Environmental education research in Indonesian Scopus indexed journal: A systematic literature review

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Review Article

Environmental education research in Indonesian Scopus indexed journal: A systematic literature review

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ABSTRACT

Studies in the field of environmental education need to be continuously promoted in line with the increasing number of environmental problems. The purpose of this systematic literature review (SLR) was to review and compare investigations of researches on articles published by one Indonesian Scopus Indexed journal i.e., Jurnal Pendidikan IPA Indoneia (JPII) so that they are expected to have significant contributions to the topic of environmental education. This systematic literature review adopts five-step guidelines. The study standards that meet the requirements were as follows: (1). The data used were from the 2012-2021 publication year; (2) articles published in English; (3) Full paper can be accessed; (4) related to the theme of environmental education. It can be concluded that JPII is a pro-environment education journal. JPII publishes 26 articles related to the theme of environment education. The most frequently used keywords were environmental education and students. JPII's important contribution in the theme of environmental education is to provide a real example of the implementation of SETS and to emphasize that the success of implementing environmental education depends on the models, methods, techniques, and tools that are continuously developed by experts.

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INTRODUCTION

Environmental problems are currently one of the main problems that many researchers and experts respond to in the world (Bradshaw et al., 2021; McMichael et al., 2008; Scherer et al., 2020; Voulvoulis & Burgman, 2019; Wiedmann et al., 2020). This is very reasonable considering that various forms of environmental problems have emerged and affect human life (Abdallah, 2017; Chu & Karr, 2017; Jianping et al., 2014; Manisalidis et al., 2020; Pereira, 2015). We can see various forms of problems that we feel as a result of environmental change, for example climate change and global warming (Anand, 2013; Fielding &

Hornsey, 2016; IPCC, 2018; Keivani, 2010; Rao & Patil, 2017; Stevenson & Peterson, 2016; WEF, 2017; Woodruff, 2010), pollution (Adebayo, 2013; Chin et al., 2019; Collins & Grineski, 2019; Giesler, 2018; Islam et al., 2016; Karataş & Karataş, 2016; Lestari & Trihadiningrum, 2019; Nriagu et al., 2016; Rhodes, 2018; Syamsussabri et al., 2019; Teksoz, 2011; United Nations Environment Programme, 2017; Zhang & Batterman, 2013), emergence of various diseases (Castro et al., 2019; El-Sayed & Kamel, 2020; Mishra et al., 2021; Nava et al., 2017; Weiss & McMichael, 2004; Wu et al., 2016), loss of biodiversity (Vijeta et al., 2021; Williams et al., 2020; Zari & Mainguy, 2014), even the threat of starvation (Janssens et al., 2020; Ritchie & Roser, 2020; Scherer et al., 2020; Vågsholm et al., 2020), and deforestation (Hudha et al., 2019; Husamah & Rahardjanto, 2019).

Responding to environmental problems and their various impacts on life, one of the many solutions offered is environmental education (Hudson, 2001; Ikhsan et al., 2019; Nurwidodo et al., 2020). Environmental education is an approach, tool, and program that develops and supports attitudes, values, awareness, knowledge, and skills related to the environment (Ardoin et al., 2020; Dalida et al., 2018; Mansoor & Kounsar, 2020; Mardiani et al., 2021). Environmental education prepares people to take action based on environmental information (Boyes & Stanisstreet, 2012; Chepesiuk, 2003; Nielsen et al., 2012; Parra et al., 2020). Environmental education is a conservation strategy that provides synergistic opportunities, for example, facilitating scientists, decision makers, community members, and other stakeholders to meet in one vision and mission (Toomey et al., 2017). Environmental education is an indispensable requirement to promote sustainable development (Benítez et al., 2019; Camilleri & Camilleri, 2020; Dost, 2021; Holfelder, 2019; Ibáñez et al., 2020).

There are still very limited journals that focus on issues of environmental education, and of course with international reputation (indexed by Scopus). Several journals on this theme, such as the Journal of Environmental Education, Australian Journal of Environmental Education, International journal in Geographical and Environmental Education, Journal of Outdoor and Environmental Education, Environmental Education Research, and Applied Environmental Education and Communication. The journals are managed by giant publishers such as Taylor & Francis and Springer Nature.

However, there are journals in the field of education that also focus their articles on the theme of environmental education. One of the journals that need to be considered is Jurnal Pendidikan IPA Indonesia (p-ISSN 2339-1286 and e-ISSN 2089-4392) or often abbreviated as JPII. This journal collaborates with *Perkumpulan Pendidik IPA Indonesia* (PPII) or Indonesian Society for Science Educators. JPII is one of the leading journals in Indonesia. This journal has been indexed by Scopus since 2017 and has qualified as a reputable Q2 journal with a 2020 SJR of 0.49.

