

LITERATURE REVIEW: CHARACTER ANALYSIS OF CARING FOR THE ENVIRONMENT IN PHYSICS LEARNING

Busra Sumeyye Kurutas^{1,*}

¹ Department of Science Education, Bahçeşehir Üniversitesi, Istanbul, Turkey

Corresponding author email: kurutas.bs@gmail.com

Article Info

Received: 22 May 2023

Revised: 21 Jun 2023

Accepted: 11 Jul 2023

OnlineVersion: 27 Jul 2023

Abstract :

This research aims to see the character of caring for the environment in learning. This research is qualitative research with a systematic literature review type. The data in this study are secondary in the form of research results documents related to this research. The population in this study was obtained from the Google Scholar website with selected article criteria related to the search keywords. The total population obtained is 25 articles from Google Scholar.

Keywords: Caring for the environment; Character; Literature Review

This is open access article under the [CC BY-NC-SA](https://creativecommons.org/licenses/by-nc-sa/4.0/) licence



INTRODUCTION

Education is the most important thing in our lives, this means that every Indonesian has the right to get it and is expected to always develop in it. Education will never end. Education in general means a process of life in developing each individual to be able to live and live life (Hasan et al., 2021; Rivani & Kurniawan, 2021; Zurweni et al., 2022). So being an educated person is very important. We are educated to be people who are useful both for the State, the Homeland and the Nation. The first education we get is in the family environment (Informal Education), the school environment (Formal Education), and the community environment (Non-formal Education) (Budiarti et al., 2022; Rahadiyani et al., 2023; Rivani & Kurniawan, 2022). Informal education is education that a person obtains from everyday experiences, consciously or unconsciously, from birth to death. This educational process lasts a lifetime. So the role of the family is very important for children, especially parents (Kamid et al., 2022; Syaiful et al., 2021; Yantoro et al., 2021).

Actually, if we pay more attention to our environment, there are many learning resources that can be utilized (Afrizon & Dwiridal, 2017; Syafii, 2019; Syarifah & Astuti, 2019). Therefore educators must be as creative and innovative as possible so that they do not lack ideas in utilizing existing teaching materials. Creative educators will be so enthusiastic about learning resources that are easily and cheaply obtained in their learning environment. Learning that is carried out with environmentally friendly content is also the educator's task which is carried out simultaneously with teaching the subject matter (Hasan et al., 2021; Imamora et al., 2020; Priyantini et al., 2015; Aryani & Haryadi, 2013). Students must raise their awareness and responsibility for environmental sustainability by making learning media made from used materials that can still be used. Thus, at the same time, educators foster a sense of environmental care and responsibility for students so that they are more aware of the environmental damage that is around them today (Azizah & Astuti, 2020; Hartati & Hariyono, 2020; Khanafiyah & Yulianti, 2013).

Therefore, with character education, it is hoped that it will also make it easier to understand knowledge in this physics subject by protecting the environment. Such as turning waste into useful teaching aids for knowledge in physics subjects. Learning aids are a means of communication and interaction between teachers and students in the learning (Aldila et al., 2023; Gay & Sofyan, 2017; Sari et al., 2021). Learning aids are something that can be used to convey messages so that they can stimulate the thoughts, feelings, interests and attention of students so that the teaching and learning process can occur. The Character of Caring for the Environment is interpreted as a basic value that builds one's personality, formed both by heredity and the environment, which distinguishes it from other people, and is manifested in attitudes and behavior in everyday life (Nurmasitoh & Rahayu, 2021; Aslamiyah & Nugroho, 2017; Astra & Jannah, 2012). Character can also be learned through science learning by incorporating scientific character with hard work, a sense of caring for the surrounding environment, social care, and responsibility.

The science learning process is filled with scientific characters, using used teaching aids which aim to implement this scientific character and scientific concept in the environment as an effort to overcome environmental damage through the use of used goods as learning aids. In learning science using environmental care characters, there are two goals that can be obtained by using used teaching aids (Fahrudin & Maryam, 2022; Liliawati, 2019; Nova et al., 2021). The first goal is to develop science learning with scientific characters (hard work, curiosity, environmental care, social care, and responsibility) with used teaching aids and assessment of student performance during learning and making used teaching aids. Meanwhile, the second goal is to increase students' understanding and skills regarding the concepts, principles and practices of making used teaching aids (Khairoh et al., 2014; Nurani et al., 2021; Sari et al., 2021). The provision of knowledge about science will certainly be different from the provision of non-scientific knowledge, because science can only be understood optimally when students learn by doing, discovering concepts and practicing them

