



An Analysis of Biology Students' Creative Thinking ability in Ethnobotany Course

Isnaini Siwi Handayani^{1*}, Muhammad Zaini², Dharmono Dharmono³, Eka Wulandari⁴

^{1,2,3} Universitas Lambung Mangkurat, Indonesia

⁴ Universitas Negeri Yogyakarta, Indonesia

ARTICLE INFO

Article History

Received : 29-12-2021

Accepted : 08-05-2022

Published : 30-06-2022

Keywords:

Creative Thinking ability;
Ethnobotany.

*Correspondence email:

isnaini.siwi.handayani@gmail.com

ABSTRACT

This study aimed to describe the creative thinking ability of biology students in the ethnobotany course. The type of research used was descriptive research using a quantitative approach. The research subjects were 28 students taking ethnobotany courses in the Biology Study Program at IAIN Palangka Raya. The data were collected using the question instrument. Fluency, flexibility, originality, elaboration, and evaluation indicators of creative thinking ability. The results show that students' creative thinking abilities were divided into high, medium, and low. The creative thinking ability of biology students was dominantly in the low category. The students' creative thinking ability in the high category was evaluation. Furthermore, the students' creative thinking ability in the medium category was fluency, and the low categories were flexibility, originality, and elaboration. These results urged that teaching materials be developed to improve students' creative thinking ability.

Analisis Kemampuan Berpikir Kreatif Mahasiswa Prodi Biologi Pada Mata Kuliah Etnobotani

ABSTRAK: Penelitian ini bertujuan untuk mendeskripsikan kemampuan berpikir kreatif mahasiswa tadris biologi pada mata kuliah etnobotani. Jenis penelitian yang digunakan adalah penelitian deskriptif dengan menggunakan pendekatan kuantitatif. Subjek penelitian adalah 28 mahasiswa yang sedang menempuh mata kuliah etnobotani pada program studi tadris biologi di IAIN Palangka Raya. Pengambilan data menggunakan instrumen soal. Indikator kemampuan berpikir kreatif yang digunakan yaitu fluency, flexibility, originality, elaboration, dan evaluation. Hasil menunjukkan bahwa kemampuan berpikir kreatif mahasiswa dibagi menjadi tiga kategori yaitu tinggi, sedang dan rendah. Kemampuan berpikir kreatif mahasiswa tadris biologi pada mata kuliah etnobotani yang dominan adalah dalam kategori rendah. Kemampuan berpikir kreatif mahasiswa yang kategori tinggi yaitu evaluasi, kategori sedang yaitu kelancaran dan kategori rendah yaitu fleksibilitas, orisinalitas, dan elaborasi. Hasil ini mengindikasikan bahwa perlu dikembangkan bahan ajar untuk meningkatkan kemampuan berpikir kreatif mahasiswa.

INTRODUCTION

Skills in facing the 21st Century are important to be considered by universities to equip their students. The skills are skills in thinking, skills in acting, and skills in living daily life (Jirana, Amin, Suarsini, & Lukati, 2016). The 21st Century is the age of knowledge, where information is widely spread, and technology is developing rapidly (Suherman, Lakatos, Muhammad, Khoiriyah, & Komarudin, 2021; Suherman, Vidákovich, & Komarudin, 2021). The increasingly interconnected world of science marks the characteristics of the 21st Century so that synergies become faster.

Preparing students with 21st-century skills is important. The focus of national education development in the current era of a knowledge-based economy is to improve the quality and competitiveness of human resources (Jirana et al., 2016). The ability to think is one of the assets that students must have in facing the development of science and technology because a person's success depends on his thinking ability, especially in solving life problems (Jirana et al., 2016). Higher education as a service provider in education is currently making several breakthroughs in ensuring the quality of its graduates, one of which is with international accreditation. The international accreditation requires that the curriculum in higher education be prepared based on outcomes (outcome-based education) by considering the application of science and technology and skills development in the 21st Century (Laurie, Nonoyama-Tarumi, Mckeown, & Hopkins, 2016).

