Volume 9 Number 1, April 2024, pp. 117-122
P-ISSN:2477-7935
E-ISSN:2548-6225
DOI: 10.59052/edufisika.v9i1.29637

ANALYSIS OF HIGH SCHOOL STUDENTS' CREATIVITY ABILITY IN SOLVING PHYSICS PROBLEMS

Mashelin Wulandari[1], Edna Virginia Rodriguez[2], Sara Afrianda[3]

[1] Universitas Negeri Yogyakarta, Yogyakarta, Indonesia
[2] University College Mayor Of Cundinamarca, Bogota, Colombia
[3] Universitas Jambi, Jambi, Indonesia
Corresponding author email: mashelinwulandari@gmail.com

Article Info
Received: 28 Nov 2023
Revised: 15 Jan 2024
Accepted: 22 Mar 2024
OnlineVersion: 30 Apr 2024

Abstract :
teaching and learning process is an activity that involves various elements that interact with each other to achieve a goal, for example student creativity. This research aims to analyze the influence of students' creative abilities on their ability to solve physics problems. This research is qualitative research with a type of literature study. The data analyzed is secondary data obtained through research documents in reputable journals. The results of research data analysis show that there is a positive influence between student creativity on the ability to solve physics problems on the subject of physical optics in class XI-A Senior high school 3 Jombang students. This creative ability is one of the important abilities for students to have in order to achieve optimal learning outcomes. Novelty in this research is information regarding the influence of creativity on problem-solving abilities in physics subjects.

Keywords: Creativity Ability, Physics Learning, Problem Solving

INTRODUCTION

Physics is a branch of natural science that is fundamental for students to be able to understand natural phenomena that occur around them (Irwandani et al., 2017). Natural Sciences begins to be presented with the hope that students will master the concepts of Natural Sciences and be able to apply scientific methods based on a scientific attitude to solve the problems they face. Physics is part of natural science which is a systematic effort to build and organize knowledge in the form of explanations that can be tested and are able to predict natural phenomena (Ibnu et al., 2019). Physics is a subject that requires more understanding than memorization (Dudeliany & Mahardika, 2021). The aim of learning physics is to master the ability to apply physics concepts in the field to be studied. Physics learning is expected to be carried out based on direct experiential activities involving students actively as activities to build ideas in obtaining something. With this activity, students are expected to gain an understanding of facts and concepts about nature and develop creativity in everyday life (Lindawati et al., 2013).

The ability to think creatively is one of the cognitive characteristics of creativity. Creative thinking skills are one of the cognitive components that support student success. However, creativity tends to be given less consideration when studying mathematics. Mathematical creative thinking skills

are mathematical abilities that include fluency, flexibility, originality and flexibility (Dilla et al., 2018). When it comes to creative thinking or problem solving, many people are reluctant to identify as "creative," or feel uncomfortable with intellectual risk-taking and openness (Henriksen et al., 2017). The ability to think creatively is a product of creativity, while creative activities are activities in learning that are directed at encouraging or bringing out student creativity (Purwaningrum, 2016). The ability to think creatively is needed to find new innovations in human life, so it is very important to develop it through the learning process so that students are trained to have the ability to find and determine something new in facing problems and are able to find many possible answers to these problems (Florentina & Leonard, 2017; Mokambu, 2021). This also encourages students in everyday life, they will be able to find solutions to problems that arise in society because they are trained to think creatively (Utami et al., 2020).

The ability to solve problems is one of the focuses that teachers want to achieve, because through problem solving abilities students can actualize what they get from learning and then apply it to their lives. Problem solving or problem solving is a cognitive process that can be said to be complex (Nurpatri et al., 2022). The ability to solve problems requires special abilities and skills (Taqiyyah et al., 2017). Problem solving activities are a series of processes consisting of several appropriate stages, such as identifying problems, analyzing, finding and implementing solutions (Aristiawan & Istiyono, 2020; Memduhoglu & Keles, 2016). From this process, students have a deep understanding and make decisions about the problems they face (Siringoringo et al., 2018). A person's ability to solve physics problems well is basically the main goal of the educational process, through problem solving abilities, each student's learning outcomes are expected to become more meaningful, and the results of the learning process can be useful for students (Wulandari & Nana, 2021). In line with the description above and considering the importance of students' creative thinking skills as an effort to improve their physics problem solving abilities, researchers feel it is necessary to know the level of students' creative thinking skills in solving physics problems.