RESEARCH METHOD

This research focuses on the character of caring for the environment in students at the elementary level (Indrawan & Jalilah, 2021; Shidiq & Choiri, 2019). This research is a qualitative research with a systematic literature review type. Systematic Literature Review (hereinafter shortened to Systematic Review-TS) is a written assessment of scientific publications with methods that have been established and recognized by the research community to achieve the target of identification, analysis, interpretation of all available evidence in order to answer certain research questions, where methods and the results of the assessment are explained in a structured and sequential manner, and are open to receiving comments and further elaboration (Yanuar & Mufit, 2021; Gunawardana et al, 2020; Wulandari & Jumaidi, 2023). The data in this study is secondary data in the form of research results documents related to this research. The population in this study was obtained from the Google Scholar site with the selected article criteria related to the search keywords. The total population obtained is 25 articles from Google Scholar.

The flow of research conducted as follows.

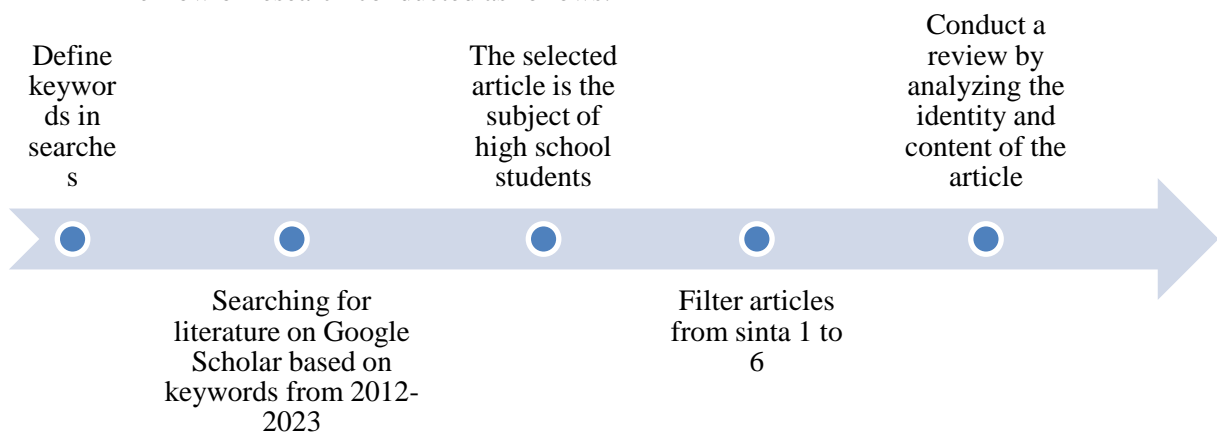


Figure 1. Literature review research flowchart

The above flow chart is explained in detail as follows:

1. Define keywords for the main search.
2. Searching for literature on Google Scholar with the keyword "Care for the environment in Physics" spanning 2012 to 2023.
3. The selected articles are articles related to keywords with high school student research subjects.
4. Articles obtained on Google Scholar are filtered again with the criteria of selected articles as review articles from Sinta 1 to Sinta 6 indexed journals.
5. Conduct a review by reading the title, abstract of the article on the research topic. After the articles that will be used as references are collected, the researcher conducts a review with several criteria shown in the descriptive statistics table.

RESULTS AND DISCUSSION

The review process is carried out on scientific articles that are selected for their reputation based on the topics studied. The character of caring for the environment of students in physics subjects. The number of articles reviewed was 25. Following are the results of a review of articles about this research.

Table 1. The results of a literature review of articles related to the character of caring for the environment in physics learning

No	Author (Year)	Sample	Research Design	Scope Environmental care	Findings
1	Mustia Dewi Irfianti, Siti Khanafiyah, Budi Astuti. (2016)	All students of class XI MIA,	quasi-experimental research with a one group pretest-posttest design	experiential learning, character, caring environment	there is an increase in the character of caring for the environment after going through learning. Based on this, it can be concluded that the application of the experiential learning model can develop the character of caring for the environment of students.
2	M. Taufiq, N. R. Dewi, A. Widiyatmoko. (2014)	science teacher and class VII students in the 2014/2015 academic year	development (Development Research)	Learning Media; Integrated Science; Conservation theme; Science Edutainment	the learning outcomes of integrated science with the theme of conservation have increased. Overall the increase (gain) in learning outcomes is 0.85, which means that the increase is with high criteria. The average total score of environmental care character indicators is 93.75, which shows the criteria of being cultured (MK) among students.
3	Lutfiana	class VII	research and	Practical	The Integrated Science

