Indonesian Journal of Educational Innovation (IJEI)
Volume 1, Issue, August 2025
Pages: 66-71

ISSN : 3109-0176
E-ISSN : 3109-0168

The Effectiveness of the Project-Based Learning (PjBL) Model on Students' Creativity

Rina Martiana[1*], Lalu Muh Rudi Susanto[2], Khaerul Anam[3], Heri Rismawan[4]

[1]Master's Program in Science Education, Postgraduate Program, University of Mataram, Mataram, Indonesia;
[2]Ammah, Faculty of Ushuluddin, Al-Azhar University, Cairo, Egypt;
[3]Master's Program in Islamic Communication and Broadcasting, Postgraduate Program, State Islamic University (UIN) of Mataram, Mataram, Indonesia;
[4]Department of Physics, Faculty of Engineering, Science and Education, University of Muhammadiyah Lamongan, Lamongan, Indonesia.

Article Info

Article History
Received: June 3, 2025
Revised: June 12, 2025
Accepted: June 30, 2025
Published: August 31, 2025

*Corresponding Author:

Rina Martina,
University of Mataram,
rynamta@gmail.com

Abstract

The use of teacher-centred learning in schools has become a common issue in education. This study aims to analyze the effectiveness of the Project-Based Learning (PjBL) model on students' creativity. The objective of this study is to examine and analyze the effectiveness of the Project-Based Learning (PjBL) model in enhancing students' creativity. The research method employed a quantitative descriptive approach with a one-group pretest-posttest design, involving 18 students from class XI at MA Pondok Pesantren Darul Muhsinin as the sample. Data was collected through tests. The analysis results showed that the implementation of PjBL in class XI increased student scores, improving learning outcomes from a pretest score of 38.6 to a posttest score of 67.7. There was a significant difference between the pretest and posttest scores, indicating that Project-Based Learning is an effective method for enhancing students' creativity in learning.

Keywords: Project based learning; creativity; conceptual understanding; science; creativity

INTRODUCTION

Project-Based Learning (PjBL) is one of the most effective learning models for enhancing students' creativity. This model provides students with opportunities to explore ideas, collaborate in teams, and develop innovative solutions through meaningful real-world projects (Maulana, 2020). PjBL aligns with the spirit of the Merdeka Curriculum, which emphasizes the importance of collaborative, creative, and exploratory learning in response to 21st-century challenges (Sari et al., 2024). The curriculum provides both teachers and students with the flexibility to create active and engaging learning environments.

The reinforcement of 21st-century skills such as critical thinking, problem-solving, and collaboration is an essential component of PjBL. Ferrara et al. (2022) emphasized that the use of technology and robotics strongly supports the development of these skills, and such technologies have been widely implemented in technology-based schools in Indonesia. This suggests that the PjBL approach is not only relevant to local contexts but is also adaptable to global technological advancements.

PjBL also aligns with the scientific approach implemented within the Merdeka Curriculum. This approach emphasizes the processes of observation, questioning, exploration, reasoning, and communication, all of which have been proven to improve students' conceptual understanding. Kaur et al. (2023) found that science curricula based on scientific approaches have a positive impact on students' understanding of complex scientific concepts. In this context, PjBL and Problem-Based Learning, as implemented in "penggerak" (pilot reform) schools, support the integration of scientific approaches into teaching practices.

Numerous studies have shown that PjBL can enhance students' creative thinking abilities. Wulandari et al. (2024) found that the implementation of PjBL had a positive effect on students' learning outcomes and creative thinking skills in physics subjects. Similar findings were reported by Satria and Haryono (2024), who observed an increase in creativity through project-based learning modules at the elementary level. Arfida and Sari (2024) also highlighted that incorporating local wisdom into environmental projects was effective in stimulating students' innovative ideas.

Furthermore, PjBL has proven to foster creativity in collaborative contexts. Anugrah et al. (2023) demonstrated that project-based instructional materials improved students' creativity in writing fantasy stories. At the higher education level, Maimon et al. (2024) reported a significant increase in scientific creativity when students engaged in independently designed projects. In language learning, Dyah et al. (2023) found that group discussions and exploration within PjBL contexts encouraged the development of original ideas among students.

