Al-Ishlah: Jurnal Pendidikan
Vol.14, 4 (December, 2022), pp. 5383-5392
ISSN: 2087-9490 EISSN: 2597-940X, DOI: 10.35445/alishlah.v14i4.1377

Creative Thinking Ability of Biology Teachers at State Senior High Schools in Pekanbaru

Febblina Daryanes, Riki Apriyandi Putra

[1] Universitas Riau, Indonesia; febblina.daryanes@lecturer.unri.ac.id
[2] Universitas Riau, Indonesia; riki.apriyandi@lecturer.unri.ac.id

ARTICLE INFO

Keywords:

Creative Thinking;
Biology Teacher;
Analysis

Article history:

Received 2021-08-10
Revised 2022-01-16
Accepted 2022-11-27

ABSTRACT

The teacher is one of the determinants of success in the learning process and the formation of the soft skills and hard skills of the students. If a teacher has the ability to think creatively and make decisions with a focus on improving higher-order thinking and is consistent over time, it is likely to be successful in training students' creative thinking skills. This study aims to analyze the level of creative thinking skills of Biology teachers at SMA Negeri Pekanbaru City. The population in this study were all Biology teachers in Pekanbaru City Senior High School, amounting to 62 people. The sampling technique used was saturated sampling. Data was collected using questionnaires and interview guidelines, the questionnaire was compiled based on 4 indicators of creative thinking developed by Marzano. The questionnaire data was analyzed by calculating the percentage and then interpreted into several categories, while the results of the interviews were analyzed qualitatively. The results showed that the level of creative thinking skills of Biology teachers in Pekanbaru City High School was 81.35%. The indicator of creative thinking ability, namely "developing new ways" is the indicator with the highest achievement, which is 83.1%. The indicator of creative thinking ability "setting personal standards" has the lowest achievement among other indicators, which is 78.7%. Teachers who have been teaching for more than 20 years achieved very good categories on the indicators of “maximizing skills and knowledge” and “setting and using personal standards”. From the results of the study, it can be concluded that the level of creative thinking of Biology Teachers in Pekanbaru City Senior High School is in the good category.

Corresponding Author:
Febblina Daryanes
Universitas Riau, Indonesia; febblina.daryanes@lecturer.unri.ac.id

1. INTRODUCTION

The era of the Industrial Revolution 4.0 is currently an era of globalization, the progress of science and technology is very rapid. The impact of this globalization era is broad and very large on various aspects of human life. Rapid changes need to be adapted to higher-order thinking skills, one of which is the ability to think creatively. Creative thinking is also one of the 21st century skills. Great challenges in facing this era of course require innovative, creative, and competitive thinking (Aryanti et al., 2021; Cahyono et al., 2021; ElSaid & Fuentes, 2018; Madyani et al., 2019). Many countries have studied the ability of human creativity, such as research in Germany using a multivariate approach that can imply various interactions between creativity and cognitive, emotional and environmental factors (Scholer et al., 2015). Research in Norway examines the relationship between a person's personality factors and their creativity profile (Martinsen, 2011). Martinsen saw that there were interesting things about the personality model of creative people, while Gurak-Ozdemir et al. (2019) conducted a study in New York trying to explore the influence of teachers' creative thinking preferences on students. The great role of this creative thinking ability makes world researchers always explore things that are closely related to the ability to think creatively.