The Partnership for 21st-Century Skills explains one of the skills or expertise students in the 21st Century must possess: higher-order thinking ability (Yanuarta, Gofur, & Indriwati, 2016). One of the Higher Order Thinking ability (HOTS) is creative thinking ability (Komarudin, Suherman, Puspita, Arrafiansyah, & Hasanah, 2020; Rahmawati, Komarudin, & Suherman, 2022). Creative thinking abilities are very important skills for students to have in

solving problems faced in a world constantly changing over time (Suherman, Lakatos, et al., 2021; Suherman et al., 2021; Widiyasari et al., 2022).

Creative thinking abilities are skills that are not inherent in humans since birth. These skills must be trained in learning (Puspitasari, In'am, & Syaifuddin, 2018). Someone who thinks creatively tends to produce something new and original (Saptenno, Tuaputty, Rumahlatu, & Papilaya, 2019). This type of thinking is part of skills in the 21st Century apart from critical, collaboration, and communication (Dariman, 2019). However, higher order thinking ability will not be able to instill a conscious and explicit sign of effort in their development.

Creative thinking ability is the ability to develop unusual ideas and generate new thoughts (Zabelina, Saporta, & Beeman, 2016). The indicators for creative thinking are classified into five according to Munandar (Tri Agustiana, Agustini, Ibrahim, & Tika, 2020). (1) Thinking Fluency, namely the ability to generate many ideas that come out of one's thinking quickly (Handayani, Rahayu, & Agustini, 2021). In fluency of thought, the emphasis is on quantity and not quality. (2) Thinking flexibility is the ability to produce several ideas, answers, or varied questions. It can see a problem from different perspectives, look for alternatives or different directions, and use various solutions and approaches or ways of thinking (Ernawati, Muhammad, Asrial, & Muhaimin, 2019). Creative people are flexible in thinking (Komarudin, Monica, Rinaldi, Rahmawati, & Mutia, 2021; Puspita, Supriadi, & Pangestika, 2018). They can easily leave the old way of thinking and replace it with a new way of thinking; (3) Thinking Original (Originality), namely the ability to generate unique ideas or the ability to generate original ideas (Handayani et al., 2021). Provide ideas that are relatively new in solving problems or answers that are different from the usual ones in answering a question. Make unusual combinations of

parts or elements in problem-solving; (4) Thinking in detail (Elaboration), namely the ability to develop ideas and add or detail the details of an object, idea, or situation so that it becomes more interesting (Ernawati et al., 2019). Develop or enrich the ideas of others. Add, organize or detail an idea to improve the quality of the idea; and (5) Thinking Judgment (Evaluation), namely the ability to find the truth of a question or the truth of a problem-solving plan (justification) (Armandita, Wijayanto, Rofiatus, & Susanti, 2017). Can generate ideas for solving a problem and can implement them properly. Have a justifiable reason for reaching a decision.

Ethnobotany is an elective course that can be taken by Biology Education Department students in the sixth semester. This course is debriefing material for students to recognize and learn about plants used by an ethnic community around their residence and in other areas. It is intended that students can further research the use of a plant in an area and appreciate the culture of local wisdom. Students need creative thinking ability to understand ethnobotany material, conduct ethnobotanical research, and produce a paper related to ethnobotany. This is one of the competencies that biology students who will later become teachers and researchers need.

Several studies on students' creative thinking ability have been reported (Suripah & Sthephani, 2017). The purpose of

this research is to obtain an overview of the creative thinking abilities of biology students in ethnobotany lectures. The contribution of this research will be the basis for developing teaching materials to improve students' creative thinking ability in ethnobotany lectures.

METHOD

The type of research was descriptive research using a quantitative approach. The research subjects were 28 students taking ethnobotany courses in the Biology Study Program at IAIN Palangka Raya. The determination of the category of students' creative thinking abilities is presented in Table 1.

Table 1. Category of Students' Creative Thinking Ability Level

No	Value	Category
1	Score ≥ 77	High
2	58 ≤ Score < 77	Moderate
3	Score < 58	Low

Source: (Armandita et al., 2017)

The material used is about ethnobotany. The research data in the form of creative thinking ability data were obtained using a question instrument in the form of an essay. The indicators of creative thinking ability used are fluency, flexibility, originality, elaboration, and evaluation (Febrianti, Djahir, & Fatimah, 2016). The rubric for assessing creative thinking ability can be seen in Table 2.