Despite its benefits, the implementation of PjBL presents various challenges, particularly in science education, such as physics. Fitriyah and Ramadani (2021) noted that the model requires considerable time and effort in both project design and assessment. Nasution et al. (2022) also emphasized the difficulty in formulating achievement indicators that are measurable and comprehensive, which remains a primary obstacle in evaluating project-based learning outcomes.

Beyond technical issues, teacher readiness is also a key factor in the successful implementation of PjBL. Sharma et al. (2023) argued that the development of 21st-

century skills highly depends on teachers' ability to design and facilitate transformative learning. Therefore, enhancing teachers' capacity through practice-based training and intensive mentoring is essential.

In addition, the rapidly changing demands of the era require education not only to adapt but also to innovate actively. Umamah and Andi (2019) stressed the importance of continuous educational transformation to ensure that teaching methods and learning approaches remain relevant. In this context, student creativity emerges as a crucial competency that must be nurtured.

Rohman et al. (2021) stated that creative students are capable of thinking critically, generating new solutions, and adapting quickly to change. Creativity is defined as the ability to produce novel ideas and innovative solutions in the face of challenges (Ridha et al., 2022). This process involves unconventional thinking, enabling individuals to connect diverse concepts, create new things, and perceive problems from alternative perspectives (Nur Hikmah & Dwi Agustin, 2020).

According to Anshori et al. (2019), there are four leading indicators for assessing creativity: fluency (the ability to generate multiple ideas or solutions), flexibility (the ability to produce ideas from various categories or perspectives), originality (the ability to express unique and original ideas), and elaboration (the ability to develop and explain ideas in detail). Sinta et al. (2022) emphasized that these aspects can be observed concretely within the context of project-based learning.

This study aims to determine the effectiveness of the Project-Based Learning (PjBL) model in enhancing students' creativity. Considering curriculum policies that emphasize active and student-centred learning, along with the growing importance of creativity in addressing global challenges, PjBL is expected to serve as an alternative solution for promoting creativity in the era of educational transformation.

MATERIALS AND METHODS

Time and Place

This research was conducted from April to June 2025 at MA Pondok Pesantren Darul Muhsinin NW Gerantung.

Research Design

The study employed a quantitative approach using a one-group pretest-posttest design. This design involved a single group that received treatment through the implementation of the Project-Based Learning (PjBL) model, with measurements of students' creativity taken before and after the intervention to observe its effect.

Population and Sample

The population in this study consisted of all eleventh-grade students at MA Pondok Pesantren Darul Muhsinin NW Gerantung in the 2024/2025 academic year. The sample consisted of 18 students from one class, selected using a saturated sampling technique, in which all members of the population were included as the research sample. The study involved two main variables. The independent variable was the implementation of the Project-Based Learning (PjBL) model, which served as the treatment given to the students during the learning process. The dependent variable was students' creativity, which was measured before and after the implementation of the PjBL model to assess its effectiveness.

To collect the necessary data, several instruments and materials were used. These included observation sheets to monitor classroom activities, documentation to record the learning process, and a teaching module developed based on the principles of the PjBL model to guide the structured delivery of instruction. Additionally, a test instrument consisting of five essay questions was developed to assess students' creativity. These questions were constructed based on indicators of creative thinking, namely, fluency, flexibility, originality, and elaboration, allowing for a comprehensive evaluation of students' creative abilities.

Research Procedure

The research procedure began with problem identification through classroom observation. The next step involved gathering information and reviewing relevant literature on the Project-Based Learning model and student creativity. This was followed by planning and implementing instruction based on the PjBL model. A pretest was administered to assess students' initial creativity levels, followed by the implementation of the PjBL model in the learning process. Following the intervention, a post-test was conducted to assess students' creativity. Data from both the pretest and posttest were collected and analyzed to draw a conclusion.

Data Analysis Techniques

The data analysis technique used in this study was a paired sample t-test to determine the difference in scores between the pretest and posttest. The analysis was conducted quantitatively using statistical software to assess the significance of the increase in students' creativity after the application of the Project-Based Learning model.

RESULTS AND DISCUSSION

Result

The Project-Based Learning (PBL) implemented in this study focused on the topic of fluid mechanics, according to the principles of the PBL learning model. The implementation of PjBL is carried out as shown in Table 1.