Creative thinking shows the ability to use new information or previous knowledge and manipulate it to achieve something new. The substance of creative thinking is usually defined as the capacity to develop new, detailed and useful ideas, form complex and original and valuable behavior and work, demonstrate the ability to adapt to changing situations and develop perspectives at various levels of thinking (Martinsen, 2011; Sugiyanto et al., 2018; Trisnayanti et al., 2020). Creative thinking is an original and intuitive thinking concept that helps in solving problems and creating innovative and high-quality solutions. The resulting ideas are elegant and surprising ideas where the thought process is characterized by flexibility, curiosity, well-developed imagination, motivated in finding solutions, and goal-oriented thinking. This creative thinking ability is needed to create effective and productive new products as potential solutions in the midst of a developing world. The concept of creative thinking has important meaning for the scientific world and in various fields (Abdi & Rostami, 2012; Aizikovitsh-Udi & Amit, 2011). Over the last few years, the ability to think creatively has become one of the most important skills that must be possessed. In progress, thinking skills develop from year to year to become more complex, specific, and differentiated (Scholer et al., 2015). The ability to think creatively is a source of human strength in the advancement of things regarding the process of tracing, developing, and discovering in the field of science that encourages technological progress (Gufron & Risnawati, 2014). Creative thinking can be demonstrated by being open-minded and flexible, using elaborated concepts, generating new original ideas and creating novelty in answers (Madyani et al., 2019).

In Indonesia, the 2013 curriculum developed aims to build the character of communication, collaboration, critical thinking and problem solving as well as creative and innovative thinking. However, the facts show that there are still many problems with low creative thinking skills. According to Trisnayanti et al. (2020), the culture of the learning process still relies on how to understand concepts, principles, and theories and has not been the target of empowering creative thinking skills. The results of research by Sugiyanto et al. (2018), Aryanti et al. (2021) and Nurhamidah et al. (2018) shows that students' creative thinking skills must be a serious concern considering the low proportion of each indicator of students' creative thinking. The results of research conducted by Murtianto et al. (2020) shows that the method of solving mathematical problems in students has been smooth and flexible, but the answers produced are not new and creative which is in line with the research results of Cahyono et al. (2021) that students can complete the process of solving mathematical problems well but students have not carried out the evaluation process properly this affects the quality of their answer ideas. Students' creative thinking skills must be a concern in education because these abilities are needed to live a better life, according to Roberts et al. (2020) and Saprudin et al. (2019) that creativity is something important in life because with creativity humans can manifest themselves, which are included in basic needs in humans, creative thinking has become a concern in formal education, involving oneself being

creative is not only beneficial but also gives satisfaction to individuals, and creativity enables people to improve their quality of life.

Several studies that have discussed the ability to think creatively are widely carried out to see the profile of creative thinking skills in students, whether viewed by gender (Cahyono et al., 2021; Madyani et al., 2019) or not (Nurhamidah et al., 2018; Saprudin et al., 2019; Sugiyanto et al., 2018; Trisnayanti et al., 2020). Research conducted by Hobri et al. (2018) regarding the level of students' creative thinking skills in NCTM-based problem solving. In addition, a lot of research has been done regarding the development of learning models in improving students' creative thinking skills (Abdi & Rostami, 2012) and through research analyzing students' creative thinking skills in practical activities such as research conducted by Ermayanti et al. (2021) which states that students' creative thinking skills in practical activities are classified as moderate. Another study conducted by Cenberci (2018) discussed the investigation of creative thinking skills in prospective mathematics teacher students and obtained information that the creative thinking abilities of prospective mathematics teacher students were in the good category. In general, the object of research that has been carried out is students and students. It is very rare to find research that examines the creative thinking ability of teachers, even though the teacher is one of the determinants of success in the learning process and the formation of soft skills and hard skills of students, because according to Aizikovitsh-Udi & Amit (2011) if a teacher has the ability to think creatively and making decisions with a focus on improving higher-order thinking and being consistent over time is likely to be successful in training students' creative thinking skills.This is in line with what was stated by Gurak-Ozdemir et al. (2019) that teachers have a tendency to support the characteristics that related to students' preferences, in particular teachers who have stronger creative idea preferences show a clear tendency to sharply encourage the development of the quality of students' ideas, and vice versa. Research conducted by Borodina et al. (2019) regarding the relevance of the problem development of creative thinking among students and become suggestions for manifestations of teachers' creative thinking abilities in the future. This is also a research gap. Therefore, there is a need for research that examines creative thinking skills from the perspective of a teacher with the object of research being the teacher. This study aims to analyze the level of creative thinking ability of Biology teachers in SMA Negeri in Pekanbaru City. This study aims to obtain information about the level of creative thinking of teachers on each indicator of creative thinking developed by Marzano.

