal of Biology Education Research (JBER)

https://journal.unpak.ac.id/index.php/jber

Fostering Creative Thinking Skills through Project-Based Learning Learning Models in Nutritional Balance Practices of High School Students

Ismi Senjayani[1]

[1]SMAN 1 Cisarua, Bogor, Indonesia

Email: biologiismi@gmail.com*

Received: April 12, 2021 Revised: May 18, 2021 Accepted: May 24, 2021

Abstract

This study aims to identify the improvement of students' creative thinking skills through the Project Based Learning model. The method used was a quasi-experimental pretest-posttest one group design. In this case the test before treatment and after treatment was used and did not use the comparison class. The research subjects were 36 students of class XI IPS 2 in the 2019/2020 academic year, with research material on balanced nutrition practices. The research data obtained came from the analysis of the observation sheet during the learning process and the description questions in the pretest-posttest. The data collected were analyzed using the percentage technique and processed descriptively. From the analysis process, it was shown that there were differences in students' creative thinking skills before and after being treated with PjBL. There is an increase in the percentage of all indicators of creative thinking skills consisting of flexibility, fluency, originality and elaboration. Based on the research results, it can be concluded that the Poject Based Learning learning model can improve students' creative thinking skills in balanced nutrition practice activities.

Keywords*:* project-based learning; creative thinking skills, nutritional balance practices

INTRODUCTION

Creative thinking skills are a necessity in the global era because of the complexity of problems in all aspects of modern life (Nurhamida, et al., 2018). Turkmen (2019) argues that creativity is the most important thing in education where students should have the ability to think creatively. In practice, students are required not only to have the ability to solve problems in the cognitive aspects but also to solve problems in the real world. So it can be said that creativity is the key to all competencies. Someone can make and change things for the better (Nurhamida, et al., 2018).

The purpose of national education is to develop the potential and better educate individual, so it is hoped that students will get a good education. So that students can have creativity, knowledge, personality, independence and a more responsible person. Nurhamida, et al. (2018) argue that students from both primary, secondary, and higher education levels have low creative skills. This is because students are not given the opportunity to solve problems in their own way. Students should be accustomed from the start to solve the problem in their own way. Thus, the teacher can apply a learning

model that can build and improve the skills of students through developing creativity in solving a problem.

Students' creative thinking skills must be a concern in the world of education. Creativity can be taught to students through a process of developing creative thinking skills. Without it students can experience difficulties in following the learning process. Learning activities that support creativity are solving problems in learning, including building ideas, connecting different ideas, expressing opinions and implementing solutions to activities, responding to unexpected results, and evaluating. Creative activities can be obtained through the learning process in the classroom, online learning and practicum. (Kaufman, 2013; Isabekov & Sadyrova, 2018)

The reality on the ground shows that this ability to think creatively has not become a concern. The ability of students 'low creative thinking skills is due to learning that has not empowered students' creative thinking skills (Purnamaningrum, et al., 2012). Sudirgayasa, et al., (2014) said that learning biology in the classroom emphasizes more on the aspect of providing information only and what you want to achieve is only academic achievement. This results in students understanding that studying biology has nothing to do with problems in everyday life, learning biology is only to face tests or exams.

Fatmawati (2016) revealed that the ability of creative thinking skills and scientific attitudes of students has a low level if students are not given learning activities that do not build creative thinking skills. This is what happened at SMAN 1 Cisarua, where the results of initial observations showed that the level of students' creative thinking skills tended to be low where the average value of students' thinking skills was only 62%. This is because students are not used to solving problems and expressing their ideas or ideas freely. The reason is the tendency of teachers in pursuing the target of delivering material which is quite a lot on time. So that students are not trained to build their creativity and the main focus is only to pass the test. According to Sandika & Fitrihidajati (2018) Students' creative thinking skills in learning are at a low level if the learning process does not stimulate students to think creatively. The use of ineffective methods results in students not being motivated to achieve success (Sandika & Fitrihidajati, 2018).

Project Based Learning (PjBL) learning model is a learning model that can motivate students to think creatively. This model applies learning techniques that are not only knowledge integration but also applying renewable knowledge. Through PjBL students learn to think, solve complex problems based on analysis of relevant data, compare other people's opinions, be fair in making decisions, actively discuss, able to communicate with many people. So that students get used to working in groups, doing simple research, and playing roles. In this case, the teacher's role is to help students to foster creativity in a pleasant learning experience (Isabekov & Sadyrova, 2018).