Project-based Learning (PBL) on the topic of fluidity was implemented through a series of structured stages. The process began with determining fundamental questions, where students were encouraged to explore essential inquiries related to fluid concepts. This stage aimed to spark curiosity and lay the foundation for critical thinking. Next, students designed project plans that applied their understanding of fluid principles by constructing real-world models such as a hydraulic jack and a water wheel. Once the project plans were established, students created a schedule to manage their time effectively throughout the project's completion.

During the implementation phase, teachers actively monitored students' progress through discussions and supervision, ensuring that the work stayed on track and

providing support when challenges arose. Upon project completion, students presented their work, explained the innovations involved, and linked their creations to the supporting literature as part of the project assessment. Finally, the learning experience was evaluated by reflecting on the overall process, identifying areas for improvement, and collecting feedback from students. Through these stages, the PjBL syntax not only facilitated a deeper understanding of fluid concepts but also promoted the development of students' critical thinking, collaboration, and problem-solving skills.

Table 1. PjBL Syntax

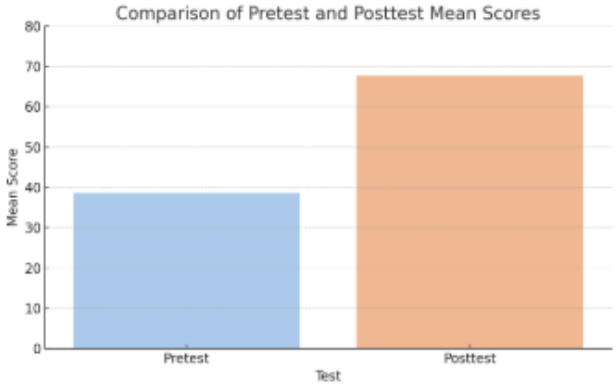
PjBL Syntax	Aspect
Determining fundamental questions	Fundamental questions related to the concept of fluid were presented during the learning process.
Designing project plans	The project involved applying fluid concepts by constructing a hydraulic jack and a water wheel.
Creating a schedule	The time required to complete the planned project.
Monitoring students and project progress	Discussing and monitoring students' project work.
Assessing project outcomes	Assessing the completed project by having students present their work and explain the innovation involved, supported by the provided literature.
Evaluating the learning experience	Evaluating the learning process by identifying its weaknesses and gathering feedback from students

The project-based learning process was carried out with the students of MA Pondok Pesantren Darul Muhsinin NW Gerantung. The projects created were related to the topic of fluid mechanics, involving the construction of a hydraulic jack and a water wheel.

Figure 1. Results of the PjBL Project

The data analysis results obtained using SPSS 21, related to students' creativity in the implemented learning process, are presented as follows:

Graph 1: Pretest-Posttest Mean Score



The graph illustrates a comparison of the mean scores between the pretest and posttest results of the students. There is a significant increase in the mean score following the implementation of the learning process. The pretest shows an average score of approximately 38,6, reflecting the students' initial understanding before receiving any instructional intervention. In contrast, the posttest displays a sharp increase, with an average score of around 67,7, indicating the students' performance after undergoing the learning process. This improvement suggests that the applied instructional method had a positive impact on enhancing the students' comprehension and academic achievement.

Table 2. Paired Sample t-Test

	Mean	N	Std. Deviation	Std. Error Mean
Pretest	38.6	18	8.5	2.0
Posttest	67.7	18	9.3	2.2

Based on the data from the Paired Sample Statistics table, there is a difference in the mean scores between the pretest and posttest. The pretest mean score was 38.6, while the posttest mean score was 67.7 after implementing the Project-Based Learning (PjBL) model in the learning process.

Table 3. Significant Correlation

Pair	Correlation	Significance (2-tailed)
Pretest - Posttest	0.273	0.262

The analysis results indicate a weak correlation between the pretest and posttest, with a correlation value of 0.273. Meanwhile, the significance value is 0.262, which is greater than 0.05, indicating that the observed correlation is not statistically significant. This means that the relationship

between pretest and posttest creativity scores cannot be considered significant. Therefore, it is necessary to conduct a difference test.

Table 4. T-test Result

Pair	Mean Difference	t	df	Sig. (2-tailed)
Pretest - Posttest	-29.1	-9.35	17	0.000

Based on the table above, there is a statistically significant difference, as the p-value is 0.00 < 0.005. This suggests that there is a difference in students' creativity before and after the implementation of the Project-Based Learning model. Therefore, it can be concluded that Project-Based Learning is effective in enhancing students' creativity in the learning process.