No	Author (Year)	Sample	Research Design	Scope Environmental care	Findings
	Khairoh, Ani Rusilowati, Sri Nurhayati. (2014)	students.	development.	Instructions; Integrated Science; Guided Inquiry	story book contains environmental care character education that has been developed with a readability score of 88.33%, meaning that the Integrated Science story book contains environmental care character education and has very appropriate criteria to be used as a learning medium.
4	A. Rusilowati, Supriyadi, A. Widiyatmoko. (2015).	Literature review	literature analysis.	bencana Alam; local wisdom; SETS	One way to instill local wisdom is by linking it to integrated natural disaster physics learning with the vision of Science Environment Technology and Society (SETS). Dissemination of local wisdom can be done through education, including in educational learning and research, as well as writing articles in the media.
5	A. Larasati*, D. Yulianti. (2014)	teachers and students of grade B	research and development (Research and Development)	development; learning materials; universe; characters; conservation	teaching materials and science (physics) enrichment materials are easy to understand. The results of the character analysis show that science teaching materials (physics) are able to develop student character.
6	Diyah Ayu Octa Nova, Dwikoranto, Nurita Apridiana Lestari. (2021)	97 people from grades 10, 11 and 12 who attend school in the Sidoarjo	survey method	student perceptions; online learning; ecopedagogy; environmental awareness	states that ecopedagogy-based physics learning is important to do. This is because ecopedagogy-based physics learning is carried out with the aim that students can

No	Author (Year)	Sample	Research Design	Scope Environmental care	Findings
		area.			solve various environmental problems based on understood physics concepts. In addition, this learning can also raise awareness or attitude of caring for the environment.
7	Lailatul Nuraini, Deni Irawan, Ita Jeny Trisnawati. (2018)	40 students taking the Basic Physics course	descriptive quantitative research.	teaching materials, student responses, cocoa processing, physics learning	the use of teaching materials about cocoa processing can increase student learning motivation, ability to master concepts, scientific attitudes and environmental awareness.
8	Putih Sari, Dwikoranto dan Nurita Apridiana Lestari. (2021)	100 students in 6 schools in Gresik Regency	quantitative methods	Environmental Learning, Response Analysis, Interest.	physics learning based on environmental learning with the aim that students can more easily understand physics by using it in everyday life and developing students' ability to reason and analyze a problem.
9	Ahmad Fahrudin , Eka Maryam. (2022)	3000 artikel	R&D, descriptive qualitative, quasi-experimental, and the Rasch model approach.	Physics education, ethnoscience, culture, local wisdom.	the application of ethnoscience-based learning, culture and local wisdom can help students understand and retain learning identitasnya. Selain itu, pendidikan berbasis environment (culture) is also very important to be integrated into the education curriculum as a process to preserve their culture so that it is maintained.
10	Winny Liliawati, Taufik Ramlan , Judhistira Aria Utama dan Annida	five experts to assess material content and character	design based research.	teaching materials, networks, online, character, global warming.	the content aspect 0.86 category is very appropriate, the media aspect and character education is 0.69 the category is very appropriate. The

No	Author (Year)	Sample	Research Design	Scope Environmental care	Findings	
	Melia Z. (2019)	education, and seven experts to assess media			conclusion is that character education-oriented online teaching materials are very suitable for implementing character education	
11	A. Fitrianti Hasan, Suarti, Ummul Hasanah. (2021)	Students and teachers	Ethnographic method.	Buletin Gempa Integrase Qur'an	Mitigasi bumi Al-	The implementation of environmentally sound physics subjects is integrated into physics subjects through classroom learning activities by solving environmental problems using physics concepts and outside the classroom, carried out by utilizing the school environment as a physics learning laboratory.
12	Marjoni Imamora Umar1* Deska Fitri Nova Lizelwati. (2020)	class XI MIPA 1 SMAN 7 Sijunjung.	Research and Development (R&D)	Module; ADDIE; Outcomes	SETS; Learning	SETS-based physics module on valid, practical, and effective material on global warming phenomena for class XI SMA/MA. The SETS-based physics module obtained validation results with a percentage of 92% with very valid criteria.
13	Ni Putu Titin Priyantini, I Wayan Sadia, I Wayan Suastra.(2015)	class X MIA SMA Negeri 4	research and development (Research and Development)	Creative Thinking Skills, Education, Learning Tools	Character Physics	There are differences in changes in the character of students in the experimental class with the cultured category and the control class with the category starting to develop; There are differences in students' creative thinking skills between students who study using the STML learning model and conventional learning models (F = 82.299

