

Development of an Environmental Character Education Model for Student Character Through Ecological Schools in Elementary Schools (Case Study of Ecological Schools in Purwakarta District)

Syarif Hendriana^{1*}, Kama Abdul Hakam¹, Sofyan Iskandar¹, Momod Abdul Somad¹

¹ Department of General and Character Education, Universitas Pendidikan Indonesia, Bandung, Indonesia.

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Corresponding Author:

Syarif Hendriana

pustaka.syarif@gmail.com

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Abstract: The development of the Environmental Character Education Model is the extent to which character education, pro-environmental behavior, environmental character and school culture affect the character of students in elementary schools in Purwakarta district both individually and through ecological schools. This study aims to determine and analyze the effect of developing an environmental character education model on student character both individually and through ecological schools. The research method used is a case study with a quantitative approach to ecological schools in Purwakarta Regency with statistical tools using SEM with the Smart PLS test tool and the Sobel test. The results showed that there is an influence of Character Education, Pro-Environmental Behavior, Environmental Character and School Culture on Ecological Schools and Impact on Student Character in Ecological Elementary Schools in Purwakarta Regency.

Keywords: Behavior; Character education; Culture; Ecological schools; Environmental

Introduction

The 21st century will be a critical time for all human and natural systems. Human behavior is rapidly changing the environment (Iksal et al., 2024; Marouli, 2021). Global climate change, air and water pollution, land use practices and biodiversity loss are pressing issues. Reiterates that the earth is currently undergoing innumerable sufferings caused by horrific human activities that relentlessly pollute the environment (Carangan, 2023). Environmental degradation adversely affects people's lives (Nguyen et al., 2023). The urban environment is one of the most polluted areas. The pollution that occurs in big cities starts from air and water pollution caused by industries (Al-Taai, 2021). In addition, there is also a lot of pollution caused by household garbage and motor vehicle pollution. The

challenge for everyone is to take the wheel of action and move towards the common goal of preserving life on earth.

Education is a universal activity process in human life, because wherever and whenever in the world there is a process of education (Bakar et al., 2023; Fitria et al., 2022). Indeed, the purpose of education is to produce a generation that has competitiveness and quality (Gryshchenko et al., 2021). Based on the Law of the Republic of Indonesia number 20 of 2003 concerning the National Education System, it is stated that the National, it is stated that "National education functions to develop the ability and national functions to develop the ability and form the character and civilization of a dignified nation in order to educate the intellectual life of the nation, aims to develop the potential of developing the potential of students to become human beings who are

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faithful and devoted to faith and devotion to God Almighty, have noble character, healthy knowledge, health, good deeds, and become democratic and democratic citizens, and become democratic and responsible citizens". The objectives of national education are a formulation of the quality of Indonesian human beings that must be developed by each unit of education (Daniati, 2022; Santika et al., 2022).

Based on data from the Director of Environment of Bappenas RI, the average Indonesian throws away 184 kg of food every year. The amount of food waste will produce 1.73 giga tons of CO₂ or about 7% of the emissions that occur in Indonesia. Other data states that the United Nations (UN) *Food and Agriculture Organization* (FAO) estimates that in 2009 about 32% of the food produced was wasted (Parfitt et al., 2010). This is due to excessive purchases of either ready-made food or semi-finished ingredients. It can also be said that not maximizing the utilization of food ingredients also results in spoilage so that it is not suitable for consumption. In response to this, people do not think long so they will immediately throw away the spoiled food in vain. The phenomenon of *food waste* has actually been a global issue for quite a long time and often appears to have a serious impact. Based on research conducted by *The Economist Intelligence Unit* (EIU) in 2017, *food waste* is a very big problem for the country because Indonesia itself is the second largest contributor after Saudi Arabia, which is around 300 kg per individual (Rofila, 2020).

The environment has become a major topic of debate and discussion in the press as well as classrooms in every part of the world, and much has been discussed about the need to take action to protect the planet and provide awareness among people in this regard (Alam, 2018; Selwyn, 2021). Such awareness fosters a thought of the importance of environmental education for learners in schools. Environmental education is a major concern in science education as the aim of contemporary education is to promote sustainable development among students. Environmental learning combines the concepts and principles of science and social science in one approach.

