Jurnal Pijar MIPA
https://jurnalfkip.unram.ac.id/index.php/JPM

ISSN 1907-1744 (Print)
ISSN 2460-1500 (Online)

Analysis of the Design and Feasibility of Volta Drive Connect as a Renewable Energy-Based Science Learning Media to Strengthen the Pancasila Students' Profile

Khaerini Rahmania*, Nasokah, Ashief El Qorny

Department of Elementary Teacher Education, Wonosobo University of Al-Qur'an Science, Central Java, Indonesia
*e-mail: khaerinirahmania@gmail.com

Received: xxx. Accepted: xxx. Published: xxx

Abstract: Science learning on renewable energy concepts in elementary schools today is often theoretical, conventional, and lacks contextual hands-on experience for students. This study aims to comprehensively describe the physical design characteristics of a renewable energy-based science learning media called Volta Drive Connect, analyze its technical and instructional feasibility level, and explore its potential in depth in strengthening the dimensions of the Pancasila Student Profile (PPP). The method used in this study is a mixed-methods approach with a convergent parallel design, in which data are collected simultaneously through passive participatory observation of classroom learning dynamics, semi-structured interviews with teachers and grade IV students at Kakuka National Elementary School, and documentation of artefacts of student learning outcomes in the field. The results of the study showed that the Volta Drive Connect science media met the excellent eligibility criteria for children's work safety, ease of operation, clarity of visual guide instructions, and educational practical value in the classroom, with an average expert-rated validity of 92%. This solar vehicle science teaching kit is designed adaptively, which is divided into three levels of mechanical complexity (Beginner, Intermediate and Advanced) and utilizes local inorganic recycled materials as the main chassis component. From the pedagogical side of the Independent Curriculum, the use of concrete media is actually able to actualize the dimensions of the Pancasila Student Profile holistically. The actualization includes the dimensions of 'Faith and Fear of God Almighty, and Noble Character' which is stimulated through the growth of ecological awareness, the dimensions of 'Critical Reasoning' and 'Creative' which are honed through solar energy conversion experiments and mechanical troubleshooting activities independently, as well as the dimension of 'Gotong Royong' which is formed from collaboration in solving technical problems in groups.

Keywords: Pancasila Student Profile; Renewable Energy; Science Learning Media; Volta Drive Connect.

Introduction

Science learning in elementary school plays a crucial role in building the foundation of understanding natural phenomena and fostering students' scientific awareness from an early age. However, in practice, renewable energy materials are often presented theoretically and textbook-centered, thus limiting students' hands-on experience in understanding energy literacy and ecological responsibility. This gap demands a transformation towards learning Salingtemas (Science, Environment, Technology, and Society), which emphasizes the experience of learning to design works through the application of science concepts. Along with the implementation of the Independent Curriculum, education is directed toward strengthening character through the Pancasila Student Profile, in which the dimensions of critical reasoning, creativity, and mutual cooperation require contextual, real-world learning experiences. Therefore, the use of innovative learning media is an urgent need to bridge abstract science concepts so that students can understand them concretely while internalizing noble character values [1][2].

One of the strategic solutions developed is Volta Drive Connect, a solar-powered vehicle science kit designed with three levels of complexity and made from recycled materials [3]. Theoretically, this media design functions not only as a visual aid but as a cognitive stimulus that triggers the engineering and problem-solving processes. The relationship between media technical design and character strengthening lies in hands-on experiences that force students to strategise, collaborate, and conduct cause-and-effect analysis when facing technical challenges in assembly. Although the potential of concrete media has been widely discussed, studies that in-depth analyze the design of renewable energy media within the framework of the Pancasila Student Profile with the support of expert validity data and user responses are still very limited. The novelty of this research lies in the integration of environmentally friendly technology directly connected to character indicators within a single adaptive prop platform [4] [5].