Discussion

The results of this study reveal a significant improvement in students' creativity following the implementation of the Project-Based Learning (PjBL) model. This finding is supported by the increase in the mean score from the pretest (M = 38.6) to the posttest (M = 67.7), as well as the results of the paired sample t-test, which showed a statistically significant difference (t = -9.35, p < 0.005). These findings suggest that PjBL effectively enhances students' creative abilities by engaging them in meaningful, real-world problem-solving tasks that encourage critical thinking, collaboration, and innovation (Nuryati, Masitoh, & Arianto, 2020).

This result is consistent with previous studies, which demonstrate that PjBL can foster creativity by involving students in constructing their knowledge and producing authentic projects (Kusadi, Sriartha, & Kertih, 2020). The structure of PjBL, which enables students to plan, research, develop, and present their projects, provides rich opportunities for divergent thinking and original idea generation —key components of creativity. Nopiyanto and Arwin (2023) found that students showed increased creativity when tasked with designing and producing learning videos, supporting the idea that hands-on projects stimulate creative output.

Moreover, the absence of a significant correlation between pretest and posttest scores (r = 0.273, p = 0.262) may indicate that students' initial creativity levels were not predictive of their performance after the learning intervention. This reinforces the idea that the instructional design itself, namely PjBL, was the key factor influencing the development of creativity. Nurkanti et al. (2024) confirmed this through their research on biology teacher candidates, demonstrating a measurable improvement in creative ability following PjBL-based instruction.

In the context of science education, PjBL has also been integrated with STEAM (Science, Technology, Engineering, Arts, and Mathematics) approaches to strengthen students' critical and creative thinking skills (Astriani et al., 2023). This integration not only enhances creativity but also prepares students to meet the challenges of 21st-century learning demands.

The findings of this research not only demonstrate the effectiveness of Project-Based Learning in enhancing students' creativity but also align with broader educational theories and empirical studies that support the use of active, student-centred pedagogies. These results have important implications for instructional design, suggesting that incorporating PjBL into the curriculum can significantly improve creative competencies among students.

CONCLUSION

This study aimed to determine the effectiveness of the *Project-Based Learning* (PjBL) model in enhancing students' creativity. Based on the data analysis, it was found that the implementation of PjBL significantly improved students' creativity scores, with the average pretest score increasing from 38.6 to a posttest average of 67.7. The results of the *paired sample t-test* showed that this difference was statistically significant (p = 0.000 < 0.05), indicating a tangible and measurable effect of PjBL on student creativity. Therefore, it can be concluded that the Project-Based Learning model is effective in enhancing students' creativity. The improvement encompasses key aspects of creative thinking, including fluency (the ability to generate numerous ideas), flexibility (the ability to view problems from various perspectives), originality (the ability to express unique ideas), and elaboration (the ability to develop ideas in detail). These findings show that PjBL successfully stimulates students' creative thinking skills comprehensively.

Although this study involved only 18 eleventh-grade students at MA Pondok Pesantren Darul Muhsinin NW Gerantung, the results can be cautiously generalized to similar populations, particularly senior high school students in Islamic boarding school settings. This generalization is supported by previous studies, which consistently highlight the positive impact of PjBL on creativity development across different educational levels. In conclusion, PjBL is a promising instructional model that should be integrated into classroom practices, especially in the context of the *Merdeka Curriculum*, which emphasises active, collaborative, and student-centred learning to foster 21st-century skills, including creativity.

ACKNOWLEDGEMENTS

The researcher would like to express sincere gratitude to all parties who have provided support and contributions throughout the implementation and completion of this research. Special thanks are extended to the lecturer of the Scientific Writing course at the University of Mataram for the guidance, direction, and motivation given during the research process. The researcher also wishes to thank the leadership, teaching staff, and all students of MA Pondok Pesantren Darul Muhsinin NW Gerantung for granting permission, providing support, and actively participating in this study, which enabled the research to run smoothly and achieve the expected outcomes.