To protect the environment, students must have environmentally friendly behavior. This behavior is often called pro-environment behavior (PEB), which is behavior that supports the balance of ecosystems and the environment (Schmitt et al., 2018; Vicente-Molina et al., 2018). In addition, students also need to have an environmental attitude (EA). Environmental attitude means how children and their environment feel, act and give opinions (Ponmozhi & Krishnakumari, 2017). It is the duty of students to develop a positive attitude towards the environment. Knowledge about the

environment creates a better attitude towards the environment they live in. The students should develop environmentally friendly attitudes and behaviors throughout their lives. So it is very important to develop environmental attitudes and pro-environmental behavior among school children. One of the school's efforts is through character education at school.

Individual experiences with nature appear to be important for developing a relationship with the natural environment and for encouraging environmentally relevant behaviors (Clayton & Brook, 2005; Tanner, 1980). Significant environmental experiences, in fact, contribute to the perception of one's relationship with nature, which has implications for individual beliefs and actions (Vining & Merrick, 2012). In the relevant literature, a distinction can be made between significant but somehow 'ordinary' nature experiences (such as hiking, camping, etc.; and 'extraordinary' nature experiences, which are characterized by strong emotional responses (such as environmental enlightenment (Vining & Merrick, 2012). The latter is defined as a moment of intense clarity in which one's perception of the relationship with nature becomes meaningful (Norman, 2023). According to Vining et al. (2012), a psychologically meaningful experience with the natural environment can motivate and redirect human behavior towards nature and biodiversity protection, due to the concomitant emotions.

The development of an environmental character education model for student character is based on an understanding of the importance of holistic education to form individuals who are responsible for the surrounding environment (Oktarina & Nisa, 2021; Ramadhani et al., 2024). Among the causes of the need to develop an environmental character education model is the existence of an environmental crisis. Climate change, environmental damage, and various global ecological problems are important issues that require serious attention. Environmental character education helps students to be more concerned and responsible for environmental conditions (Monte & Reis, 2021). Then, another cause is the relationship between humans and the environment. Understanding the close relationship between humans and the environment encourages the need for comprehensive learning to preserve nature. In addition, the need for environmental ethics is another contributing factor to the need to develop an environmental character education model. In an increasingly connected global context, ethical attitudes and behaviors towards the environment are becoming increasingly important. Environmental character education helps students develop ethical values in interactions with nature.

Among the indicators of the development of environmental character education models can cover various fundamental aspects. Among the indicators that can be used to measure the effectiveness and development of environmental character education models on students is environmental knowledge. Students' ability to understand basic environmental concepts, such as recycling, biodiversity, pollution, and conservation is the core of their knowledge of the environment. In addition, attitude towards the environment is one of the indicators in the development of the character education model. The level of students' awareness and attention to environmental issues and the level of empathy and concern for environmental sustainability is one of the benchmarks. Then, sustainable skills are expected to be one of the benchmarks in developing a character education model. Students' practical skills in protecting the surrounding environment, such as recycling practices, waste reduction, or reforestation as well as students' ability to plan and implement sustainable environmental projects are also one of the core of environmental education. Furthermore, student participation and activity are important factors in developing an environmental character education model.

TA study by Berkowitz et al. (2023) of the University of St. Louis, showed an increase in students' motivation to achieve academically in schools that implemented character education. Classes that are comprehensively involved in character education show a drastic decrease in students' negative behaviors that can negatively hinder their academic success. However, according to Ma'mur, the character of the younger generation is already at a very worrying point, the nation's morals have been separated from the norms, ethics, religion, and noble culture of this nation.

The poor practice of education in schools indicates that there is no conducive school culture that creates cheating or dishonest behavior among teachers and students (Kaluma, 2023). Likewise, the condition of school culture does not support the creation of honesty character. According to Tohri et al. (2022) "teachers have lost the spirit and values of honesty in educational practice". This statement is an impact of the widespread symptoms of cheating in national examinations carried out by educational actors in schools. Riftyanti et al. (2024), even said that schools in Indonesia failed to build the nation's character.

Based on the above, this research intends to develop an environmental character education model and its impact on the character of elementary school students through the development of ecological schools.

Method

The research method used in this research is a case study with a quantitative approach. the population in this study were ecological elementary school students in Purwakarta district totaling 2000 people. the sample of this study amounted to 350 respondents with judgment sampling technique where the sampling technique used was based on certain considerations. Data collection techniques are by questionnaire (Baker, 2003; Mazhar et al., 2021) with data analysis techniques are using SEM (Structural equation model) with lat statistical test is using smart pls 4 and sobel test (Birant et al., 2024).