Table 2. Creative Thinking Ability Assessment Rubric

Dimensions of Questions	No Question	Characteristics	Score
Thinking Fluency	1, 2	Can write five variations of answers	10
		Can write four variations of answers	8
		Can write three variations of answers	6
		Can write two variations of answers	4
		Can you write one variation of the answers	2
		No answer	0
Thinking Flexible	3, 4	Can write two answers with explanations	6-10
		Can write one answer with explanations	1-5
		No answer	0

Dimensions of Questions	No Question	Characteristics	Score
Thinking Originality	7, 8	Can give five new ideas	10
		Can give four new ideas	8
		Can give three new ideas	6
		Can give two new ideas	4
		Can give one new idea	2
		No answer	0
Thinking Elaboration	5, 6	Can make detailed project designs	6-10
		Can make project designs but lacks detail	1-5
		No answer	0
Thinking Evaluation	9, 10	Can rate an idea and leave a comment	6-10
		Can rate an idea but leave no comments	1-5
		No answer	0

RESULTS AND DISCUSSION

The results in the form of scores are obtained from giving questions containing five indicators of creative thinking to determine students' creative thinking ability as a whole. The recapitulation of the student scores can be seen in Table 3.

Table 3. Student Score Recapitulation

Category	Value	Number of Students	(%)
High	Score \geq 77	1	3,57
Moderate	Score \leq 58	8	28,57
Low	Score $<$ 58	19	67,86

Based on table 2, it can be seen that there is only one student who has high creative thinking ability. In contrast, those who have low creative thinking ability are 19 students, and eight other students have moderate creative thinking ability. The highest score that students can achieve is 78, while the lowest score is 18. Based on these results, the comparison can be seen in Figure 1.

Figure 1 shows that the students are more dominant in having a low level of creative thinking ability in the ethnobotany course. The categories of each indicator of students' creative thinking abilities can be seen in Table 3.

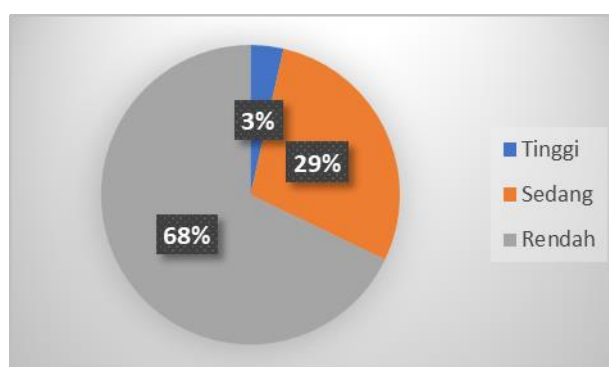


Figure 1. Comparison of Creative Thinking Categories for Biology Students

Table 4. Categories of Each Indicator of Students' Creative Thinking Ability

No	Indicator	Average Score	Category
1	Fluency	58,04	Low
2	Flexibility	41,79	Moderate
3	Originality	33,04	Moderate
4	Elaboration	28,04	Moderate
5	Evaluation	77,32	High

Based on table 4, it was found that the students' creative thinking ability was in the high category, namely evaluation, the medium category was fluency, and the low category was flexibility, originality, and elaboration. Based on the results obtained, the following is a descriptive analysis of each creative thinking ability.

1. Thinking Fluency

Based on the existing data, the student's ability to think fluently is in the medium category. Some students are still not fluent in generating many ideas. Fluency

is the ability to generate many ideas that come from one's mind quickly. In fluency in thinking, the emphasis is on quantity, not quality (Tri Agustiana et al., 2020). According to Torrance, fluent thinking is the ability to generate several ideas or produce many answers, while the characteristics of fluency include:

- a. generate lots of ideas, lots of answers, lots of problem-solving, and lots of questions fluently,
- b. provide many ways or suggestions for doing things,
- c. always think of more than one answer (Armandita et al., 2017).

2. Thinking Flexibility Ability

Flexible thinking is a person's ability to think of more than one idea in solving a problem (Armandita et al., 2017). Based on the existing data, the flexible thinking ability of students is in a low category. This is because some students are less flexible in providing solutions.