Based on the description above, the researcher wants to identify the improvement of students' creative thinking skills through the Project Based Learning model. By using balanced nutrition practice material, the researcher identified how to build students' creative thinking skills using the Project Based Learning model.

Creativity is defined as innovation, quality and relevance, relating to something new or a new way of working in short, creativity is innovation. Besides that, creativity must be of high quality, unique, relevant to a new job or context. Based on this definition, creativity is a person's ability to solve problems and create solutions. (Diki, 2013). Creative Thinking is one of the cognitive aspects that is very important in learning science in the classroom, including practicum activities. The Biology Practicum can stimulate students to formulate problems, propose hypotheses, make predictions, use tools and analyze and make conclusions, argue, discuss, use broad reasoning strategies, involve skills in creative, critical thinking. (Chin & Chia, 2005; Hong & Kang, 2009 in Sari et al., 2017)

Project Based Learning (PjBL) learning model is a learning model that uses problems as a first step in collecting and integrating new knowledge based on experiences in real activities. Through PjBL the inquiry process begins by raising a guiding question and guiding students in a project (material) in the curriculum. PjBL is an in-depth investigation of a real-world topic, this will be valuable for students'

attention and efforts (Kemdikbud, 2015). With PjBL students can improve their creative abilities, stimulate students to carry out scientific research.

PjBL does not only apply pedagogical aspects but students learn to think to analyze relevant data, compare various opinions of others, make decisions and be active in discussions. In addition, students are trained to work in groups or pairs, do simple research, and play roles. In the end, students can build their creativity based on their learning experiences (Isabekov & Sadyrova, 2018).

The practice of balanced nutrition is one of the practices in the basic competencies of the digestive system, class XI semester odd. The purpose of balanced nutrition practice is that students can prepare a diet with balanced nutrition for adolescents with normal activities. By using the Project Based Learning learning model, the author wants to identify the influence of the PjBL model on balanced nutrition practices to build students' creative thinking skills.

Some researchers who use the Project Based Learning learning model to increase student creativity state: the results show that the Project Based Learning learning model can build student creativity (Insyasiska, et al., 2015; Noviyana, 2017; Sari, et al., 2017; Isabekov & Sadyrova, 2018). Project Based Learning learning model is a learning model that can build students' creative thinking skills. Because in its stages this learning model can train students to work in groups or in pairs, do simple research, and play roles. So that in the end, creative students will be created who can answer the challenges in the global era in the 21st century.

METHOD

This type of research is a quasi-experimental with one group pretest posttest design. This study does not use a comparison class and uses tests before treatment and after treatment. The learning model used is Project Based Learning in balanced nutrition practicum activities. The subjects of this study were 36 students of class XI IPS2 (cross-interest) at SMAN 1 Cisarua, Bogor Regency in the odd semester of the 2019-2020 academic year. Data was obtained through observations during the learning process which were included in the observation sheet. The observation were processed descriptively with the following calculations:

$$\mathrm{Na} = \frac{\mathrm{X}}{\mathrm{Xm}}$$

Na = affective value
X = received score
Xm = maximum score

Then the student creativity criteria are obtained as follows:

Table 1. Criteria of Students' Creativity

Percentage (%)	Students' Creativity*
81 – 100	Very high
61 – 80	High
41 – 60	Medium
21 – 40	Low
1 – 20	Very low

*Adopted and modified from Sari (2012)

The improvement of students 'creative thinking skills was obtained through the pretest and posttest before and after the treatment. The form of tests in the pretest and posttest is in the form of description questions that can measure students' creative thinking skills. The data is then analyzed using the N-Gain calculation after being tested for normality first. So that it can be seen whether there is an increase in students' creative thinking skills after the treatment or not. The formula for calculating the N-Gain used in this study is as follows:

$$\text{N} - \text{Gain} = \frac{\text{S postest} - \text{S Pretest}}{\text{S Maks} - \text{S Pretest}} \text{X } 100\%$$

Posttest score: Test score after learning period
Pretest score: Test score before learning period
Max score: Maximum score

The N-Gain category according to Hake (1999) is as follows:

Table 2. N-Gain Category

Average of N-Gain	Category
N-Gain ≥ 0,7	High
0,7 > N-Gain ≥ 0,3	Medium
0,3 > N-Gain	Low

RESULT AND DISCUSSION

Student activities in balanced nutrition practicum learning follow the steps of the Project Based Learning model. Beginning with preparation, in this stage learning begins with essential questions that can assign students to carry out an activity. The assignment of students during preparation is to prepare a food menu that meets the requirements of balanced nutrition for adolescents with regular activities. The problem given is that students are not allowed to use rice and flour as a source of carbohydrates. The selection of food ingredients must be local products that are easily obtained at affordable prices but still have good nutritional standards for health.