There are several studies that are relevant to this research. Research by Wahyuni & Kurniawan (2018) analyzed the relationship between creative thinking abilities and learning outcomes. The results of this research show that the ability to think creatively influences student learning outcomes with an insignificant value and the ability to think creatively influences student learning outcomes by 22.5%. Furthermore, research by Fadillah (2016) regarding the influence of problem solving learning on students' mathematical creative thinking abilities. The results of this research indicate that there is a significant difference in students' mathematical creative thinking abilities between the experimental class and the control class. Learning can also be integrated with learning models. Research by Rohim et al (2012) regarding the application of the guided discovery model in physics learning in improving creative thinking abilities. The results of this research indicate that the application of the guided discovery learning model can improve students' creative thinking abilities. Furthermore, research by Damayanti et al (2020) provides information that the use of a flipped classroom-based problem based learning model can facilitate students' creative thinking abilities and make learning more active. Based on the analysis of relevant research, it can be concluded that research on students' creative skills is important for achieving maximum learning outcomes. The novelty in this research is finding information regarding the influence of students' creative abilities in solving physics problems. So the aim of the research is to analyze students' creative abilities in solving physics problems at school.

RESEARCH METHOD

The research conducted was qualitative research. The data in this research was obtained through literature study activities. Researchers in qualitative research are people who unlock, examine and explore the entire space carefully and freely (Halaluddin and Wijaya, 2019). Data analysis uses the Miles and Huberman model with steps including data collection, data reduction, interpreting and concluding (Sartono, 2014). The data in this research was obtained through secondary data, namely from research results documents related to this research. The research documents in this study were obtained from scientific publications in reputable journals. After the article to be used as a reference is obtained, the researcher carries out a review by examining the results of the research.

RESULTS AND DISCUSSION

Information analysis was carried out by collecting information from research by Sambada (2012) regarding the role of student creativity in their ability to solve physics problems in contextual learning. The results of this research are in the form of quantitative data, namely in the form of correlation analysis. The steps taken are as follows: Normality Test, Regression Analysis, and Correlation Analysis. This analysis was carried out to analyze the role of student creativity. The aspects of the creativity tests carried out are presented in the Table 1.

Table 1. The Creativity Test Aspects

No.	Aspect	No.	Aspect
1	Smoothness	10	Look for satisfactory and comprehensive answers
2	Flexibility	11	Passionate, active and dedicated in carrying out his duties
3	Authenticity	12	Think flexible
4	Sensitivity	13	Respond to questions and habitually provide more answers
5	Desire to know	14	Ability to make analysis and synthesis
6	Be open to new experiences	15	Ability to form abstractions
7	Resourceful	16	Have a spirit of inquiry
8	Desire to discover and research	17	Flexibility in background reading abilities
9	Tend to prefer to do heavy tasks		

Measurement of the ability to think creatively in Physics lessons on the subject of optics and physics is carried out using a creativity test. The results of this analysis include the results of normality tests, regression tests and correlation tests. The normality test is a test to measure whether our data has a normal distribution so that it can be used in parametric statistics (inferential statistics). The method commonly used to calculate this problem is Chi Square. But because this test has weaknesses, what we use is Kolmogorov-Smirnov (Widhiarso, 2017). Multiple linear regression is intended to test the influence of two or more independent (explanatory) variables on one dependent variable. This model assumes that there is a straight line/linear relationship between the dependent variable and each predictor (Nurmala, 2012). Correlation analysis is an analytical tool used to find the relationship between independent variables and dependent variables (Mulyana, 2011).

These tests are used by researchers to analyze students' creative abilities in solving physics problems. All data obtained will be processed, then tested starting from normality, regression and correlation so that students' creative abilities are related to solving physics problems.

The normality test results obtained can be seen in Table 2.

Table 2. Normality Test Results

Variable	P	$X^2{}_{calculate}$	$X^2{}_{table}$
Creativity	0.05	7.11	7.81
Problem Solving	0.05	7.49	7.81

The normality test results obtained show that X^2 Calculation is smaller than X^2 table, so the data obtained is normally distributed. The final results of the regression test obtained are presented in Table 3.

Table 3. Regression Test Results

ΣXi	ΣYi	ΣXi^2	ΣXi^2	$\Sigma XiYi$
2675	2613	187375	177153	181970

The regression equation is in the form $\hat{Y} = a + bX$. Based on table 3, the regression equation obtained is $\hat{Y} = 8{,}37 + 0{,}85X$. This linear regression equation model can be used to determine a

student's ability to solve physics problems, if the student's creativity is known. Based on the calculation results in the previous section, it can be seen that student creativity is positively correlated with the ability to solve physics problems on the subject of physical optics. Apart from that, there is a positive influence between student creativity on the ability to solve physics problems on the subject of physical optics in class XI-A Senior High School 3 Jombang, namely an r correlation of 0.752 and a linear regression line equation. $\hat{Y} = 8{,}37 + 0{,}85X$. The level of student creativity plays a real role in the ability to solve problems in physics lessons and the teaching and learning process in contextual learning settings is very helpful in knowing student creativity.