REFERENCE

Al Anshori, I., Rokhmat, J., & Gunada, I. W. (2019). Penerapan model pembelajaran kausalitik dalam meningkatkan kreativitas peserta didik. Jurnal Pendidikan Fisika dan Teknologi, 5(2), 205–212. https://doi.org/10.29303/jpft.v5i2.1215

Anugrah, A. F., Marzuki, M., & Andriani, N. (2023). Pengembangan perangkat pembelajaran berbasis proyek untuk meningkatkan kreativitas menulis cerita fantasi siswa. Jurnal Inovasi Pendidikan dan Pembelajaran Sekolah Dasar, 7(2), 141–151. https://doi.org/10.17509/jppsd.v7i2.43597

Arfida, N. A., & Sari, D. P. (2024). Increasing high school students' creativity in local wisdom-based environmental studies through the project-based learning model. Jurnal Kimia dan Pendidikan Kimia, 9(1), 1–10. https://doi.org/10.20961/jkpk.v9i1.85224

Astriani, D., Martini, R., Fauziah, A. N. M., & Purnomo, A. R. (2023). Steam project-based learning (PJBL): Efforts to train critical thinking skills for prospective science teachers. Jurnal Penelitian Pendidikan IPA, 9(10), 7909–7915. https://doi.org/10.29303/jppipa.v9i10.3823

Cimermanova, I. (2022). The effects of the 21st century skills curriculum on the development of students' creative thinking skills. Procedia - Social and Behavioral Sciences. https://doi.org/10.1016/j.sbspro.2022.10.230

Dyah, E., Sari, P., & Adiarti, D. (2023). Assessment of students' creative thinking skill on the implementation of project-based learning. International Journal of Language Education, 7(3), 414–428. https://doi.org/10.26858/ijole.v7i3.38462

Ferrara, F., Mangione, G. R., & De Felice, F. (2022). Towards 2030: Enhancing 21st century skills through educational robotics. Frontiers in Education, 7, 955285. https://doi.org/10.3389/feduc.2022.955285

Fitriyah, A., & Ramadani, S. D. (2021). Penerapan metode project based learning. Journal of Education, 3(1), 7. https://doi.org/10.26737/jpmi.v1i1.76

Kaur, T., Blair, D., & Stannard, W. (2023). Developing and implementing an Einsteinian science curriculum from years 3 to 10: Part A concepts, rationale and learning outcomes. arXiv Preprint. https://doi.org/10.48550/arXiv.2306.17342

Kayan-Fadlelmula, F., Elçi, A. N., & Yalçın, A. E. (2022). Components of Education 4.0 in 21st century skills frameworks: Systematic review. Sustainability, 14(3), 1493. https://doi.org/10.3390/su14031493

Kurniawan, A. B., & Hidayah, R. (2020). Innovation in Merdeka curriculum e-module: Integrating scientific approach with socio-scientific issues to improve students' critical thinking. Indonesian Journal of Educational Research and Review, 3(2), 178–187. https://doi.org/10.23887/ijerr.v3i2.82919

Kusadi, N. M. R., Sriartha, I. P., & Kertih, I. W. (2020). Model pembelajaran project based learning terhadap keterampilan sosial dan berpikir kreatif. Thinking Skills and Creativity Journal, 3(1), 18–27. https://doi.org/10.23887/tscj.v3i1.24661

Maimon, S., Jatmiko, B., Supardi, I., & Suprianto, S. (2024). The influence of the project-based learning model on the scientific creativity of physics education undergraduate students at Madura Islamic University. Science Education Journal, 8(1), 15–25. https://doi.org/10.21070/sej.v8i1.1651

Maulana, M. (2020). Penerapan model project based learning berbasis STEM pada pembelajaran fisika siapkan kemandirian belajar peserta didik. Jurnal Teknodik, 24(2), 39–50. https://doi.org/10.32550/teknodik.v0i2.678

Nasution, T., Ambiyar, A., & Wakhinuddin, W. (2022). Model project-based learning untuk meningkatkan hasil belajar di perguruan tinggi. Edukasi: Jurnal Pendidikan, 20(1), 152–165. https://ejournal.stkipbbm.ac.id/index.php/edukasi/article/view/876

Nopiyanto, Y. E., & Arwin. (2023). Project based learning and creativity: is the application of project based learning can increase student creativity in making learning videos. Jurnal Pendidikan Kesehatan Rekreasi, 9(1), 65–73. https://doi.org/10.5281/zenodo.7559570