The next stage is implementation, student activities in the form of making balanced nutritional food products with carbohydrate sources other than rice and flour. Next is the assessment and evaluation activities.

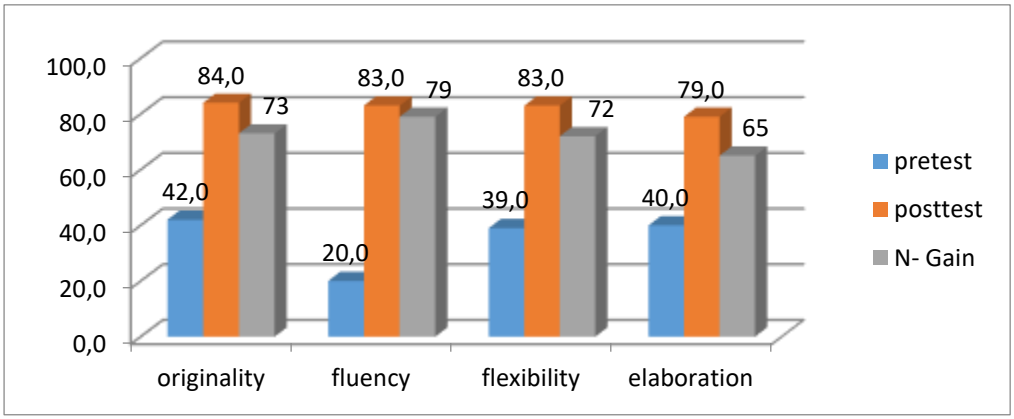
Student creativity during PjBL learning shows that the highest student creative thinking skills are at the implementation stage with an average of 88%, then the evaluation stage is 78% and 68% preparation. Judging from the aspect of the student's creativity category, all indicators at the three stages indicate a high category (Table 3).

Table 3. Average of Students' Creative Thinking Skills

Indicators	Preparation	Implementation	Evaluation
Ability to think originally (originality)	70%	87%	75%
Ability to think fluently (fluency)	68%	100%	75%
Ability to think flexibly (flexibility)	68%	88%	88%
Ability to explain (Elaboration)	65%	75%	75%

In the preparatory stage, students plan a project in groups, in this stage students are challenged to build their creativity, to think unusual, to arrange a food menu that is unusual but can be enjoyed as healthy food with balanced nutrition. The average creative thinking skill at this stage is 68%. The implementation stage obtains an average value of creative thinking skills of 88% which is the highest value when compared to the implementation stage and the evaluation stage. At the stage of implementing student activities in the form of making products as planned. Students look enthusiastic because the product is the food that they have planned and are ready to enjoy. Next is the assessment and evaluation, at this stage students assess products and product evaluation in class discussion activities with the average acquisition of creative thinking skills reaching 78%.

The pre-test and post-test data were obtained through descriptive questions and then analyzed using the N-Gain calculation (Hake 1999) to see how much improvement in students' creative thinking skills. Based on the data in Graph 1, the N-Gain value shows that there is an increase in students' creative thinking skills on the indicators of flexibility, fluency, originality and elaboration with high categories. The highest increase occurred in the fluent thinking indicator with an N-Gain value of 79%. The lowest increase occurred in the elaboration indicator with an N-Gain value of 65%. In this case this happens because students can come up with ideas and ideas well, but to develop ideas and combine ideas and ideas from others, they still have to be trained.



Graph 1. Data of Pretest, Posttest, and N - Gain for Each Indicator of Students' Creative Thinking Skills

After going through various processes of analysis and research, it can be concluded that there are differences in students' creative thinking skills between before and after being treated with PjBL. The results of the research on students 'creative thinking skills after being treated with PjBL experienced positive changes at the time of the posttest compared to the time before being given the PjBL treatment. Based on the results of the study it can be concluded that students' creative thinking skills have increased, this is indicated by an increase in the percentage of the indicators of creative thinking skills achievement. consisting of flexibility, fluency, originality and elaboration with a high category. So it

can be said that the project based learning model on balanced nutrition practice activities can improve students' creative skills.

CONCLUSION

Based on the results of the study, it can be concluded that the Project Based Learning learning model on balanced nutrition practice activities can improve students' creative thinking skills.This is indicated by an increase in the percentage of achievement indicators for creative thinking skills consisting of flexibility, fluency, originality and elaboration with high categories. The indicator with the highest percentage is fluency with an N-Gain value of 79%. In conducting research, careful preparation and adequate instruments are very important. In addition, the use of learning models must be adapted to the conditions of students and the school environment. Then the preliminary observational data can be used in decision making.