2. METHODS

This research is a descriptive study that aims to see the level of creative thinking of Biology teachers in Pekanbaru City High School. The research was conducted in the city of Pekanbaru, to be precise at the MGMP of Biology Teacher at SMA Negeri Pekanbaru. The population in this study were all Biology teachers at the Pekanbaru City Public High School. The sampling technique used is saturated sampling. According to Sugiyono (2014), that: "saturated sampling technique is a sampling technique when all members of the population are used as samples." The number of samples was 62 biology teachers at the Pekanbaru City Public High School. Data were collected using questionnaires and interview guidelines, which were compiled based on 4 indicators of creative thinking developed by Marzano, namely 1) Not giving up easily, 2) Maximizing abilities and knowledge, 3) Setting and using personal evaluation standards, 4) Developing new methods. The questionnaire uses a modified Likert scale with 4 answer choices. Before the instrument was used in the study, 2 lecturers had validated the expert judgment and tested the instrument. The reliability value obtained is 0.866. The following presents the results of the validation of the creative thinking ability instrument carried out by expert judgment.

Table 1. Expert judgment validation results

No	Assessment Component	Average value
1.	Language Component	4.5
2.	Diactive components	5
3.	Construction Components	4.75
4.	Technical Components	4.75
	Average	**4.75**

The criteria for making validation decisions can be seen based on table 2 below:

Table 2. Validity Criteria

Score Interval	Quality	Information
4.21-5.00	Very good	Very Valid
3.41-4.20	Well	Valid
2.61-3.40	Enough	Quite Valid
1.81-2.60	Not good	Invalid
1.00-1.80	Very Not Good	Very Invalid

(Sugiyono, 2016)

The following are the results of the instrument validity test:

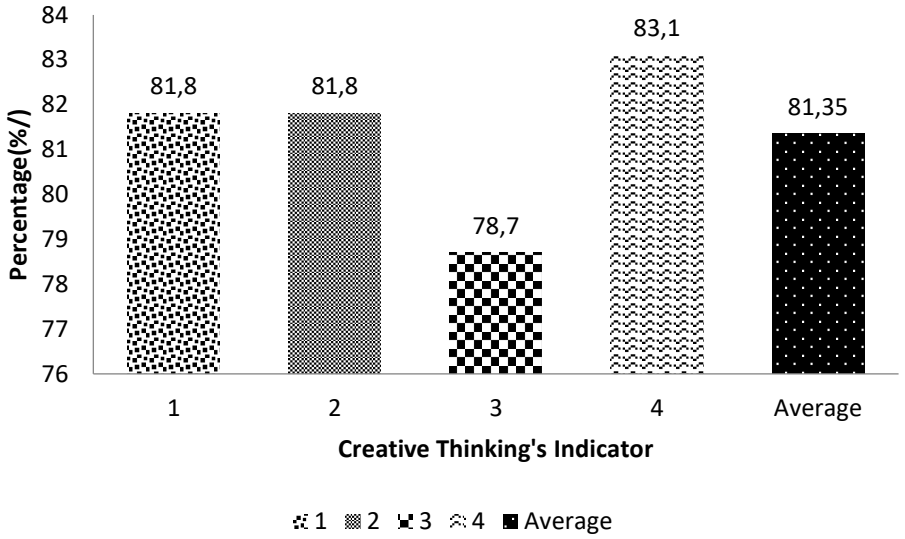
Table 3. The results of the instrument validity test

No	Indicator	Correlation	Signs. correlation	Information
1.	Not easily give up	5.35	Significant	Valid
2.	Maximize ability and knowledge	6.84	Very Significant	Valid
3.	Setting and using personal evaluation standards	6.79	Very Significant	Valid
4.	Developing new ways	6.95	Very Significant	Valid

Questionnaire data were analyzed quantitatively and qualitatively, and the data from the interviews were analyzed qualitatively. Data regarding the creative thinking abilities of respondents that have been collected through a questionnaire are then analyzed. For each item, the statement in the questionnaire consists of four score choices. Data analysis was carried out by calculating the percentage based on the score selected by the teacher for all items and then interpreted into several categories. Very good category (86-100%), good category (76-85%), moderate category (60-75%), poor category (55-59%) and very poor category (≤ 54%) (Purwanto, 2008).