Nur Hikmah, L., & Dwi Agustin, R. (2020). Pengaruh model pembelajaran project based learning terhadap kemampuan berpikir kreatif siswa. Jurnal PRISMATIKA, 1(1), 1–9. https://doi.org/10.33503/prismatika.v1i1.291

Nurkanti, M., Tresnawati, C., Aryanti, F., & Ibrahim, Y. (2024). Implementation of project based learning in assessing the creativity abilities of prospective biology teachers. Research and Development in Education (RaDEn), 4(1), 67–75. https://doi.org/10.22219/raden.v4i1.32176

Nuryati, D. W., Masitoh, S., & Arianto, F. (2020). Pengaruh project based learning terhadap kreativitas peserta didik di masa pandemi. Educate: Jurnal Teknologi Pendidikan, 5(2), 98–106. https://doi.org/10.32832/educate.v5i2.3375

Papagiannis, P., & Pallaris, G. (2024). Evaluating 21st century skills development through makerspace workshops in computer science education. arXiv Preprint. https://doi.org/10.48550/arXiv.2411.05012

Ridha, M. R., Zuhdi, M., & Ayub, S. (2022). Pengembangan perangkat pembelajaran PjBL berbasis STEM dalam meningkatkan kreativitas fisika peserta didik. Jurnal Ilmiah Profesi Pendidikan, 7(1), 223–228. https://doi.org/10.29303/jipp.v7i1.447

Rohman, A., Ishafit, I., & Husna, H. (2021). Pengaruh penerapan model project based learning terintegrasi STEAM terhadap berpikir kreatif ditinjau dari pemahaman konsep fisika siswa SMA pada materi dinamika rotasi. Jurnal Pendidikan Fisika dan Teknologi, 9(1), 15–21. http://jurnal.fkip.untad.ac.id/index.php/jpft

Sari, Y., Maulana, R., & Hasanah, D. (2024). The integration of 21st century skills in the curriculum of education. Heliyon, 10, e35148. https://doi.org/10.1016/j.heliyon.2024.e35148

Satria, A., & Haryono, H. (2024). Enhancing learning outcomes and creative thinking through project-based learning modules in fourth grades. International Journal of Pedagogy and Teacher Education, 4(2), 100–110. https://doi.org/10.20961/ijpte.v4i2.89320

Sharma, N., Jindal, S., & Mehrotra, M. (2023). Teaching 21st century skills: Understanding the depth and width of the challenges to shape proactive teacher education programmes. Sustainability, 15(9), 7365. https://doi.org/10.3390/su15097365

Sinta, M., Sakdiah, H., Novita, N., Ginting, F. W., & Syafrizal, S. (2022). Penerapan model pembelajaran project based learning (PjBL) untuk meningkatkan kemampuan berpikir kreatif siswa pada materi hukum gravitasi Newton di MAS Jabal Nur. Jurnal Phi: Jurnal Pendidikan Fisika dan Fisika Terapan, 3(3), 24. https://doi.org/10.22373/p-jpft.v3i3.14546

Tammets, K., Pata, K., & Laanpere, M. (2021). Promoting students' perceived self-efficacy towards 21st century skills through everyday life-related scenarios. Education Sciences, 11(10), 570. https://doi.org/10.3390/educsci11100570

Thana, P. M., Wulandari, R. S., & Faizal, M. (2023). Developing students' 21st-century skills through a multidisciplinary approach. Journal of Digital Learning and Distance Education, 1(7). https://doi.org/10.56778/jdlde.v1i7.64

Umamah, C., & Andi, H. J. (2019). Pengaruh model project based learning terhadap keterampilan berpikir kreatif dalam pembelajaran fisika terapan. Jurnal Pendidikan Fisika dan Keilmuan (JPFK), 5(1), 7–14. https://doi.org/10.25273/jpfk.v5i1.3033

Wulandari, N. O., Sutrio, Doyan, A., & Rahayau, S. (2024). The influence of project based learning model on creative thinking skills and physics learning outcomes. Jurnal Penelitian Pendidikan IPA, 10(12), 10660–10669. https://doi.org/10.29303/jppipa.v10i12.9738

Yamin, Y., Permanasari, A., Redjeki, S., & Sopandi, W. (2020). The effects of project-based learning model toward students' creative thinking skill on civics subject. Jurnal Penelitian Pembelajaran Fisika, 10(1), 70–76. https://doi.org/10.26877/jp2f.v10i1.3507