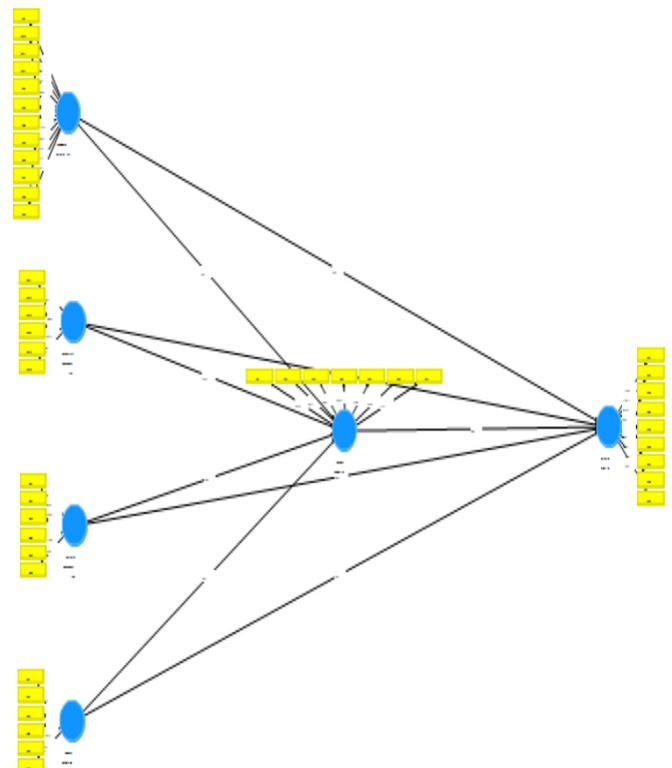


Figure 1. Research design

Results and Discussion

Design

The relationship between exogenous latent constructs and endogenous latent constructs can be seen where all relationships are declared significant at a significance level of 5%, namely School Culture X4 -> Student Character (Y), School Culture X4 -> School Ecology (Z), Environmental Character (X3) -> Student Character (Y), Environmental Character (X3) -> Ecological School (Z), Character education (X1) -> Student Character (Y), Character education (X1) -> Ecological School (Z), Pro Environmental Behavior (X2) -> Student Character (Y), Pro-Environmental Behavior (X2) -> Ecological School (Z) and Ecological School (Z) -

> Student Character (Y). This means that there is an influence of School Culture X4 on Student Character (Y), There is an Influence of School Culture (Z), There is an influence of character education (X1) on student character (Y), There is an influence of character education (X1) on Ecological Schools (Z), There is an influence of pro-environmental behavior (X2) on student character (Y), There is an influence of behavior Environmental Pros (X2) towards Ecological Schools (Z) and There is an Influence of Ecological Schools (Z) on Student Character (Y).

Descriptive Description of Character Education (X1), Pro-Environmental Behavior (X2), Environmental Character (X3), School Culture (X4), Ecological School (Z) and Student Character (Y) in Primary Schools in Purwakarta Regency

The average percentage of respondents' responses to the character education variable was 83.00% which was in the good category. This shows the meaning that the character education implemented by the school is truly proven by the implementation of character education indicators by students including, religious values, honesty, independence, discipline, love of the country, creativity and others that are truly implemented by students as a result of education (Syarnubi et al., 2021). character that is carried out at school well. This is evident from the average percentage that is in the good category.

The average percentage of respondents' responses to the environmental behavior variable was 79.57 which was in the good category. This means that student behavior reflects pro-environmental behavior which can be seen from student behavior which shows indications of energy saving, sustainable mobility, resource consumption, good waste management, green consumption, and involvement in environmental activities. This is also proven by the average percentage value which is in the good category.

The average percentage of respondents' responses to the environmental character variable was 70.11 which was in the quite good category. This means that the student's character reflects the character of the environment which can be seen from the student's character which shows indications including the habit of maintaining environmental cleanliness and sustainability, attitudes towards waste, attitudes towards energy, attitudes towards air, land and water, environmental care and sustainability activities. Environment. This is also evident from the average percentage value which is in the quite good category.