The flexibility of thinking is the ability to produce several ideas, answers, or varied questions, see a problem from different perspectives, look for alternatives or different directions, and use various approaches or ways of thinking. Creative people are people who are flexible in thinking. Creative students can easily leave the old way of thinking and replace it with a new way of thinking. Flexible thinking provides space for changing ideas and thinking to include different points of view and different approaches to a solution. Furthermore, the flexibility of thinking is the ability to produce several ideas, answers, or varied questions, see a problem from different perspectives, and look for alternatives or directions. (Tri Agustiana et al., 2020).

3. Thinking Originality

Based on the existing data, the student's original thinking ability is in a low category. The low average value indicates a lack of student sensitivity in answering

questions that expect many original student answers. Sensitivity to the questions given is one of the factors needed in realizing the ability to think creatively so that it can bring up new ideas or ideas that have never been thought of by others.

Original thinking is the ability to express ideas or solve problems in ways others have never thought of. Extensive knowledge is the basis for creativity. The wider the knowledge, the more likely it is to generate new ideas so that they can affect one's original thinking ability. Original thinking is the ability to think of new ideas that have never existed before to solve problems (Armandita et al., 2017).

Authenticity is the ability to generate unique ideas or the ability to generate original ideas. Authenticity relates to the ability to provide something unique or unique that is different from the others. Authenticity is the ability to create unique combinations of problem-solving. Ideas' originality is described as unique, surprising, unusual, unconventional, strange, and extraordinary (Huda, Suherman, Komarudin, Syazali, & Umam, 2020; Puspita, Firdaos, & Istiqomah, 2019; Suherman, Komarudin, & Supriadi, 2021).

4. Thinking Elaboration

Elaborative thinking is a person's ability to describe a simple thing in a broader definition (Armandita et al., 2017). Based on the existing data, the students' elaborative thinking ability is in a low category. This is because there are still many students who are not able to describe something.

The elaboration aspect of creative thinking focuses on the ability to develop ideas and add or detail the details of an object, idea, or situation so that it becomes more interesting. Elaboration can also be said to add details or information to an existing idea (Tri Agustiana et al., 2020).

5. Thinking Evaluation

Based on existing data, students' evaluative thinking abilities are in the high

category. This result can be seen from the students' correct answers in assessing the solution to a problem. In evaluative thinking, one does not add or subtract ideas but judges them based on certain criteria. Evaluative thinking is a person's ability to judge whether or not an idea is good or bad (Armandita et al., 2017).

The evaluation aspect is the ability to make decisions in open situations. Evaluation in solving a problem not only sparks ideas but also implements them wisely (Tri Agustiana et al., 2020).

Students' creative thinking ability, which is still low, does not rule out the possibility to be improved by improving the quality of learning. The quality of learning can be supported by the availability of teaching materials specifically designed and arranged systematically to enable students to study independently, effectively, and efficiently (Sari & Wulanda, 2019). The use of teaching materials in learning that has been going on so far is to teach students according to the textbooks used by lecturers (Nurmita, 2017). Several studies related to the development of teaching materials and learning tools have been carried out and have been proven to be effective in improving students' creative thinking ability (Sari & Wulanda, 2019)(Fadhilaturrahmi, Ananda, & Yolanda, 2021) (Salamiyah & Kholiq, 2020) (Arvianto & Ardhana, 2020).

CONCLUSIONS AND SUGGESTIONS

The results show that students' creative thinking ability is divided into three categories: high, medium, and low. The creative thinking ability of biology students in the ethnobotany course was in a low category. The students' creative thinking ability in the high category was evaluation. Furthermore, the students' creative thinking ability in the medium category was fluency, and the low categories were flexibility, originality, and elaboration. These results urged that teaching materials be developed

to improve students' creative thinking ability.

ACKNOWLEDGEMENT

I thank Mrs. Ayatusa'adah, M.Pd. as a lecturer in ethnobotany courses who helped me collect research data at IAIN Palangka Raya.