No	Author (Year)	Sample	Research Design	Scope Environmental care	Findings
14	Mardiyanti Hartati1, Eko Hariyono. (2020)	Class XI students	descriptive quantitative	Sustainable Development Goals (SDGs), Integrasi Pembelajaran Fisika, Aksi Iklim	and $p < 0.05$). students are able to give their ideas to reduce the impact of climate change by increasing awareness of protecting the environment by 90.83%. There is a new breakthrough to develop the integration of SDGs principles with other relevant physics materials that need to be carried out,
15	Lailatul Aslamiyah*, Masturi, Sunyoto Eko Nugroho. (2017)	curriculum analysis, concept analysis of the Koran, and student analysis	research and development methods.	physics comic, integrationinterconnection, Alquran values	character values based on the Koran, and there are pages that present the characters of the Prophet Muhammad SAW, Aisyah r.a., and Sultan Fatah. Comic media was declared worthy as media by material experts and media experts.
16	Renol Afrizon, Letmi Driwidal. (2017)	to society	survey method	Physics material, Local wisdom, Character of environmental care	local wisdom values originating from nature so that they can be one of the efforts to foster a caring character for the environment in learning physics.
17	Nur Azizah, Budi Astuti. (2020)	35 students	Research and Development with a 4D development model	based I-SETS, complimented of local wisdom, character values, instructional materials physic	Physics teaching materials based on I-SETS complemented by local wisdom and character content are very appropriate and easy to understand and practical to use in the learning process and can develop character in students
18	Marjoni Imamora Ali Umar, Deska Wira Fitri, Novia Lizelwati.	class XI MIPA 1 SMAN 7 Sijunjung	Research and Development (R&D) uses the ADDIE model	Module; SETS; ADDIE; Learning Outcomes.	the SETS-based physics module has also met the effective criteria with an N-gain value of 0.76

No	Author (Year)	Sample	Research Design	Scope Environmental care	Findings
19	A. EKA FITRIANTI HASAN. (2017)	students of SMA Negeri 10 Bulukumb a	descriptive qualitative	Education in the environment, care for the environment, physics	learning students have an attitude of caring for the environment and change the habits of students by instilling character values to protect the surrounding environment by solving environmental problems in everyday life but there are still a small number of students who do not understand the importance of the environment so they often litter using plastic and cups as wrap.
20	A. Eka Fitrianti Hasan, Suarti, Ummul Hasanah. (2021)	school principals, vice principals, heads of administra tion, senior teachers, and committee chairs.	descriptive qualitative	Bulletin of Earthquake Mitigation Integrasi Al-Qur'an	The implementation of environmentally sound physics subjects is integrated into physics subjects through classroom learning activities by solving environmental problems using physics concepts and outside the classroom, carried out by utilizing the school environment as a physics learning laboratory
21	Mardiyanti Hartati , Eko Hariyono. (2020)	Class XI student of SMAN 4 Proboling go	quasi experimental design method with Non- equivalent control group design.	Sustainable Development Goals (SDGs), Integration of Physics Learning, Climate Action	Through the research that has been given by students, students are able to give their ideas to reduce the impact of climate change by increasing environmental awareness by 90.83%. A new breakthrough is needed to develop the integration of the principles of SDGs with other relevant physics materials, so

No	Author (Year)	Sample	Research Design	Scope Environmental care	Findings
22	Lathifah Safiinaton Najaah, Musfiq Amrulloh. (2022)	30 students of class XI MIPA	Classroom Action Research (CAR)	blended learning, interactive learning media, global warming	that more SDGs goals are achieved. in cycle I for the eight environmental care attitude indicators have not reached the target. Then the environmental care attitude of class XI MIPA 1 students at SMA Negeri 1 Wonogiri experienced an increase in cycle II, achievements in cycle II for the eight indicators had reached the target.
23	Muhammad Syafi'i. (2020)	FKIP Physics Education Study Program students	correlational survey,	Mindset, Behavior, FKIP UNRI Physics Students, Environmental Quality	mindset is related to the behavior of students of the Physics Education Study Program FKIP Unri, mindset is also related to concern for maintaining environmental quality
24	Bilqis Asy Syarifah *, Budi Astuti.(2019)		Research and Development (RnD).	I-SETS, teaching materials, learning motivation	student motivation questionnaires, interviews and observation sheets found that I-SETS-based physics teaching materials can increase learning motivation. The results of the student character questionnaire show that religious character, discipline, responsibility, and care for the environment develop.
25	Ni Putu Titin Priyantini, I Wayan Sadia, I Wayan Suastra. (2015).	class XI IPA 4,	R&D research	Creative Thinking Skills, Character Education, Physics Learning Tools	The results of the follow-up with the Tukey Test showed that the average creative thinking skills of students who learned using character-laden high school physics learning tools with

No	Author (Year)	Sample	Research Design	Scope Environmental care	Findings
					STML settings were better than using conventional learning models (Qh>Qt=15.62>2.89).