3. FINDINGS AND DISCUSSION

The results obtained regarding the level of creative thinking ability of Biology teachers at the Pekanbaru City Senior High School can be seen in graph 1 below.



Description: 1) Not giving up easily, 2) Maximizing ability and knowledge, 3) Setting and using personal evaluation standards, 4) Developing new ways

Figure 1. The level of creative thinking ability of the Biology teacher at SMA N Pekanbaru City

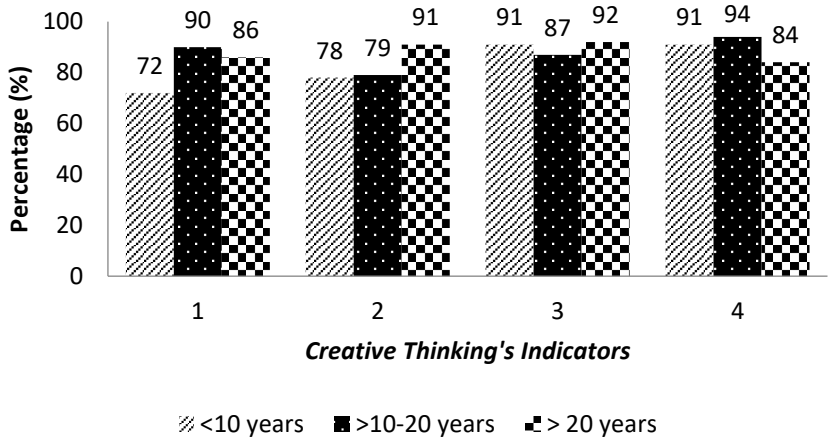
Based on Figure 1. It can be seen that the level of creative thinking of Biology teachers in Pekanbaru City Senior High School is in the good category with a percentage of 81.35%. The importance of creative thinking for a teacher is currently one of the highlights in the world of education because it is quite closely related to the way a teacher thinks which ultimately affects the way he teaches the learning process that can build students' creativity. According to Aizikovitsh-Udi & Amit (2011), that not only to learn but to teach also requires creative thinking skills, because teaching also really requires in-depth knowledge and understanding to overcome things that are not known to students as well as a lot of intellectual efforts from teachers who are part of student success. The teacher as a mediator plays a role in asking questions, posing challenges and assigning investigations and helping students to think more deeply about various concepts and ideas in constructing their knowledge and understanding. This is in line with the opinion of Madyani et al. (2019) and Azhari & Somakim (2013), that educators must be able to support students in facilitating students to have practical abilities from creative thinking skills. Students think creatively that is flat and not optimal, allegedly because the teacher does not try to explore students' knowledge and understanding of something creatively. According to Abdi & Rostami (2012), people must improve their creative thinking to develop technology and utilize it in today's changing and evolving world. Individuals who are key in determining the development of the world and have high-level creative thinking skills can provide a better life in society. In line with what was stated by Cahyono et al. (2021) the importance of someone having the ability to think creatively because through the ability to think creatively a person can actualize himself, humans will be able to improve the quality of their lives and be able to solve the problems they encounter.

Creative thinking ability can be seen from the achievement of creative thinking indicators. Figure 1. Shows that the percentage of achievement indicators 1 and 2, namely, "not easy to give up" and "maximizing abilities and knowledge" are in the good category with the same presentation achievement of 81.8%. This shows that teachers have an attitude of not giving up easily even though it is difficult to find answers or solutions to a problem and always use various ways to do their work. In addition, teachers also always try to complete their assignments or work by maximizing their abilities to successfully complete them and learn all things related to the tasks or work given. Based on interviews, information was obtained that teachers always communicate with other teachers and cooperate when they get assignments or jobs, so that they motivate each other and share experiences and help each

other. This is supported by the opinion of Cahyono et al., (2021) that through good communication it is easy to adapt to changing conditions both in the academic atmosphere and the world of work.