REFERENCES

- Armandita, P., Wijayanto, E., Rofiatus, L., & Susanti, A. (2017). Analisis Kemampuan Berpikir Kreatif Pembelajaran Fisika Di Kelas XI Mia 3 Sma Negeri 11 Kota Jambi. *Penelitian Ilmu Pendidikan, 10*(2).
- Arvianto, I. R., & Ardhana, Y. M. K. (2020). Pengembangan Perangkat Pembelajaran Untuk Meningkatkan Kemampuan Berpikir Kreatif. *Prima: Jurnal Pendidikan Matematika, 4*(1), 22. <https://doi.org/10.31000/prima.v4i1.2032>
- Dariman, K. (2019). Students' Creative Thinking With 4'R Applications in Procedure Text Project Based Learning. *International Journal for Educational and Vocational Studies, 1*(1), 15. <https://doi.org/10.29103/ijevs.v1i1.1375>
- Ernawati, M. D. W., Muhammad, D., Asrial, A., & Muhaimin, M. (2019). Identifying creative thinking ability in subject matter bio-chemistry. *International Journal of Evaluation and Research in Education, 8*(4), 581–589. <https://doi.org/10.11591/ijere.v8i4.20257>
- Fadhilaturrahmi, Ananda, R., & Yolanda, S. (2021). Jurnal basicedu. *Jurnal Basicedu, 5*(3), 1683–1688.
- Febrianti, Y., Djahir, Y., & Fatimah, S. (2016). Analisis Kemampuan Berpikir Kreatif Peserta Didik dengan Memanfaatkan Lingkungan pada Mata Pelajaran

- Ekonomi di SMA Negeri 6 Palembang. *Jurnal Profit*, 3(1), 121–127.
- Handayani, S. A., Rahayu, Y. S., & Agustini, R. (2021). Students' creative thinking ability in biology learning: Fluency, flexibility, originality, and elaboration. *Journal of Physics: Conference Series*, 1747(1). <https://doi.org/10.1088/1742-6596/1747/1/012040>
- Huda, S., Suherman, S., Komarudin, K., Syazali, M., & Umam, R. (2020). *The Effectiveness of Al-Qurun Teaching Model (ATM) Viewed from Gender Differences: The Impact on Mathematical Problem-Solving Ability*. <https://doi.org/doi:10.1088/1742-6596/1467/1/012001>
- Jirana, Amin, M., Suarsini, E., & Lukati, B. (2016). Analisis Keterampilan Berpikir Kritis Mahasiswa pada Mata Kuliah Evolusi di Universitas Sulawesi Barat. *Prosiding Seminar Nasional Pendidikan dan Saintek*, 1(2), 63–73.
- Komarudin, K., Monica, Y., Rinaldi, A., Rahmawati, N. D., & Mutia, M. (2021). Analisis Kemampuan Berpikir Kreatif Matematis: Dampak Model Open Ended dan Adversity Quotient (AQ). *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 10(2), 550–562.
- Komarudin, K., Suherman, S., Puspita, L., Arrafiansyah, R., & Hasanah, U. (2020). Program course lab 2.4 mathematics learning media for increasing of creativity domain at Higher Order Thinking ability (HOTS). *Journal of Gifted Education and Creativity*, 7(3), 131–136.
- Laurie, R., Nonoyama-Tarumi, Y., Mckeown, R., & Hopkins, C. (2016). Contributions of Education for Sustainable Development (ESD) to Quality Education: A Synthesis of Research. *Journal of Education for Sustainable Development*, 10(2), 226–242. <https://doi.org/10.1177/0973408216661442>
- Nurmita, F. (2017). Pengembangan Buku Ajar Siswa Dan Buku Guru Berbasis Matematika Realistik Untuk Meningkatkan Pengetahuan, Sikap Dan Keterampilan Matematika Siswa Kelas Viismpal Karim Kota Bengkulu. *EDU-MAT: Jurnal Pendidikan Matematika*, 5(1), 86–98. <https://doi.org/10.20527/edumat.v5i1.3825>
- Puspita, L., Firdaos, R., & Istiqomah, C. (2019). Analisis Kemampuan Berpikir Kritis: Dampak Model Pembelajaran Creative Problem Solving dan Roundhouse. *Biosfer: Jurnal Tadris Biologi*, 10(2), 121–130.
- Puspita, L., Supriadi, N., & Pangestika, A. D. (2018). Pengaruh Model Pembelajaran Creative Problem Solving (CPS) Disertai Teknik Diagram Vee Terhadap Keterampilan Berpikir Kreatif Peserta Didik Materi Fungsi Kelas X Man 2 Bandar Lampung. *Biosfer: Jurnal Tadris Biologi*, 9(1), 01–12.
- Puspitasari, L., In'am, A., & Syaifuddin, M. (2018). Analysis of Students' Creative Thinking in Solving Arithmetic Problems. *International Electronic Journal of Mathematics Education*, 14(1), 49–60. <https://doi.org/10.12973/iejme/3962>
- Rahmawati, N. D., Komarudin, K., & Suherman, S. (2022). Pengembangan instrumen penilaian matematika berbasis HOTS pada calon Guru Sekolah Dasar. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 11(2).