Overall, previous researchers limited the evaluation of the scope of learning to four major components, among others; (1) character education, (2) character care for the environment in physics, (3) environmental character assessment for high school level students, and in this article the character cares for the environment in physics only focuses on the scope in the domain of learning outcomes with a sample of special school students upper middle,

Based on the results of the analysis of 25 articles, the results of the discussion analysis are:
 a. The character of caring for the environment of students

In the review analysis of 25 articles regarding caring for the environment in physics, the existence of a school that cares and has an environmental perspective will be able to build a foundation for students as the basis for forming environmental ethics. Instilling the environment from an early age in the school environment will be a provision for students in realizing awareness and discipline, resulting in a clean and healthy culture (Hoyi & Liza, 2021; Saputri, 2021). Solving current and future environmental problems and crises cannot only be done through technical education, but the most important thing is through a moral approach. Programs offered to care for the school environment can be in the form of community service, gardening, healthy walks, love the earth campaigns, picking and collecting trash and tree planting activities, many other activities besides that. Actions to care for the environment in schools that are used to it will make an impression and become ingrained because they are carried out continuously (Khairoh et al., 2014; Larasati & Yulianti, 2014; Cordon & Polong, 2020). This is in line with Anthony Brock's opinion, education will change in the next generation, as long as the spirit and goals change, the results of education will not be measured according to the amount of knowledge that has been given, but people gather to make suggestions that will help the government in determine the strategy according to the state of education. To care for the environment in schools really helps learning in realizing the content of the school curriculum is also not something static, but the curriculum is more dynamic following changes and developments in society and science and therefore tends to experience change, improvement and even renewal.

b. Environmental care character assessment of students

The character of caring for the environment of students. In the review analysis of 25 articles regarding caring for the environment in physics, the existence of a school that cares and has an environmental perspective will be able to build a foundation for students as the basis for forming environmental ethics. Instilling the environment from an early age in the school environment will be a provision for students in realizing awareness and discipline, resulting in a clean and healthy culture. Solving current and future environmental problems and crises cannot only be done through technical education, but the most important thing is through a moral approach (Rivani et al., 2022; Ramadhanti & Simamora, 2023). Programs offered to care for the school environment can be in the form of community service, gardening, healthy walks, love the earth campaigns, picking and collecting trash and tree planting activities, many other activities besides that. Actions to care for the environment in schools that are used to it will make an impression and become ingrained because they are carried out continuously. This is in line with Anthony Brock's opinion, education will change in the next generation, as long as the spirit and goals change, the results of education will not be measured according to the amount of knowledge that has been given, but people gather to make suggestions that will help the government in determine the strategy according to the state of education. To care for the environment in schools really helps learning in realizing the content of the school curriculum is also not something static, but the curriculum is more dynamic in nature following changes and developments in society and science and therefore tends to experience change, improvement and even

renewal (Ayuningtyas et al., 2020; Farisi, 2013; Wulandari, 2020). This physics learning process contains scientific characters, using used props which aim to implement this scientific character and physics concepts in the environment as an effort to overcome environmental damage through the use of used materials as learning aids. In learning physics using environmental care characters, there are two goals that can be obtained by using props made from used materials. The first goal is to develop physics learning with scientific characters (hard work, curiosity, environmental care, social care, and responsibility) with used teaching aids and assessment of student performance during learning and making used teaching aids. Meanwhile, the second goal is to increase students' understanding and skills regarding the concepts, principles and practices of making used teaching aids.

c. The impact of the character of caring for the environment of students

The character of caring for the environment in high school level students has an impact both in the long term and in the short term. In the long-term students can apply a clean life within themselves, students can get used to always keeping the environment clean and teach students the importance of mutual cooperation in cleaning the environment. Caring for the environment is carried out in order to create a clean and healthy environment so that residents or students who study and live there feel comfortable and peaceful (Hamidah & Palupi, 2012; Neldawati, 2020; Astalini et al., 2022). The short-term impact carried out by students is that students know the types of waste that are disposed of according to the type. In addition, students are protected from mosquito bites or animals that can carry disease, which makes students study comfortably and focus on learning.

CONCLUSION

An analysis of 25 article reviews explains the important factors in cultivating the character of Caring for the Environment in high school level students. By caring for the environment students can recognize the types of waste according to their group. There are several schools that are still low on environmental care for students. This is because teachers, principals and parents do not participate in implementing environmental care. The impact caused by students besides making students comfortable learning also helps students get used to living a healthy and clean life.