Indicator 4, namely "developing new ways" is also in the good category with a percentage of 83.1% and is the indicator with the highest level of achievement among other indicators. This shows that teachers have used their time and resources creatively and were able to develop things in a different way than others. Based on the interviews that have been conducted, information was obtained that teachers always explore and modify new things in order to have a high value of originality. This shows that the teacher's creative thinking ability is good because according to ElSaid & Fuentes (2018), the keys to creativity are flexibility, novelty, flexibility, elaboration, and originality. According to Ariyati et al. (2020), the originality category refers to the uniqueness of each response given and produces something new and unique.

Indicator 3 on creative thinking, namely "setting and using personal evaluation standards" is in the good category with an achievement percentage of 78.7%. This shows that most of the teachers have made their work standards and set high standards so that their performance is also of high quality and checks and evaluates their performance whether it reaches the standards they set. Although it is still in the good category, the percentage achievement of this indicator is lower than the achievements of other indicators. Based on the results of interviews obtained information that some teachers do not have the confidence to set high standards in their performance. According to Martinsen (2011), someone who lacks self-confidence tends not to be goal-oriented, does not have high standards and is less interested in new tasks or activities. They also tend to only accept solutions and set minimum standards. In addition, teachers also do not have much time to check their performance results due to their busy work schedule. Even though it is important to evaluate the work that has been done so that teachers know whether the standards or targets that have been set have been achieved or not and know how to follow up to produce something with good quality. Some teachers may not be much aware of its importance, according to Gurak-Ozdemir et al. (2019), most teachers have limited knowledge of the importance of evaluating the achievement of performance standards that have been carried out because this is also related to creative thinking skills that must be developed. Teachers have an important role in developing students' creativity. Teachers who are ideators will stimulate students to also become ideators.



Description: 1) Not giving up easily, 2) Maximizing ability and knowledge, 3) Setting and using personal evaluation standards, 4) Developing new ways

Figure 2. The indicator level of the teacher's creative thinking ability based on the length of teaching

Based on Figure 2. It can be seen that the level of achievement of creative thinking skills in indicators 1 and 4, namely "not giving up easily" and "developing new ways" is the highest for teachers who have taught more than 10 to 20 years in the very good category with successive percentages. 90%

and 94%. Teachers who teach more than 10 to 20 years are in the optimal phase of developing themselves, they already have enough experience and still have high motivation to boost their performance so that teachers with 10 to 20 years of teaching are still energetic to develop ways of teaching. New ways that they modify from their habits and from the development of information technology. In indicator 4, namely “developing new ways”, teachers who have taught for more than 20 years admit that they have found it difficult to keep up with the times, especially in terms of technology. develop new ways. According to Nurhamidah et al. (2018) in the current global era, critical thinking skills are very close in terms of discussing and solving complex problems in all aspects of modern life including mastery of technology and information. All teachers from various timelines should continue to develop new ways and hone their creativity as a teacher because of the findings of Cahyono et al., (2021), revealed that most creative teachers will transfer their creative abilities in teaching in a very effective way. Creative teachers will have more potential to recognize children's creativity. Ideator teachers are more likely to connect with ideator students

In indicators 2 and 3 on creative thinking skills, namely "maximizing abilities and knowledge" and "setting and using personal evaluation standards" the highest percentage of achievement levels is for teachers who have taught more than 20 years with 91% and 92% achievement percentages, respectively. . Even though on the indicators of developing new methods, senior teachers feel they are not updated but they feel they are still maximizing their abilities and knowledge and setting their personal standards as in the achievements of indicators 2 and 3. Based on interviews, information was obtained that teachers with more than 20 years of teaching had sufficient a lot of experience so that they always maximize the knowledge they already have. This is also in line with the opinion of Trisnayanti et al. (2020), that the development of creativity in individuals is supported by experience when interacting with the environment.