Based on this urgency, this study aims to analyze the design characteristics and technical feasibility of Volta Drive Connect through a mixed-methods approach to provide a valid database. In addition to the technical aspect, this study also examines in depth how the media design elements contribute to strengthening the dimensions of the Pancasila Student Profile in the elementary school environment. The application of innovative and adaptive learning approaches enables educators to equip students with practical skills crucial for facing future challenges. The main focus of 21st-century competencies is on the formation of superior, productive, and democratically conscious individuals who actively contribute to sustainable global development. By integrating qualitative and quantitative data, this study aims

How to Cite:
K. Rahmania, N. Nasokah, and A. E. Qorny, "Analysis of the Design and Feasibility of Volta Drive Connect as a Renewable Energy-Based Science Media to Strengthen the Pancasila Students' Profile", *J. Pijar.MIPA*, vol. 21, no. 3, pp. 626–631, Jun. 2026. https://doi.org/10.29303/jpm.v21i3.11964

to answer questions about the level of media feasibility, as assessed by experts, and the extent to which the interactive design supports the holistic development of student character. The results of this research are expected to make both a theoretical contribution to the development of sustainable science media and a practical contribution to educators' effective implementation of the Independent Curriculum [6][7].

Research Methods

This study uses a mixed-methods approach with a convergent parallel design to provide a comprehensive, objective understanding of media design and its feasibility. A descriptive qualitative approach is used to explore the meaning and characteristics of design in character reinforcement, while a quantitative approach is applied to measure product validity through numerical data. The research was carried out at SD Nasional Kakuka, involving research subjects comprising teachers and grade IV students, who were selected through purposive sampling based on their direct experience with the Volta Drive Connect media [8]. The selection of these locations and subjects is based on the need to obtain in-depth primary data on the tool's functionality in a real-world classroom setting.

The data collection procedure was carried out simultaneously through observation, interview, and documentation techniques. Observations were conducted in a passive-participatory manner to record students' interactions with media components, while semi-structured interviews were conducted to explore the subjects' perceptions of security aspects and the ease of use of the media. Quantitative data were collected through validation sheet instruments completed by media and material experts, as well as user response questionnaires that used a Likert scale to measure the practicality of the media. All research instruments have undergone the expert-judgment stage to ensure that the question items and observation indicators are closely aligned with the research objectives [9] [10].

Quantitative data in this study were analyzed using descriptive and inferential statistics. Descriptive statistics are used to present the average energy literacy achievement of students, while inferential statistics are applied to measure the effectiveness of the media. The inferential analysis step begins with the Shapiro-Wilk normality test to ensure that the distribution of the small-sample data meets the requirements for parametric testing. Furthermore, the researcher conducted a paired-samples t-test to assess whether there was a significant difference in students' energy literacy before and after the implementation of Volta Drive Connect. Finally, to measure the magnitude of the effectiveness of the increase, Normalized Gain (N-gain) analysis was used.

To ensure the validity of qualitative data, the researcher applied source triangulation by comparing the perspectives of teachers and students, and triangulation by verifying interview results through field observation findings and activity photo documents. Data analysis is carried out by seamlessly integrating qualitative and quantitative results. Qualitative data is analyzed through the stages of data reduction to filter the core information, present the data in a coherent descriptive narrative, and draw conclusions through verification of emerging character patterns. Simultaneously, quantitative data were analyzed using descriptive statistics to calculate the percentage of validity from experts as well as the average response scores from students and teachers. All of these procedures are arranged in an interrelated narrative format to ensure that the research methodology's flow remains consistent and systematic, in accordance with the standards of scientific manuscripts [11] [12].

Results and Discussion

The results of the study show that Volta Drive Connect has design characteristics that meet the standards of educational, interactive, and sustainable learning media. The quantitative analysis showed that implementing Volta Drive Connect significantly increased students' energy literacy [13]. The increase in the average score from 66.8 to 78.3 represents a 17.2% increase in literacy achievement. To determine the effectiveness of the increase, a Shapiro-Wilk normality test was conducted, with pre-test $p = 0.793$ and post-test $p = 0.695$ (both $p > 0.05$), indicating that the data were normally distributed. Hypothesis testing using a paired-samples t-test yielded a p-value of 0.000 ($p < 0.05$), indicating a highly significant difference between the scores before and after the use of the media. Furthermore, the calculation of the N-gain score resulted in a number of 0.36, which categorized the effectiveness of improving students' energy literacy into moderate criteria. This improvement was reinforced by observational findings indicating that students showed strong motivation to learn and active engagement during the media assembly process.