- Salamiyah, Z., & Kholiq, A. (2020). Pengembangan Ecthing (E-Book Creative Thinking) Untuk Meningkatkan Keterampilan Berpikir Kreatif Peserta Didik Smk Pada Materi *Inovasi Pendidikan Fisika*, 09(03), 342–348.
- Saptenno, A. E., Tuaputty, H., Rumahlatu, D., & Papilaya, P. M. (2019). The improvement of learning motivation and creative thinking ability of senior high school students through modified problem based learning model. *Journal for the Education of Gifted Young Scientists*, 7(4), 1175–1194. <https://doi.org/10.17478/jegys.597519>
- Sari, D. S., & Wulanda, M. N. (2019). Pengembangan lembar kerja mahasiswa berbasis proyek dalam meningkatkan kemampuan berfikir kreatif mahasiswa. *Natural: Jurnal Ilmiah Pendidikan IPA*, 6(1), 20. <https://doi.org/10.30738/natural.v6i1.4073>
- Suherman, S., Komarudin, K., & Supriadi, N. (2021). Mathematical creative thinking ability in online learning during the Covid-19 Pandemic: A systematic review. *Online Learning in Educational Research*, 1(2), 75–80.
- Suherman, S., Lakatos, K., Muhammad, R. R., Khoiriyah, B., & Komarudin, K. (2021). Course Review Horay-Based Bamboo Dancing in 21st Century Learning: How Can We Assess Students' Mathematical Creative Thinking? *Al-Jabar: Jurnal Pendidikan Matematika*, 12(1), 45–57.
- Suherman, S., Vidákovich, T., & Komarudin, K. (2021). STEM-E: Fostering mathematical creative thinking ability in the 21st Century. *Journal of Physics: Conference Series*, 1882(1), 012164. IOP Publishing.
- Suripah, S., & Sthephani, A. (2017). Kemampuan berpikir kreatif matematis mahasiswa dalam menyelesaikan akar pangkat persamaan kompleks berdasarkan tingkat kemampuan akademik. *Pythagoras: Jurnal pendidikan Matematika*, 12(2), 149–160. <https://doi.org/10.21831/pg.v12i2.16509>
- Tri Agustiana, I. G. A., Agustini, R., Ibrahim, M., & Tika, I. N. (2020). Efektivitas Model OPPEMEI untuk Meningkatkan Kemampuan Berpikir Kreatif Mahasiswa. *Journal of Education Technology*, 4(2), 150. <https://doi.org/10.23887/jet.v4i2.25343>
- Widiyasaki, E., Mujib, M., Suherman, S., Komarudin, K., Anggoro, B. S., & Mardiyah, M. (2022). CORE Teaching Model Based Mnemonic Technique Impact Students' Mathematical Creative Thinking Ability and Metacognitive Awareness. *AlphaMath: Journal of Mathematics Education*, 8(1), [49-59].
- Yanuarda, L., Gofur, A., & Indriwati, E. (2016). Pemberdayaan Kemampuan Berpikir Kritis Siswa melalui Implementasi Model Pembelajaran Think Talk Write dipadu Problem Based Learning Empowerment Of Students Critical Thinking ability Through Implementation Of Think Talk Write Combined Problem Based Learning. *Proceeding Biology Education Conference*, 13(1), 268–271.
- Zabelina, D., Saporta, A., & Beeman, M. (2016). *Flexible or leaky attention in creative people? Distinct patterns of attention for different types of creative thinking.* 488–498. <https://doi.org/10.3758/s13421-015-0569-4>