REFERENCES

- Afrizon, R., & Dwiridal, L. (2017). Upaya Menumbuhkan Karakter Peduli Lingkungan Melalui Kajian Konsep Fisika Pada Arsitektur Kearifan Lokal Budaya Sumatera Barat. *Jurnal Eksakta Pendidikan (Jep)*, 1(2), 9. <https://doi.org/10.24036/jep.v1i2.60>
- Ahmad Fahrudin, & Eka Maryam. (2022). Review Analisis Pendidikan Fisika Berbasis Etnosains, Budaya, dan Kearifan Lokal di Indonesia. *Jurnal Riset Rumpun Matematika Dan Ilmu Pengetahuan Alam*, 1(1), 12–24. <https://doi.org/10.55606/jurrimipa.v1i1.126>
- Amalia Nurmasitoh, Q., & Rahayu, R. (2021). Pengaruh Pembelajaran Berbasis Lingkungan Terhadap Sikap Pelestarian Lingkungan Pada Materi Pencemaran Lingkungan. *Jurnal Riset Fisika Edukasi Dan Sains*, 8(1), 1–7. <https://doi.org/10.22202/jrfes.2021.v8i1.4570>
- Aryani, R. M., & Haryadi, R. (2023). Principals'implementation Of Collaborative Leadership To Improve Learning Quality. *EduFisika: Jurnal Pendidikan Fisika*, 8(1).
- Aldila, F. T., Rini, E. F. S., Octavia, S. W., Khaidah, H. N., Sinaga, F. P., & Septiani, N. (2023). The Relationship Of Teacher Teaching Skills And Learning Interests Of Physics Students Of Senior High School. *EduFisika: Jurnal Pendidikan Fisika*, 8(1), 101-105.
- Aslamiyah, L., & Nugroho, S. E. (2017). Pengembangan Media Pembelajaran Komik Fisika Berbasis Integrasi-Interkoneksi Nilai-Nilai Alquran. *UPEJ Unnes Physics Education Journal*, 6(3), 44–52.
- Astra, I. M., & Jannah, M. (2012). Pengaruh Model Pembelajaran Problem Posing Tipe Pre-Solution Posing Terhadap Hasil Belajar Fisika Dan Karakter Siswa Sma. *Jurnal Pendidikan Fisika Indonesia*, 8(2), 135–143.
- Astalini, A., Darmaji, D., Kurniawan, D. A., Widodo, R. I., & Rohana, S. (2022). Junior High School Teacher's Forum Group Discussion Response on Application of Adat Bersendi Syara'Syara'Bersendi Kitabullah in Learning. *Journal Evaluation in Education (JEE)*, 3(4), 102-107.