The average percentage of respondents' responses to the school culture variable was 72.90, which is in the quite good category. This means that student cultures reflect school culture which can be seen from student culture which shows indications of, among others,

Encouraging Collaboration, Achievement Evaluation, Teacher Collegiality, Honest Behavior, Habits of Maintaining Cleanliness and Environmental Sustainability and Habits of Maintaining Cleanliness and Sustainability. This is also evident from the average percentage value which is in the quite good category.

The average percentage of respondents' responses to the ecological school variable was 77.83 which was in the good category. This means that the student's school has reflected an ecological school which can be seen from the student's school which shows indications including Environmental Knowledge, Environmental Awareness, Sustainable Behavior, Participation in Environmental Activities, Environmental Ethics, Project Based Learning and Monitoring and Evaluation. This is also evident from the average percentage value which is in the good category.

The average percentage of respondents' responses to the student character variable was 71.99 which was in the quite good category. This means that the students' character values have been reflected in the students themselves which can be seen from the students' character which shows indications including Obedience to Religious Teachings, Courage to speak and act Correctly, Ability to appreciate and accept differences, Compliance with rules, Awareness and skills in carrying out tasks, discipline in work, ability to think creatively and innovatively, independence in making decisions and concern for other people. This is also evident from the average percentage value which is in the quite good category.

The Influence of Character Education (X1) on Ecological Schools (Z) in Elementary Schools in Purwakarta Regency

Character Education (X1) has a significant influence on the Ecology School (Z). These results were obtained from research that was conducted with a sig value of 0.000, where the significance level is smaller than the alpha value of 0.05 ($0.000 \leq \alpha < 0.05$). So it can be concluded that there is a significant influence of Character Education on Ecological Schools in Elementary Schools in Purwakarta Regency.

The Influence of Pro-Environmental Behavior (X2) on Ecological Schools (Z) in Elementary Schools in Purwakarta Regency

Pro-Environmental Behavior (X1) has a significant influence on the Ecology School (Z). These results were obtained from research that was conducted with a sig value of 0.000, where the significance level is smaller than the alpha value of 0.05 ($0.000 \leq \alpha < 0.05$). So it can be concluded that there is a significant influence of Pro-Environmental Behavior on Ecological Schools in Elementary Schools in Purwakarta Regency.

The Influence of Environmental Character (X3) on Ecological Schools (Z) in Elementary Schools in Purwakarta Regency

Environmental Character (X3) has a significant influence on the Ecology School (Z). These results were obtained from research that was conducted with a sig value of 0.000, where the significance level is smaller than the alpha value of 0.05 ($0.000 \leq \alpha 0.05$). So it can be concluded that there is a significant influence of Environmental Character on Ecological Schools in Primary Schools in Purwakarta Regency.

The Influence of School Culture (X4) on School Ecology (Z) in Elementary Schools in Purwakarta Regency

School Cultural Education (X4) has a significant influence on School Ecology (Z). These results were obtained from research that was conducted with a sig value of 0.000, where the significance level is smaller than the alpha value of 0.05 ($0.000 \leq \alpha 0.05$). So it can be concluded that there is a significant influence of School Culture on Ecological Schools in Elementary Schools in Purwakarta Regency.

The Influence of Character Education (X1) on Student Character (Y) in Elementary Schools in Purwakarta Regency

Character Education (X1) has a significant influence on Student Character (Z). These results were obtained from research that was conducted with a sig value of 0.000, where the significance level is smaller than the alpha value of 0.05 ($0.000 \leq \alpha 0.05$). So it can be concluded that there is a significant influence of Character Education on the Character of Students in Elementary Schools in Purwakarta Regency.

The Influence of Character Education (X1) on Student Character (Y) in Elementary Schools in Purwakarta Regency

Character Education (X1) has a significant influence on Student Character (Z). These results were obtained from research that was conducted with a sig value of 0.000, where the significance level is smaller than the alpha value of 0.05 ($0.000 \leq \alpha 0.05$). So it can be concluded that there is a significant influence of Character Education on the Character of Students in Elementary Schools in Purwakarta Regency.

The Influence of Environmental Character (X3) on Student Character (Y) in Elementary Schools in Purwakarta Regency

Environmental Character (X1) has a significant influence on Student Character (Y). These results were obtained from research that was conducted with a sig value of 0.000, where the significance level is smaller than the alpha value of 0.05 ($0.000 \leq \alpha 0.05$). So it can be concluded that there is a significant influence of environmental character on student character in elementary schools in Purwakarta Regency.