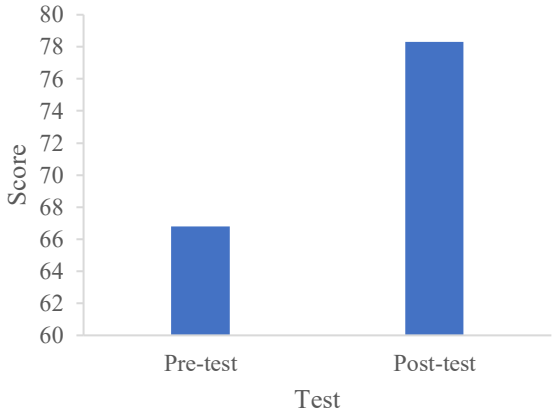

Figure 1. Comparison of Average Energy Literacy Scores Before (Pre-test) and After (Post-test) Implementation of Volta Drive Connect.

Qualitatively, the increase in energy literacy is directly proportional to the strengthening of the Pancasila Student Profile dimension in the classroom. The increase in the above statistical score is not just a number but a manifestation of students' active involvement in the hands-on process. This mechanical troubleshooting feature in this medium puts students in a situation of "cognitive conflict" that requires them to perform inductive and deductive reasoning independently, thereby tangibly manifesting the critical reasoning element.

In addition, students' freedom to modify the chassis using recycled materials fosters flexible thinking and creativity that are applicable, not just imaginative. Positive interdependent group work patterns also naturally foster a dimension of mutual cooperation, in which students learn to

share roles and responsibilities in prototype assembly. Compared to conventional theoretical methods, the use of Volta Drive Connect has proven to be more effective in bridging abstract scientific concepts into concrete manipulatives, which ultimately strengthens energy literacy while internalizing noble character in accordance with the 2030 SDGs targets. Thus, this medium can be presented as a differentiated learning instrument that is not only superior academically but also capable of fostering ecological awareness in future generations from an early age.

Based on the validity test conducted by media and material experts, this media obtained an average score of 92%, which falls within the very feasible category. Technical validity includes 95% component safety and 89% instructional accuracy, demonstrating that integrating a chassis made from recycled materials with industry-standard electronic components works optimally.

Table 1. Validation Results of the Volta Drive Connect Science Teaching Kit Media

No	Aspects Assessed	Maximum Score	Acquisition Score	Categories
1	Security	3	2	Good
2	Ease of Use	3	3	Highly Worth It
3	Attraction	3	3	Highly Worth It
4	Quality of Presentation Procedure	3	3	Highly Worth It
5	Renewable Energy Exploration Activities	3	3	Highly Worth It
6	Tools and Materials for Energy Conversion	3	3	Highly Worth It
7	Energy Conservation Experiments in Daily Life	3	3	Highly Worth It
8	Completeness of Guides and Worksheets	3	2	Good
	Quantity	24	22	Highly Worth It

Table 2. Validation Results of the Volta Drive Connect Science Teaching Kit Material

No	Aspects Assessed	Maximum Score	Acquisition Score	Categories
1	Material Accuracy	3	3	Highly Worth It
2	Readability	3	2	Good
3	LKPD Accuracy	3	3	Highly Worth It
4	Conceptual Accuracy	3	3	Highly Worth It
5	Conformity with Student Characteristics	4	2	Quite Decent
	Quantity	16	13	Highly Worth It

The main innovation of this medium lies in the tiering of three levels of complexity that allows the transition of learning from analog systems at an entry-level to an Arduino NodeMCU-based digital system at an advanced level. These quantitative data are reinforced by the results of the user response questionnaire, in which teachers gave a practicality score of 94%, and students' enthusiasm reached 88%, indicating that this medium is not only technically feasible but also pedagogically interesting.