- Ayuningtyas, Y., Ismaun, I., Gazali, M., & Fua, J. La. (2020). Pengaruh Model Pembelajaran Sains Teknologi Masyarakat (STM) dalam Meningkatkan Kemampuan Literasi Sains Siswa di MTsN 1 Konsel. *Kulidawa*, 1(1), 41. <https://doi.org/10.31332/kd.v1i1.1809>
- Azizah, N., & Astuti, B. (2020). Pengembangan Bahan Ajar Fisika Berbasis I-SETS (Islamic, Science, Environment), *Unnes Physics Education Journal*, 9(2), 164–177.
- Budiarti, R. S., Kurniawan, D. A., & Rivani, P. A. (2022). A study of interests and science process skills. *Jurnal Inovasi Pendidikan IPA*, 7(2), 195–212. <https://doi.org/10.21831/jipi.v7i2.42676>
- Cordon, J. M., & Polong, J. D. B. (2020). Behind the Science literacy of Filipino students at PISA 2018: A Case study in the Philippines' Educational System. *Integrated Science Education Journal*, 1(2), 70-76.
- Farisi, M. I. (2013). Kurikulum Rekonstruksionis dan Implikasinya terhadap Ilmu Pengetahuan Sosial: Analisis Dokumen Kurikulum 2013. *Jurnal Ilmiah Kependidikan Khasanah Pendidikan*, 16(2), 147, 161.
- Gay, E., & Sofyan, N. (2017). The effectiveness of using Edmodo in enhancing students' outcomes in advance writing course of the fifth semester at FIP-UMMU. *Journal of English Education*, 2(1), 1-11.
- Gunawardana, A., Arooz, F. R., Peramunugamage, A., & Halwatura, R. U. (2020). Critical analysis of lecturer's perception on integrating concepts of sustainability in university curricular. *Integrated Science Education Journal*, 1(3), 109-121.
- Hamidah, S., & Palupi, S. (2012). Peningkatan Soft Skills Tanggung Jawab Dan Disiplin Terintegrasi Melalui Pembelajaran Praktik Patiseri. *Jurnal Pendidikan Karakter*, 0(2), 143–152.
- HARTATI, M., & HARIYONO, E. (2020). Efektifitas Pembelajaran Fisika Terintegrasi Dengan Aksi Iklim Pada Prinsip Sdgs (Sustainable Development Goals) Dalam Meningkatkan Karakter Peduli Lingkungan. *IPF: Inovasi Pendidikan Fisika*, 9(3), 349–355. <https://doi.org/10.26740/ipf.v9n3.p349-355>
- Hasan, A. E. F., Suarti, S., & Hasanah, U. (2021). Implementasi Konsep Adiwiyata Dalam Pembelajaran Fisika Sman 10 Bulukumba. *Al-Khazini: Jurnal Pendidikan Fisika*, 1(2), 155–162. <https://doi.org/10.24252/al-khazini.v1i2.24250>
- Hoyi, R., & Liza, L. (2021). Identify the Disciplinary Attitude of Learning Physics in High School Students. *Journal Evaluation in Education (JEE)*, 2(1), 39-43.
- Imamora, M., Fitri, D. W., & Lizelwati, N. (2020). Pengembangan Modul Gejala Pemanasan Global Berbasis Pendekatan SETS untuk Meningkatkan Hasil Belajar Siswa Fisika Kelas XI SMAN 7 Sijunjung. *Sainstek: Jurnal Sains Dan Teknologi*, 12(2), 51. <https://doi.org/10.31958/js.v12i2.2625>
- Indrawan, D., & Jalilah, S. R. (2021). Metode Kombinasi/Campuran Bentuk Integrasi Dalam Penelitian. *Jurnal Studi Guru Dan Pembelajaran*, 4(3), 735–739.
- Kamid, K., Winarni, S., Rohati, R., Rivani, P. A., & Azzahra, M. Z. (2022). The Comparison of Jigsaw Cooperative Learning Model with STAD on Mathematics Subjects in Junior High School. *Journal of Education Research and Evaluation*, 6(1), 118–130. <https://doi.org/10.23887/jere.v6i1.40425>
- Khairoh, L., Rusilowati, A., & Nurhayati, S. (2014). Pengembangan Buku Cerita Ipa Terpadu Bermuatan Pendidikan Karakter Peduli Lingkungan Pada Tema Pencemaran Lingkungan. *Unnes Science Education Journal*, 3(2), 519–527.
- Khanafiyah, S., & Yulianti, D. (2013). Model Problem Based Instruction Pada Mengembangkan Sikap Kepedulian Lingkungan. *Jurnal Pendidikan Fisika Indonesia (Indonesian Journal of Physics Education)*, 9(1), pp 35-42.
- Larasati, A., & Yulianti, D. (2014). Pengembangan Bahan Ajar Sains (Fisika) Tema Alam Semesta Terintegrasi Karakter dan Berwawasan Konservasi. *Unnes Physics Education Journal*, 3(2), 26–33.
- Liliawati, W. dkk. (2019). Desain Bahan Ajar Fisika Dalam Jaringan (Daring) Berorientasi Pendidikan Karakter Untuk Siswa SMA. *Jurnal Inovasi Dan Pembelajaran Fisika*, 6(2), 113–121. ejournal.unsri.ac.id/index.php/JIPF
- Neldawati, N. (2020). Deskripsi lingkungan belajar siswa terhadap mata pelajaran fisika di sma ferdy ferry putra kota jambi. *Journal Evaluation in Education (JEE)*, 1(1), 1-7.