The Influence of School Culture (X4) on Student Character (Y) in Elementary Schools in Purwakarta Regency

School Culture (X4) has a significant influence on Student Character (Y). These results were obtained from research that was conducted with a sig value of 0.000, where the significance level is smaller than the alpha value of 0.05 ($0.000 \leq \alpha 0.05$). So it can be concluded that there is a significant influence of School Culture on Student Character in Elementary Schools in Purwakarta Regency.

The Influence of Ecological Schools (Z) on Student Character (Y) in Elementary Schools in Purwakarta Regency

Ecology School (Z) has a significant influence on Student Character (Y). These results were obtained from research that was conducted with a sig value of 0.000, where the significance level is smaller than the alpha value of 0.05 ($0.000 \leq \alpha 0.05$). So it can be concluded that there is a significant influence of Character Education on the Character of Students in Elementary Schools in Purwakarta Regency.

The Influence of Character Education (X1) on Student Character (Y) in Primary Schools in Purwakarta Regency through Ecological Schools (Z)

Character Education (X1) has a significant influence on the Character of Students (Y) Going through Ecology School (Z). These results were obtained from research that was conducted with a sig value of 0.000, where the significance level is smaller than the alpha value of 0.05 ($0.000 \leq \alpha 0.05$). So it can be concluded that there is a significant influence of Character Education on the Character of Students in Primary Schools in Purwakarta Regency through Ecological Schools.

The Influence of Pro-Environmental Behavior (X2) on Student Character (Y) in Primary Schools in Purwakarta Regency through Ecological Schools (Z)

Pro-Environmental Behavior (X2) has a significant influence on the Character of Students (Y) Going through Ecology School (Z). These results were obtained from research that was conducted with a sig value of 0.000, where the significance level is smaller than the alpha value of 0.05 ($0.000 \leq \alpha 0.05$). So it can be concluded that there is a significant influence of Pro-Environmental Behavior on the Character of Students in Primary Schools in Purwakarta Regency through Ecological Schools.

The Influence of Environmental Character (X3) on Student Character (Y) in Primary Schools in Purwakarta Regency through Ecological Schools (Z)

Environmental Character (X3) has a significant influence on the Character of Students (Y) Going through Ecology School (Z). These results were obtained

from research that was conducted with a sig value of 0.000, where the significance level is smaller than the alpha value of 0.05 ($0.000 \leq \alpha 0.05$). So it can be concluded that there is a significant influence of environmental character on the character of students in elementary schools throughout Purwakarta Regency through Ecological Schools.

The Influence of School Culture (X4) on Student Character (Y) in Primary Schools in Purwakarta Regency through Ecological Schools (Z)

School Culture (X4) has a significant influence on the Character of Students (Y) Going through the Ecological School (Z). These results were obtained from research that was conducted with a sig value of 0.000, where the significance level is smaller than the alpha value of 0.05 ($0.000 \leq \alpha 0.05$). So it can be concluded that there is a significant influence of school culture on student character in elementary schools throughout Purwakarta Regency through Ecological Schools.

Conclusion

Character Education for Class V Elementary School Students in Purwakarta Regency is in the good category. Then the Pro-Environmental Behavior of Class V Elementary School Students in Purwakarta Regency is in the good category. Furthermore, the Environmental Character of Class V Elementary School Students in Purwakarta Regency is in the quite good category. Then the School Culture of Class V Elementary School Students in Purwakarta Regency is in the quite good category. Furthermore, the Ecology School for Class V Elementary School Students in Purwakarta Regency is in the good category. And finally, the Character of Class V Elementary School Students in Purwakarta Regency is in the quite good category. There is an influence of character education on the ecological school of elementary school students throughout Purwakarta Regency. There is an influence of Pro-Environmental Behavior on Ecological Schools for Elementary School Students in Purwakarta Regency. There is an influence of environmental character on the ecological school of elementary school students in Purwakarta Regency. There is an influence of school culture on the school ecology of elementary school students throughout Purwakarta Regency. There is an influence of character education on the character of elementary school students throughout Purwakarta Regency. There is an influence of pro-environment behavior on the character of elementary school students in Purwakarta Regency. There is an influence of environmental character on the character of elementary school students throughout Purwakarta Regency. There is an influence of school

culture on the character of elementary school students throughout Purwakarta Regency. There is an influence of Ecological Schools on the Character of Elementary School Students in Purwakarta Regency. There is an influence of character education on the character of elementary school students throughout Purwakarta Regency through the Ecology School. There is an influence of Pro-Environmental Behavior on the Character of Elementary School Students in Purwakarta Regency through the Ecology School. There is an influence of environmental character on the character of elementary school students throughout Purwakarta Regency through the Ecology School. There is an influence of school culture on the character of elementary school students throughout Purwakarta Regency through the Ecology School.