The feasibility of this medium is evaluated using four main indicators, combining qualitative and quantitative analyses. The first indicator is technical safety, in which the use of plug-and-play systems without soldering ensures the safety of elementary school students during physical exploration [14]. The second indicator relates to instructional clarity, where gradual guidance has been shown to stimulate students' independence in assembling kits to function. The third indicator is material efficiency, which highlights the use of domestic waste and *e-waste* as a means of internalizing a real sustainable lifestyle. Finally, the adaptability indicator shows that this medium can serve different learning needs at each grade level, making it a flexible teaching tool for implementing the Independent Curriculum.

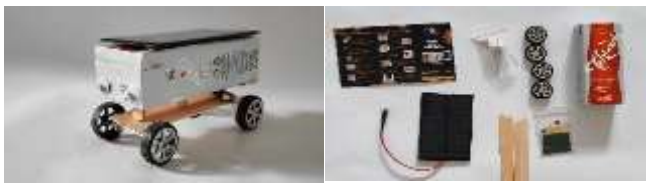

Figure 1. Volta Drive Connect Level 1 Science Teaching Kit

Figure 2. Volta Drive Connect Level 2 Teaching Kit

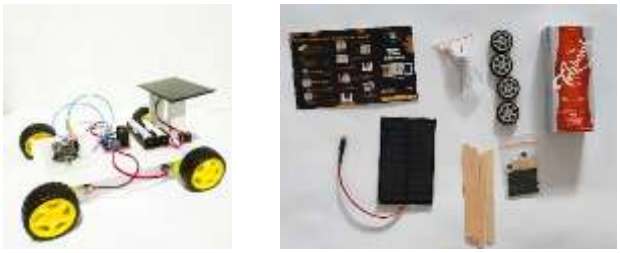

Figure 3. Volta Drive Connect Level 3 Teaching Kit

A critical analysis of the relationship between design and the Pancasila Student Profile reveals that Volta Drive Connect serves as a catalyst for the holistic strengthening of character. Critical reasoning dimensions are reinforced through natural "troubleshooting" features that arise during assembly, such as determining the exact angle of the solar panel to move the DC motor. This process of problem identification and finding solutions forces students to process information critically, which is theoretically more effective than simply accepting theories from textbooks. Meanwhile, the dimension of creativity is manifested in students' freedom to modify vehicle chassis using various materials, transforming them from technology users to innovators with empathy for the environment. The group's activities in this project also naturally foster a dimension of mutual cooperation through the division of assembly tasks and collaboration to achieve common goals [15][16][17].

A significant improvement in the character of grade IV students of SD Nasional Kakuka after utilizing Volta Drive Connect shows that, psychologically, elementary school-age children are at a concrete operational stage, where the understanding of abstract values such as mutual cooperation, creativity, and critical reasoning requires a bridge in the form of physical objects that can change. The integration of the Volta Drive Connect mechanical design has been empirically proven to simultaneously and measurably address the three main dimensions of PPP. The Pancasila Student Profile is our educational guideline to build students' character and abilities. It is very important for all parties involved to understand this profile so that these values are not only theoretical but also lived out in daily activities at school and in the surrounding environment [18][19].

Critical reasoning is one of the elements of the Pancasila Student Profile. Critical reasoning is very necessary to cultivate in every student. Critical reasoning is indispensable for students when solving problems. Reasoning skills are also discussed in the project to strengthen the Pancasila Student Profile in the Independent Curriculum. Reasoning ability is included in a character dimension that will be strengthened in students and will then be known as the critical reasoning dimension. Critical reasoning dimension exploration through mechanical troubleshooting. The critical reasoning dimension is not built through unidirectional instructions but is actively stimulated by the natural troubleshooting features inherent in the structure of these props [20] [21]. When the solar panel does not get a perpendicular orientation of light or when the chassis of a used cardboard box is distorted by weight (the center of gravity is disturbed), the vehicle will not run linearly, or even the DC motor will not rotate at all. This technical obstacle forces students to enter a phase of cognitive conflict that stimulates the executive function of the child's brain in solving problems logically.