4. CONCLUSION

Based on the results of the study, it can be concluded that the level of creative thinking ability of the Biology teacher at SMA Negeri Pekanbaru City is in the good category with an achievement percentage of 81.35%. The indicator of creative thinking ability, namely "developing new ways" is the indicator with the highest achievement, which is 83.1% in the good category. This shows that teachers have used their time and resources creatively and were able to develop things in a different way than others. However, this ability can continue to be developed in order to achieve a very good category. This is followed by the achievement of creative thinking indicators, namely "not giving up easily" and "maximizing abilities and knowledge" with the same percentage of 81.8%. The indicator of creative thinking ability "setting personal standards" has the lowest achievement among other indicators, which is 78.7%, but is still in the good category. Teachers who have been teaching for more than 20 years achieved very good categories on the indicators of “maximizing abilities and knowledge” and “setting and using personal standards” and teachers with 10 to 20 years of teaching achieved very good categories on the indicators of “never give up” and “develop new way".

The category of teachers' creative thinking skills still needs to be improved in order to reach the very good category, teachers can take part in training that can develop creative thinking skills. Teachers should always update knowledge and developments in their learning process so that students are also encouraged to think creatively. This research is an initial study to detect the level of creative thinking ability of biology teachers in SMA Negeri in Pekanbaru, suggestions for further research that can be carried out are methods of developing teachers' creative thinking skills to improve the creative thinking skills of teachers.

REFERENCES

Abdi, A., & Rostami, M. (2012). The Effect Multiple Intelligences-Based Instruction on Student's Creative Thinkingability at 5th Grade in Primary School. *Procedia - Social and Behavioral Sciences*, *47*(1988), 105–108. https://doi.org/10.1016/j.sbspro.2012.06.621

Aizikovitsh-Udi, E., & Amit, M. (2011). Developing the skills of critical and creative thinking by probability teaching. *Procedia - Social and Behavioral Sciences*, *15*(1), 1087–1091. https://doi.org/10.1016/j.sbspro.2011.03.243

Ariyati, E., Susilo, H., Suwono, H., & Rohman, F. (2020). Habits of mind potency of students of prospective biology teacher. *Journal of Physics: Conference Series*, *1567*(2), 1–7. https://doi.org/10.1088/1742-6596/1567/2/022048

Aryanti, Y., Afandi, Wahyuni, E. S., & Putra, D. A. (2021). Torrance Creative Thinking Profile of Senior High School Students in Biology Learning: Preliminary Research. *Journal of Physics: Conference Series*, *1842*(1), 1–8. https://doi.org/10.1088/1742-6596/1842/1/012080

Azhari, A., & Somakim, S. (2013). Peningkatan Kemampuan Berpikir Kreatif Matematik Siswa Melalui Pendekatan Konstruktivisme Di Kelas Vii Sekolah Menengah Pertama (Smp) Negeri 2 Banyuasin Iii. *Jurnal Pendidikan Matematika*, *7*(2), 1–12. https://doi.org/10.22342/jpm.8.1.992.1-12

Borodina, T., Sibgatullina, A., & Gizatullina, A. (2019). Developing creative thinking in future teachers as a topical issue of higher education. *Journal of Social Studies Education Research*, *10*(4), 226–245.