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Conflicts of Interest

The authors declare no conflict of interest.

References

- Al-Taai, S. H. H. (2021). Water pollution Its causes and effects. *IOP Conference Series: Earth and Environmental Science*, 790(1), 12026. <https://doi.org/10.1088/1755-1315/790/1/012026>
- Alam, A. (2018). Protection and Conservation of Environment: An Important Role of Education. *I-Manager's Journal of Educational Technology*, 15(3), 1. Retrieved from <https://shorturl.asia/d4FEp>
- Bakar, M. A., Umroh, K. A., & Hameed, F. (2023). Improving Quality Islamic Education for Today's Generation. *At-Tadzkir: Islamic Education Journal*, 2(2), 118-128. <https://doi.org/10.59373/attadzkir.v2i2.42>
- Baker, M. J. (2003). Data collection--questionnaire design. *The Marketing Review*, 3(3), 343-370. <https://doi.org/10.1362/146934703322383507>
- Berkowitz, M. W., & Tirrell, J. M. (2023). *Journal of Character Education*. IAP. Retrieved from <https://shorturl.asia/HL2JY>
- Birant, S., Veznikli, M., Kasimoglu, Y., Koruyucu, M., Evren, A. A., & Seymen, F. (2024). Analyzing

- effects on anterior open bite in twins by PLS-SEM and sobel test. *Clinical Oral Investigations*, 28(9), 488. <https://doi.org/10.1007/s00784-024-05874-1>
- Carangan, M. A. C. (2023). Assessing the Stakeholders' Level of Awareness in Environmental Education in Coastal Schools: Basis for an Action Plan. *International Journal of Open-Access, Interdisciplinary & New Educational Discoveries of ETCOR Educational Research Center (IJOINED ETCOR)*, 2(3), 355-372. Retrieved from <https://shorturl.asia/WiZpP>
- Clayton, S., & Brook, A. (2005). Can psychology help save the world? A model for conservation psychology. *Analyses of Social Issues and Public Policy*, 5(1), 87-102. <https://doi.org/10.1111/j.1530-2415.2005.00057.x>
- Daniati, H. (2022). School Administration With National Standards of Education to Improve the Quality of Education Indonesia. *Indonesian Journal of Education (INJOE)*, 2(3), 177-186. Retrieved from <https://injoe.org/index.php/INJOE/article/view/23>
- Fitria, T. N., Simbolon, N. E., & others. (2022). Possibility of metaverse in education: opportunity and threat. *SOSMANIORA: Jurnal Ilmu Sosial Dan Humaniora*, 1(3), 365-375. <https://doi.org/10.55123/sosmaniora.v1i3.821>
- Gryshchenko, I., Ganushchakâ, L., Shcherbak, V., Nifatova, DHžlena, Zos-Kior, DHœykola, Hnatenko, I., Martynova, L., Martynov, A., & others. (2021). Making use of competitive advantages of a university education innovation cluster in the educational services market. *European Journal of Sustainable Development*, 10(2), 336. Retrieved from <http://ecsdev.org/ojs/index.php/ejsd/article/view/1230>
- Iksal, I., Hayani, R. A., & Aslan, A. (2024). Strengthening character education as a response to the challenges of the times. *Indonesian Journal of Education (INJOE)*, 4(3), 761-774. Retrieved from <https://injoe.org/index.php/INJOE/article/view/116>
- Kaluma, D. C. (2023). *Deviant behaviour among teachers and students and its effects on learning: Managers' perspectives in four selected secondary schools in Malawi*. Retrieved from <http://repository.mzuni.ac.mw:8080/handle/123456789/490>
- Marouli, C. (2021). Sustainability education for the future? Challenges and implications for education and pedagogy in the 21st century. *Sustainability*, 13(5), 2901. <https://doi.org/10.3390/su13052901>
- Mazhar, S. A., Anjum, R., Anwar, A. I., & Khan, A. A. (2021). Methods of data collection: A fundamental tool of research. *Journal of Integrated Community Health*, 10(1), 6-10. Retrieved from <http://medicaljournalshouse.com/index.php/A-DR-CommunityHealth/article/view/631>