- Nova, D. A. O., Dwikoranto, D., & Lestari, N. A. (2021). Analisis Persepsi Siswa Terhadap Pembelajaran Fisika Berbasis Ecopedagogy Dengan Metode Daring Selama Pandemi Covid-19. *ORBITA: Jurnal Kajian, Inovasi Dan Aplikasi Pendidikan Fisika*, 7(1), 19. <https://doi.org/10.31764/orbita.v7i1.4213>
- Nurani, M., Riyadi, R., & Subanti, S. (2021). Profil Pemahaman Konsep Matematika Ditinjau Dari Self Efficacy. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, 10(1), 284. <https://doi.org/10.24127/ajpm.v10i1.3388>
- Rahadiyani, D. W. S., Rivani, P. A., & Untari, F. (2023). Implementation of Problem Based Learning Model as an Effort to Improve Student Activities and Outcomes in Temperature and Heat Materials. *Integrated Science Education Journal*, 4(1), 19–22. <https://doi.org/10.37251/isej.v4i1.292>
- Ramadhanti, A., & Simamora, N. N. (2023). The Use of Fractional Card Media-Based Concept Attainment Models to Improve Understanding of Fractional Concepts. *Journal of Basic Education Research*, 4(1).
- Rivani, P. A., & Kurniawan, D. A. (2021). Persepsi Guru Fisika Tentang Minat Belajar Siswa Terhadap Fisika. In *Prosiding Seminar Nasional Fisika* (Vol. 1, No. 1, pp. 99-104).
- Rivani, Putri Ayu, & Kurniawan, D. A. (2022). Analisis Kecerdasan Emosional Siswa terhadap Pembelajaran Fisika. 1–8.
- Rivani, P. A., Kurniawan, D. A., & Yohafrinal, Y. Pengaruh Minat Belajar Terhadap Prestasi Belajar Fisika Pada Siswa Di Sman 11 Kota Jambi. *Tunjuk Ajar: Jurnal Penelitian Ilmu Pendidikan*, 5(1), 143-150.
- Sari, P., Dwikoranto, D., & Lestari, N. A. (2021). Analisis Respon dan Ketertarikan Peserta Didik Terhadap Pelaksanaan Pembelajaran Fisika Berbasis Environmental Learning di SMA. *PENDIPA Journal of Science Education*, 5(3), 337–344. <https://doi.org/10.33369/pendipa.5.3.337-344>.
- Saputri, J. (2021). Pembelajaran Tematik: Komparasi Karakter Peduli Lingkungan dan Karakter Cinta Damai. *Journal of Basic Education Research*, 2(3), 79-83.
- Shidiq, U., & Choiri, M. (2019). Metode Penelitian Kualitatif di Bidang Pendidikan. In *Journal of Chemical Information and Modeling* (Vol. 53, Issue 9).
- Syafii, M. (2019). Analisis Pola Pikir Dan Perilaku Lingkungan Mahasiswa Program Studi Pendidikan Fisika Fkip Unri Terhadap Lingkungan Hidup Di Kampus Fkip Unri. *Jurnal Pendidikan*, 9(1), 51. <https://doi.org/10.31258/jp.9.1.51-70>
- Syaiful, Kamid, Kurniawan, D. A., & Rivani, P. A. (2021). The impact of project-based learning on students' achievement in mathematics. *Journal of Educational Research and Evaluation*, 5(4), 558–567. <https://doi.org/10.48081/kxbi5168>
- Syarifah, B. A., & Astuti, B. (2019). Bahan Ajar Fisika Berbasis I-SETS (Islamic, Science, Environment, Technology, and Society) Terkomplementasi Karakter untuk Meningkatkan Motivasi Belajar Siswa. *UPEJ Unnes Physics Education Journal*, 8(3). <https://journal.unnes.ac.id/sju/index.php/upej/article/view/35621>
- Titin Priyantini, N. P., Sadia, I. W., & Suastra, I. W. (2015). Pengembangan Perangkat Pembelajaran Fisika Sma Bermuatan Karakter Dengan Setting Model Pembelajaran Sains Teknologi Masyarakat Dan Lingkungan Untuk Meningkatkan Karakter Dan Keterampilan Berpikir Kreatif Siswa. *E- Journal Program Pascasarjana Universitas Pendidikan Ganesha*, 5(3), 1–10.
- Wulandari, M., & Jumadi, J. (2023). Analisis Penggunaan E-Modul Untuk Mendukung Kemampuan Pembelajaran Fisika Siswa Di Sma: Tinjauan Pustaka Sistematis. *EduFisika: Jurnal Pendidikan Fisika*, 8(1).
- Wulandari, S. (2020). Pengaruh penggunaan metode drill terhadap kemampuan menggali informasi dari dongeng peserta didik kelas II sekolah dasar. *Journal of Basic Education Research*, 1(1), 01-06.
- Yantoro, Y., Kurniawan, D. A., Perdana, R., & Rivani, P. A. (2021). A Survey of Process Skills Mathematics Learning in Elementary School. *Jurnal Pendidikan Dan Pengajaran*, 54(3), 467–474. <https://doi.org/10.23887/jpp.v54i3.37180>

- Yanuar, D., & Mufit, F. (2021). Online Learning: Penggunaan Google Classroom Dan Dampaknya Dalam Pembelajaran Fisika. *EduFisika: Jurnal Pendidikan Fisika*, 6(2), 85-92.
- Zurweni, Z., Kurniawan, D. A., Rivani, P. A., & Perdana, R. (2022). Gender Analysis From a Review of Middle School Students' Attitudes and Self-efficacy. *JPI (Jurnal Pendidikan Indonesia)*, 11(2), 252–264. <https://doi.org/10.23887/jpiundiksha.v11i2.36391>