Cahyono, B., Rohman, A. A., & Fauzi, M. (2021). Profile of students' creative thinking in solving mathematics problems in terms of gender. *IOP Conference Series: Earth and Environmental Science*, *1796*(1), 1–7. https://doi.org/10.1088/1742-6596/1796/1/012117

Cenberci, S. (2018). The Investigation of the Creative Thinking Tendency of Prospective Mathematics Teachers in Terms of Different Variables. *Journal of Education and Training Studies*, *6*(9), 78. https://doi.org/10.11114/jets.v6i9.3434

ElSaid, O. A., & Fuentes, M. del M. F. (2018). Creative Thinking and Entrepreneurial Attitudes Among Tourism and Hospitality Students: The Moderating Role of the Environment. *Journal of Hospitality and Tourism Education*, *31*(1), 23–33. https://doi.org/10.1080/10963758.2018.1480963

Ermayanti, E., Anwar, Y., & Santri, D. J. (2021). Analysis of students' creative thinking on plant microtechnical laboratory practices. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, *7*(2), 111–116. https://doi.org/10.22219/jpbi.v7i2.12321

Gurak-Ozdemir, S., Acar, S., Puccio, G., & Wright, C. (2019). Why Do Teachers Connect Better With Some Students Than Others? Exploring the Influence of Teachers' Creative-Thinking Preferences. *Gifted and Talented International*, *34*(1), 102–115. https://doi.org/10.1080/15332276.2019.1684221

Hobri, H., Suharto, S., & Rifqi Naja, A. (2018). Analysis of students' creative thinking level in problem solving based on national council of teachers of mathematics. *Journal of Physics: Conference Series*, *1008*(1). https://doi.org/10.1088/1742-6596/1008/1/012065

Madyani, I., Yamtinah, S., & Utomo, S. B. (2019). Profile of Creative Thinking Skills on Junior High School Students in Science Learning by Gender. *JScientiae Educatia: JJurnal Pendidikan Sains*, *8*(2), 119–130. https://doi.org/10.1088/1742-6596/1567/2/022049

Martinsen, Ø. L. (2011). The creative personality: A synthesis and development of the creative person profile. *Creativity Research Journal*, *23*(3), 185–202. https://doi.org/10.1080/10400419.2011.595656

Murtianto, Y. H., Rahmawati, N. D., & Apriana, D. (2020). Creative thinking profile of students in the completion of the area of 2D-shapes reviewed from the type of personality of Myer-Briggs dimension. *Journal of Physics: Conference Series*, *1663*(1), 1–11. https://doi.org/10.1088/1742-6596/1663/1/012013

Nurhamidah, D., Masykuri, M., & Dwiastuti, S. (2018). Profile of senior high school students' creative thinking skills on biology material in low, medium, and high academic perspective. *Journal of Physics: Conference Series*, *1006*(1), 1–7. https://doi.org/10.1088/1742-6596/1006/1/012035

Roberts, R. P., Grady, C. L., & Addis, D. R. (2020). Creative, internally-directed cognition is associated

with reduced BOLD variability. *NeuroImage*, *219*(1), 1–15. https://doi.org/10.1016/j.neuroimage.2020.116758

Saprudin, S., Liliasari, S., Prihatmanto, A. S., & Setiawan, A. (2019). Profile of pre-service physics teachers' creative thinking skills on wave and optics course. *Journal of Physics: Conference Series*, *1157*(3), 6–10. https://doi.org/10.1088/1742-6596/1157/3/032030

Scholer, M., Lemétayer, F., & Schiltz, L. (2015). Revealing the creative process in music psychotherapy by applying a test of creative thinking and clinical observational frames. *Nordic Journal of Music Therapy*, *25*(3), 229–247. https://doi.org/10.1080/08098131.2015.1034757

Sugiyanto, F. N., Masykuri, M., & Muzzazinah, M. (2018). Analysis of senior high school students' creative thinking skills profile in Klaten regency. *Journal of Physics: Conference Series*, *1006*(1), 1–5. https://doi.org/10.1088/1742-6596/1006/1/012038

Sugiyono. (2016). *Metode Penelitian Kombinasi (Mixed Methods).* Bandung. Alfabeta

Trisnayanti, Y., Ashadi, Sunarno, W., & Masykuri, M. (2020). Creative thinking profile of junior high school students on learning science. *Journal of Physics: Conference Series*, *1511*(1), 1–9. https://doi.org/10.1088/1742-6596/1511/1/012072