- Monte, T., & Reis, P. (2021). Design of a pedagogical model of education for environmental citizenship in primary education. *Sustainability*, 13(11), 6000. <https://doi.org/10.3390/su13116000>
- Nguyen, T. T., Grote, U., Neubacher, F., Do, M. H., Paudel, G. P., & others. (2023). Security risks from climate change and environmental degradation: Implications for sustainable land use transformation in the Global South. *Current Opinion in Environmental Sustainability*, 63, 101322. <https://doi.org/10.1016/j.cosust.2023.101322>
- Norman, D. A. (2023). *Design for a better world: Meaningful, sustainable, humanity centered*. MIT Press.
- Oktarina, E., & Nisa, A. F. (2021). Development of Environmental Care-Based Curriculum in Improving Character Education in Elementary Schools. *JHSS (Journal of Humanities and Social Studies)*, 5(2), 126-130. <https://doi.org/10.33751/jhss.v5i2.3713>
- Ponmozhi, D., & Krishnakumari, S. (2017). Environmental attitude of school students. *Journal of Humanities and Social Science*, 22(7), 3. <https://doi.org/10.9790/0837-2207030104>
- Ramadhani, T., Widiyanta, D., Sumayana, Y., Santoso, R. Y., & Agustin, P. D. (2024). The Role Of Character Education In Forming Ethical And Responsible Students. *IJGIE (International Journal of Graduate of Islamic Education)*, 5(2), 110-124. <https://doi.org/10.37567/ijgie.v5i2.3064>
- Riftyanti, I. A., Masripah, M., Saifullah, I., & Nasrullah, Y. M. (2024). Nilai-Nilai Pendidikan Karakter Dalam QS Yusuf Ayat 90 (Perspektif Pendidikan Islam). *Jurnal Intelek Insan Cendikia*, 1(8), 3528-3557. Retrieved from <https://jicnusantara.com/index.php/jiic/article/view/1113>
- Rofila, R. Q. (2020). Global Food Waste On Circular Economy And Knowledge Co-Production. *Journal of World Trade Studies*, 7(2), 53-66. Retrieved from <https://journal.ugm.ac.id/v3/JWTS/article/view/4827>
- Santika, I. G. N., Arnyana, I. B. P., Suastra, I. W., & Kartika, I. M. (2022). Contents Standard Policy of Basic Education in The National Level Reviewed from The Scope of Citizenship Education Materials. *Journal of Sustainable Development Science*, 4(1), 29-36. <https://doi.org/10.46650/jsds.4.1.1263.29-36>
- Schmitt, M. T., Aknin, L. B., Axsen, J., & Shwom, R. L. (2018). Unpacking the relationships between pro-

- environmental behavior, life satisfaction, and perceived ecological threat. *Ecological Economics*, 143, 130–140. <https://doi.org/10.1016/j.ecolecon.2017.07.007>
- Selwyn, N. (2021). *Education and technology: Key issues and debates*. Bloomsbury Publishing.
- Syarnubi, S., Mansir, F., Purnomo, M. E., Harto, K., & Hawi, A. (2021). Implementing Character Education in Madrasah. *Jurnal Pendidikan Islam*, 7(1), 77–94. <https://doi.org/10.15575/jpi.v7i1.8449>
- Tanner, T. (1980). Significant life experiences: A new research area in environmental education. *The Journal of Environmental Education*, 11(4), 20–24. <https://doi.org/10.1080/00958964.1980.9941386>
- Tohri, A., Rasyad, A., Sururuddin, M., & Istiqlal, L. M. (2022). The Urgency of Sasak Local Wisdom-Based Character Education for Elementary School in East Lombok, Indonesia. *International Journal of Evaluation and Research in Education*, 11(1), 333–344. Retrieved from <https://eric.ed.gov/?id=EJ1341295>
- Vicente-Molina, M. A., Fernández-Sainz, A., & Izagirre-Olaizola, J. (2018). Does gender make a difference in pro-environmental behavior? The case of the Basque Country University students. *Journal of Cleaner Production*, 176, 89–98. <https://doi.org/10.1016/j.jclepro.2017.12.079>
- Vining, J., & Merrick, M. S. (2012). *Environmental epiphanies: Theoretical foundations and practical applications*. Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199733026.013.0026>