Based on the results of the research analysis above, it can be seen that creativity has a significant influence on physics problem solving abilities. Creativity is very useful in children's development because creativity is a very meaningful ability in later life (Yanuarsi & Mayar, 2022). There are 4 aspects of creativity that are assessed, namely flexible thinking, originality thinking, fluency in thinking, and elaboration (Khoiri et al., 2016). Creativity helps someone to think more broadly, explore various approaches, and find innovative and effective solutions. Creativity provides the freedom to think of unconventional solutions and see problems from different points of view. With a strong imagination, a person can imagine complex physics situations in greater detail, allowing for a deeper understanding of difficult physics concepts. More than just finding solutions, creativity drives innovation in problem-solving approaches, enabling the integration of different concepts and the creation of new methods. The flexibility of thinking obtained through creativity allows adaptation to a variety of situations, while deeper emotional involvement in physics problems can increase motivation and persistence in finding solutions (Astria & Kusuma, 2023). Thus, the ability to be creative is not only a valuable addition in solving physics problems, but also an important element in expanding understanding and development in this field.

CONCLUSION

Based on the results of the literature study in the research above, it can be concluded that there is a positive influence between student creativity on the ability to solve physics problems on the subject of physical optics in class XI-A Senior High School 3 Jombang students. The level of student creativity plays a real role in the ability to solve problems in physics lessons and the teaching and learning process in contextual learning settings is very helpful in knowing student creativity.

ACKNOWLEDGMENTS

The researcher would like to thank all parties who have supported this research

REFERENCES

Aristiawan, & Istiyono, E. (2020). Developing instrument of essay test to measure the problem-solving skill in physics. *Jurnal Pendidikan Fisika Indonesia*, *16*(2), 72–82. https://doi.org/10.15294/jpfi.v16i2.24249

Astria, R., & Kusuma, A. B. (2023). Analisis pembelajaran berdiferensiasi untuk meningkatkan kemampuan berpikir kreatif matematis. *Proximal: Jurnal Penelitian Matematika Dan Pendidikan Matematika*, *6*(2), 112–119. https://doi.org/10.30605/proximal.v6i2.2647

Damayanti, S. A., Santyasa, I. W., & Sudiatmika, A. A. I. A. R. (2020). Pengaruh model problem based-learning dengan flipped classroom terhadap kemampuan berpikir kreatif. *Journal of Chemical Information and Modeling*, *53*(9), 1689–1699.

Dilla, S. C., Hidayat, W., & Rohaeti, E. E. (2018). Faktor Gender dan Resiliensi dalam Pencapaian Kemampuan Berpikir Kreatif Matematis Siswa SMA. *Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang*, *2*(1), 129. https://doi.org/10.31331/medives.v2i1.553

Dudeliany, J. A., & Mahardika, M. (2021). Penerapan Model Pembelajaran Berbasis Masalah (PBM) disertai LKS Berbasis Multirepresentasi pada Pembelajaran IPA-Fisika Di SMP. *Jurnal Pendidikan*, *3*(3), 254–259. https://doi.org/10.19184/jpf.v3i3.23281

Fadillah, A. (2016). Pengaruh Pembelajaran Problem Solving Terhadap Kemampuan Berpikir Kreatif Matematis Siswa. *FIBONACCI: Jurnal Pendidikan Matematika Dan Matematika*, *2*(1), 1. https://doi.org/10.24853/fbc.2.1.1-8

Florentina, N., & Leonard. (2017). Pengaruh model pembelajaran kooperatif terhadap kemampuan berpikir kreatif matematis siswa noviyani. *Jurnal Formatif*, *7*(2), 96–106.

Henriksen, D., Richardson, C., & Mehta, R. (2017). Design thinking: A creative approach to educational problems of practice. *Thinking Skills and Creativity*, *26*(March), 140–153. https://doi.org/10.1016/j.tsc.2017.10.001

Ibnu, M., Indriyani, B., Inayatullah, H., & Guntara, Y. (2019). Aplikasi Rasch Model: Pengembangan Instrumen Tes untuk Mengukur Miskonsepsi Mahasiswa. *Prosiding Seminar Nasional Pendidikan FKIP*, *2*(1), 205–210.