REFERENCES

Arbain, R. 2019.Model Pembelajaran Problem Based dengan Mind Mapping untuk Meningkatkan Kemampuan berpikir Kreatif Materi Sistem Respirasi. [tesis]. Bogor. Universitas Pakuan.

Diki,D.2013. Creativity for learning biology in higher education. LUX. A JOURNAL of transdisciplinary writing and reaseach from Claremont graduate university.volume3.issue

D. K. Sari,A.Permanasari,F.M.T.Supriyanti,.K., dkk. 20.17. profile of students' creative thinking skills on quantitative project-based protein testing using lokal materials. Chemistry education study, Sriwijaya University, Indonesia.DOI:10.15294/jpii.v611.9516

Fatmawati,B. 2016. The analysis of students' creative thingking ability using mind map in biotechnology course. Biology edocation, STKIP Hamzanwati Selong, Indonesia. DOI:10.15294/jpii.v5i2.5825

Insyasiska,D,Zubaidah.S,Susilo,H.2015.Pengaruh project based learning terhadap motivasi nelajar, kreativitas, kemampuan berpikir kritis dan kemampuan koqnitif siswa pada pembelajaran biologi.SMA NEGERI 1 Batu. Jurnal pendidikan biologi . volume 7, nomor 1 . agustu 2015, hlm9-21

Isabekov,A., & Saddyrova,G .2018. Project-based learning to develop creative abilities in students. Technical and vocational education and training: Issues, concern and prospects 28

Kemdikbud (2015). Materi Pelatihan Guru implementasi kurikulum 2013.

Noviana, H. 2017.Pengaruh model project based learning terhadap kemampuan berpikir kreatif matematika siswa. Pendidikan matematika STKIP PGRI Bandar Lampung.Jurnal Edumath, volume 3, No. 2(2017)Hlm.110-117.

(Nurhamida.D, Masykuri.M & Dwiastuti.Sl. 2018. profil of senior high school students' creative thinking skills on biology material in low, medium, and high academic perspective. Science education sudy program, postgraduate program of sebelas maret university, Indonesia. IOP Conf. Series:Journal of Physics:Conf. Series 1006(2018)012035.

Nusrowati, M. & taufiq. 2015. Develoing creative thinking skills and creative attitude thtouhg problem green vision chemistry enviromtmen learning.state university of semarang, Indonesia.http://journal.unnes.ac.id/nju/index.php/jpii

(Purnamaningrum, Dwiastuti, & Probosari. .2012. Peningkatan Kemampuan Berpikir kreatif Melalui Problem Based Learning (pbl) pada pembelajaran biologi siswa X-10 sma negeri 3 surakarta tahun pelajaran 2011/2012. Pendidikan biologi volume 4, nomor 3 hlm 39-51.

Safina, D. 2019. Keterampilan dan Kemampuan Berpikir Kreatif Siswa dengan Menggunakan Model Project Based Learning (PjBL) pada Materi Sistem Ekskresi di MTsN 3 Bireun.[skripsi]. Banda Aceh.Universitas Islam Negeri AR-Raniry.

Sandika,B. & Fitrihidajati, F. 2018. Improving creative thinking skills and scientific attitude through inquiry based learning in basic biology lecture toward student of biology education. Jurnal Pendidikan Biologi Indonesia

Sari,R.T., & Angreni,S. 2018. Penerapan model pembelajaran project based learning upaya peningkatan kreativitas mahasiswa. Program studi pendidkan guru guru sekolah dasar fakultas keguruan dan ilmu pendidikan universitas bung hatta. Varia pendidikan. Vol.30,no 1. Juli2018:79-83

Sari, W.P,dkk.2018. keterampilan berpkir kreatif siswa sma dalam pembelajaran project based learning (pjbl) pada materi fluida statis. Universitas negeri malang. http://jounal.um.oc.id/index.php/iptpp/EISSN;2504.47IX.DOAJ-SHERPA/ROMEO-GOOGLE

Sudirgayasa,I.G,Suastra,I.W, Ristiati,N.P (2014).Pengaruh model pembelajaran berbasis Nature of Science (NoS) terhadap kemampuan aplikasi konsep biologi dan pemahaman NoS siswa dalam pembelajaran biologi di SMA Negeri 1 Marga.Jurnal Pendidikan dan Pembelajaran IPA Indonesia 4(1)