Based on observational data, students did not give up but instead engaged in inductive and deductive reasoning independently: they checked the functionality of plug-and-play cables, tested the panels' sensitivity to sunlight intensity outside the classroom, and repositioned the wheels. The process of problem identification, cause-and-effect analysis, and decision-making based on physical evidence reflects the main indicators of the elements involved in obtaining and processing information and ideas within the structure of the Pancasila student profile. Concrete-based learning like this positions students as active subjects who construct their own knowledge, so that understanding of the concept of converting solar energy into kinetic energy is retained longer in long-term memory [22]. This interactive approach has also been shown to develop scientific thinking acumen, an important foundation for future technological literacy [23].

The creative dimension in this project is not only limited to aesthetic freedom, but also emphasizes the ability to engineer design using limited domestic materials. The design decision to use recycled materials, such as used milk cartons at Level 1, used cosmetic plastic bottles at Level 2, and custom chassis at Level 3, challenged students' spatial imaginations. The implementation of the creative dimension within the elements for generating original ideas in this project demonstrates its effectiveness in honing students' innovative thinking skills [24].

The results of the observation show that the freedom to modify this chassis fosters students' flexibility of thought. Some groups cut plastic bottles to reduce aerodynamic load, and others added ice cream sticks as axle reinforcements. Transforming a worthless waste object into a functional green technology prototype is a tangible demonstration of the ability to generate original ideas and works. In addition, this creative dimension indirectly fosters early ecological awareness (eco-literacy), making students aware that the management of inorganic waste around them can be solved through simple technological innovations. Through this process, students' creativity is no longer purely imaginative, but applicative and a solution to real environmental problems [25].

The dimension of mutual cooperation is successfully realized through a positive interdependence structure of task work. The design characteristics of the Volta Drive Connect kit, consisting of multiple subsystems: energy-harvesting subsystems (solar panels), wheelbase subsystems, and wiring subsystems, make it mechanically difficult for a single individual to assemble within a limited allocation of classroom learning time. This design pattern naturally conditions students to divide roles within their groups. [26]

During the assembly process, group dynamics involve intense interpersonal communication: one student is in charge of holding the chassis position, another attaches the wheels to the shaft, and the third ensures that the positive and negative pole cable connections are properly connected. Elements of collaboration and caring are realized when students who are faster understand the instructions in the visual handbook, and help their peers who have difficulty understanding the series diagram. Mutual cooperation in this context is no longer seen as abstract sociological jargon but is experienced by students as an essential strategy for

achieving a common goal: the success of their solar vehicle prototype. This inclusive division of group labor minimizes individual dominance and maximizes the collective contribution of all group members [27][28][29].

Compared with previous findings, this study makes a new contribution by integrating the cognitive aspects of science, digital skills, and character building into a single academically validated platform. If previous research by Purnawati and Yakin focused more on cognitive learning outcomes, this study demonstrates that concrete media based on renewable energy can also be a practical means of realizing the 2030 SDGs target on clean energy from an early age. The use of digital components at Level 3 provides advantages over conventional science media because it prepares students to face the digitalization era without overriding environmentally friendly principles. Overall, the transition from theoretical learning methods to a project-based approach with Volta Drive Connect has a positive psychological impact, significantly boosting students' motivation and energy literacy [30].

Conclusion

This study concluded that Volta Drive Connect is a science learning medium that meets high eligibility criteria, both technically and pedagogically, for use at the elementary school level. With a design validated by experts and widely received positively by users, this media has proven capable of meeting the need for adaptive teaching aids to support the implementation of the Independent Curriculum. The findings of the study show that the use of this media effectively integrates understanding of renewable energy while strengthening the dimensions of the Pancasila Student Profile, especially the elements of critical reasoning, creativity, and mutual cooperation. The students' success in assembling and operating these solar vehicles demonstrates that the transition from theoretical learning to project-based practice has a real impact on both energy literacy and student character formation. The practical implications of this study emphasize that educators can adopt Volta Drive Connect as an efficient and economical differentiated learning instrument. Teachers are advised to use media difficulty levels to adjust the depth of the material to students' cognitive readiness across grade levels. In addition, the use of recycled materials in this media provides a real example for schools in realizing a sustainable lifestyle that is in line with the global goal of clean energy. For education policy, this result provides a reference to the importance of developing teaching media that not only focus on academic content, but also on internalizing noble values and empathy for the environment as part of the preparation of future generations who care about the sustainability of the earth.