Irwandani, I., Latifah, S., Asyhari, A., Muzannur, M., & Widayanti, W. (2017). Modul Digital Interaktif Berbasis Articulate Studio'13: Pengembangan pada Materi Gerak Melingkar Kelas X. *Jurnal Ilmiah Pendidikan Fisika Al-Biruni*, *6*(2), 221–231. https://doi.org/10.24042/jipfalbiruni.v6i2.1862

Khoiri, N., Marinia, A., & Kurniawan, W. (2016). Keefektifan Model Pembelajaran PjBL (Project Based Learning) terhadap Kemampuan Kreativitas dan Hasil Belajar Siswa Kelas XI. *Jurnal Penelitian Pembelajaran Fisika*, *7*(2), 142–146. https://doi.org/10.26877/jp2f.v7i2.1309

Lindawati, Fatmariyanti, S. D., & Maftukhin, A. (2013). Penerapan Model Pembelajaran Project Based Learning Untuk Meningkatkan Kreativitas Siswa Man I Kebumen. *Radiasi*, *3*(1), 42–45. https://doi.org/10.2991/seadric-17.2017.81

Memduhoglu, H. B., & Keles, E. (2016). Evaluation of the Relation between Critical-Thinking Tendency and Problem- Solving Skills of Pre-Service Teachers. *Journal of Educational Sciences Research*, *6*(2), 75–94. https://doi.org/10.12973/jesr.2016.62.5

Mokambu, F. (2021). Pengaruh model project based learning terhadap kemampuan berpikir kreatif siswa pada pembelajaran ipa di kelas V SDN 4 Talaga Jaya. *PROSIDING SEMINAR NASIONAL PENDIDIKAN DASAR "Merdeka Belajar Dalam Menyambut Era Masyarakat 5.0," November*, 56–62.

Mulyana . (2011). Peningkatan Kreativitas Mahasiswa Dalam Pemanfaatan Barang Bekas Pada Mata Kuliah Media Pembelajaran. *Jurnal Pendidikan Dasar Nusantara.* Vol.1(2):1-15.

Nirmala. (2012). *Statistik Deskriptif &Regresi Linier Berganda dengan SPSS*. Semarang: Semarang University Press.

Nurpatri, Y., Dini, M., Zaturrahmi, Z., & Indrawati, E. S. (2022). Analisis Peningkatan Keterampilan Pemecahan Masalah Siswa SMP pada Pembelajaran Fisika. *Jurnal Pendidikan Mipa*, *12*(3), 912–918. https://doi.org/10.37630/jpm.v12i3.701

Purwaningrum, J. P. (2016). Mengembangkan Kemampuan Berpikir Kreatif Matematis Melalui Discovery Learning Berbasis Scientific Approach. *Refleksi Edukatika*, *6*(2), 145–157. https://doi.org/10.24176/re.v6i2.613

Rohim, F., Susanto, H., & Ellianawati. (2012). Penerapan Model Discovery Terbimbing Pada Pembelajaran Fisika Untuk Meningkatkan Kemampuan Berpikir Kreatif. *Unnes Physics Education Journal*, *1*(1), 2.

Sambada, D. (2012). Peranan Kreativitas Siswa Terhadap Kemampuan Memecahkan Masalah Fisika Dalam Pembelajaran Kontekstual. *Jurnal Penelitian Fisika Dan Aplikasinya (JPFA)*, *2*, 1–47.

Siringoringo, E., Yaumi, M. R., Santhalia, P. W., & Kusairi, S. (2018). Kemampuan Pemecahan Masalah Siswa Kelas Xi Sma Pada Materi Suhu Dan Kalor. *Jurnal Pendidikan Matematika Dan Sains*, *6*(2), 114–122.

Taqiyyah, S. A., Subali, B., & Handayani, L. (2017). Implementasi bahan ajar sains berbahasa inggris berbasis metakognitif untuk meningkatkan kemampuan pemecahan masalah siswa SMP. *Jurnal Inovasi Pendidikan IPA*, *3*(2), 224. https://doi.org/10.21831/jipi.v3i2.14859

Utami, R. W., Endaryono, B. T., & Djuhartono, T. (2020). Meningkatkan kemampuan berpikir kreatif matematis siswa melalui pendekatan open-ended. *Jurnal Ilmiah Kependidikan*, *7*(1), 43–48.

Wahyuni, A., & Kurniawan, P. (2018). Hubungan Kemampuan Berpikir Kreatif Terhadap Hasil Belajar Mahasiswa. *Matematika*, *17*(2), 1–8. https://doi.org/10.29313/jmtm.v17i2.4114

Wulandari, S., & Nana. (2021). Studi literatur penggunaan pbl berbasis video untuk meningkatkan kemampuan pemecahan masalah. *Jurnal Pendidikan Fisika*, *9*(1), 7–17.

Yanuarsi, & Mayar, F. (2022). Pengaruh Permainan Ludo Bergambar Terhadap Kecerdasan Naturalis Anak di Taman Kanak-kanak Tunas Bangsa Bukittinggi. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *4*(1), 428. https://doi.org/10.31004/obsesi.v4i1.358