Author's Contribution

K. Rahmania: contributes to research design, data collection, data analysis, and manuscript editing. Nasokah: contributes to concept validation, methodological supervision, and manuscript review. A.E. Qarny: contributed to the review and refinement of the manuscript.

Acknowledgements

The author would like to thank SD Nasional Kakuka for permission and support during the research implementation, as well as the teachers and grade IV students who actively participated in the learning process and data collection. Thank you also to all parties who have provided input and support in preparing this article.

References

[1] J. Research, A. Education, D. Handono, A. Fitrotun Nisa, Y. Prihatni, and S. Negeri Jetak, "E D U K A S I Application of Project-Based Learning Methods in Science Learning in Elementary Schools," 2023. [Online]. Available: http://journal.ummgl.ac.id/nju/index.php/edukasi

[2] N. Wulandani, A. Suryawan, P. Elementary School Teachers, F. Teacher Training and Education, and U. Muhammadiyah Magelang, "implementation of problem-based learning assisted by innovative learning media to improve science literacy of elementary school students."

[3] K. Rahmania, F. N. Saniyyah, F. M. Afina, and D. P. Hanifah, "Volta Drive Connect: Science Kit to Stimulate the Elementary Students in Sustainable Development," *Radiation : Periodic Journal of Physics Education*, vol. 17, no. 2, pp. 58–70, Sep. 2024, doi: 10.37729/radiation.v17i2.5113.

[4] C. Sutinah, "the effect of hands-on learning and virtual lab on students' concept understanding and critical thinking," *Journal of Elementary Education*, vol. 05, p. 3, 2022.

[5] N. A. Agustinaningrum *et al.*, "Project-Based Education Innovation: Implementation of the Environmentally Friendly City Diorama in the Pancasila Student Profile Strengthening Project (P5)," *Journal of Community Engagement and Empowerment*, vol. 02, no. 02, doi: 10.58706/dedication.

[6] N. N. Shofia Rohmah, Markhamah, Sabar Narimo, and Choiriyah Widyasari, "Strategies for Strengthening the Profile of Pancasila Students with a Global Diversity Dimension in Elementary Schools," *Journal of Elementary Education*, vol. 6, no. 3, pp. 1254–1269, Sep. 2023, doi: 10.31949/jee.v6i3.6124.

[7] M. Azaim, A. Latif, and M. zaironi, "curriculum evaluation as a driver of student competence: combining qualitative and quantitative methods for holistic results," 2025.

[8] M. Quantitative Research, D. Mixed, H. Sagaf SPettalongi, Mp. M. IrMuas, M. Arafat, and Ms. Dian Nustanti Ndaomanu, "REFERENCE BOOK."

[9] I. A. A. Darmawan *et al.*, *Development of Research Instruments*. PUBLISHER OF NAGA PUSTAKA, 2025.

[10] M. Ulfah and N. Imam Bonjol Padang, "learning product testing instruments (validity, practicality, effectiveness testing)," 2025.

[11] D. Indrawan and S. R. Jalilah, "Combination/Mixed Method of Integration Forms in Research," *Journal of Teacher Studies and Learning*, vol. 4, no. 3, pp. 735–739, Dec. 2021, doi: 10.30605/jsgp.4.3.2021.1452.

[12] F. Nurrisa and D. Hermina, "Qualitative Approach in Research: Strategies, Stages, and Data Analysis," vol. 02, pp. 793–800, 2025.

[13] J. Law *et al.*, "A S A S W A T A N D H I M The Role of Interactive Learning Media In," 2025.
[14] L. Yuviananda and R. S. Dewi, "development of an evaluation framework for early childhood education applications: integration of cognitive, interactivity, and social contextual indicators," 2026.
[15] Mr. Mansyur, *Education Towards the Era of Society 5.0 21st Century Digital Revolution: Learning to Think Critically, Creatively and Innovatively Shaping Students' Character*. Deepublish, 2025.
[16] N. Karisma, S. F. Selegi, and S. Wahyuningsi, "Analysis of Creative and Critical Dimensions in the Independent Curriculum of Grade IV Elementary School Students," *Journal of Learning Research and Innovation*, vol. 5, no. 3, pp. 1213–1222, Dec. 2025, doi: 10.51574/jrip.v5i3.4076.
[17] J. Gentala and P. Dasar, "Analysis of Mutual Cooperation as An Internalization of Pancasila Student Profile in Project-Based Learning," vol. 10, no. 3, pp. 793–804, 2025, doi: 10.22437/gentala.v4i1.xxxxx.
[18] H Alfi, internalization of the pancasila student profile strengthening project (P5) and student profile rahmatan lil alamin (P2RA) IN MIN 6 BANDAR LAMPUNG, *Radcliffe State Islamic University Lampung,*2025
[19] W. Ibad, "The Application of Pancasila Student Profiles at the Elementary School Level," *JIEES : Journal of Islamic Education at Elementary School JIEES*, vol. 3, no. 2, pp. 84–94, 2022, doi: 10.47400/jiees.v3i2.47.
[20] Y. Ernawati and F. P. Rahmawati, "Analysis of Pancasila Student Profiles of Critical Reasoning Elements in the Literacy and Numeracy Student Learning Module at the Elementary School Level," *Basicedu Journal*, vol. 6, no. 4, pp. 6132–6144, May 2022, doi: 10.31004/basicedu.v6i4.3181.
[21] Z. A. Purwanto, E. Yusmin, and A. Yani, "Students' Mathematical Reasoning Ability Based on the Dimension of Critical Reasoning," *Academy of Education Journal,* vol. 14, no. 2, 2023.
[22] N. Karisma, S. F. Selegi, and S. Wahyuningsi, "Analysis of Creative and Critical Dimensions in the Independent Curriculum of Grade IV Elementary School Students," *Journal of Learning Research and Innovation*, vol. 5, no. 3, pp. 1213–1222, Dec. 2025, doi: 10.51574/jrip.v5i3.4076.
[23] L. Juniardiansah Amrullah and N. Wayan Arini, "the application of a problem-based learning model with the help of concrete media to improve student learning outcomes in science subjects," *Scientific Journal of Teacher Professional Education*, vol. 1, no. 1, 2018.
[24] R. Yuniarti *et al.*, "GOLDEN GENERATION Journal of Early Childhood Islamic Education Volume 7 Number 2, implementation of creative dimensions in the pancasila student profile strengthening project". August 2024
[25] S. Mulyani, I. K. Nurmeta, and L. H. Maula, "Analysis of the Implementation of Pancasila Student Profiles in Elementary Schools," *Journal of Educatio FKIP UNMA*, vol. 9, no. 4, pp. 1638–1645, Oct. 2023, doi: 10.31949/educatio.v9i4.5515.
[26] N. Hasanah, A. Enteding, M. Jayadin Ilham, and S. Tahengo, "Linear : Journal of Education description of students' understanding in the pancasila student profile on the dimensions of mutual cooperation," vol. 7, no. 2, pp. 2776–3463, doi: 10.53090/jlinear.v7i2.584.
[27] Education Standards, Curriculum, and Assessment Agency, Learning and Assessment Guide: Early Childhood Education, Primary Education, and Secondary Education, Revised Edition. Jakarta: Ministry of Primary and Secondary Education of the Republic of Indonesia, 2025.
[28] M. P. Nurkumalasari, "Internalization of the Value of Independence and Responsibility Through Extracurricular Activities at MAN 3 Madiun," Thesis, *IAIN Ponorogo*, 2023.
[29] M.A.Ulum, D F Sari, N A Sari, S Hotijah, realizing justice in group learning: an analysis of role imbalances and strategies for handling them in elementary schools, *PGSD Scientific Journal FKIP Mandiri University,*2025
[30] A. Purnawati and N. Yakin, "Implementation of Science Literacy Skills in Integrated Science Learning in Elementary Schools. *Action Research Journal,*2025.