Referring to JPII's focus and scope, it is written that "This journal publishes original articles on the latest issues and trends occurring internationally in science curriculum, instruction, learning, policy, and preparation of science teachers with the aim to advance our knowledge of science education theory and practice. Moreover, this journal also covers the issues concerned with environmental education and environmental science". The question is whether this journal is really pro-environmental education? This Systematic Literature Review will address this question.

Systematic Literature Review has been done a lot. However, specifically for the theme of environmental education, there are only a few Systematic Literature Reviews. Based on a Google Scholar search, only seven articles were found on the Systematic Literature Review on the theme of Environmental Education. These articles, which are about learners and learning in environmental education (Rickinson, 2001), environmental education in higher education (Niño & Romero, 2014), environmental education in pre-service teacher training (Álvarez-García et al., 2015), early childhood environmental education (Ardoin & Bowers, 2020), environmental education outcomes for conservation (Ardoin et al., 2020), environmental education and education for sustainable development in higher education (Acosta Castellanos & Queiruga-Dios, 2021), environmental education for sustainable development goals (Dost, 2021) and Sustainable development research in EJMSTE (Husamah et al., 2022). However, the systematic literature review focused on leading journals such as JPII has yet to be found. In fact, it is important to do this as a basis for researchers to use JPII as the main reference in their research or articles, given its international reputation. Therefore, the purpose of this systematic literature review is to review and compare investigations of researches on articles published by JPII so that they are expected to have significant contributions to the topic of environmental education.

METHOD

This research is a Systematic Literature Review (SLR). SLR is the process of identifying, evaluating and analyzing all available information to answer predetermined research questions (Snyder, 2019; Xiao & Watson, 2019).

This systematic literature review adopts five-step guidelines from Denyer and Tranfield (2009) (Figure 1). This method has also been applied by some SLR studies. The organization of the SLR and analysis follows the important features, reported in Han et al (2020).

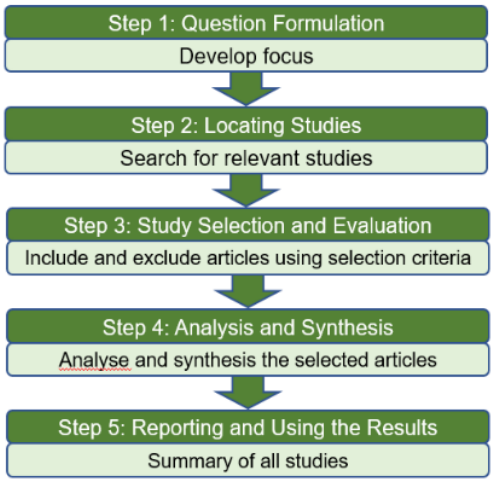

Figure 1. Five steps of an SLR, adapted from Denyer and Tranfield (2009) by (Han et al., 2020)

Step 1: question formulation

This first step is to define the scope to develop a clear focus for the study. This study proposes and attempts to address the following questions (from 2012 to 2021). This research question was made based on the needs of the chosen topic, namely: RQ1: What is the trend of JPII's publications for the past 1 decade? RQ2: What are the trends in the types of research published at JPII related to the theme of environmental education? RQ3: Where do the authors who publish related to the environmental education theme come from? RQ4: What are the trends of authors and what keywords are often used related to the theme of environmental education? RQ5: What important contributions and information can be obtained for the development of environmental education?

Step 2: locating studies

This second step of Systematic Literature Review is to locate, select, assess and list the core contributions related to the review questions. The target of this research is Environmental Education. These keywords are used to track related/appropriate articles published by JPII from 2012 to 2021. The search process uses the search menu at the JPII journal website address (https://journal.unnes.ac.id/nju/index.php/jpii/search) and the Scopus indexer (https://www.scopus.com/sourceid/21100823999) with the keyword used is "environment". The data obtained is stored in the form of *CSV and *RIS which are then stored in the Mendeley Reference Manager. The data was visualized using VOS-viewer software.

These databases were selected based on their availability in academic institutions and having been considered in other similar studies. Literatures from the articles resulted from keyword search are reviewed for the backward search. Forward search was conducted through reviewing additional sources resulted from cited references of selected studies. No further studies were located during the process.

Step 3: study selection and evaluation

This stage is carried out to ensure that the data or information obtained is suitable for use in research (Systematic Literature Review) or not. The study standards that meet the requirements are as follows: (1). The

data used are from the 2012-2021 publication year; (2) Articles published in English; (3) Full paper can be accessed; (4) related to the theme of environmental education. Explicit selection criteria were applied for the inclusion and exclusion of relevant studies to maintain the transparency of the process (Figure 2). In the first phase, titles and abstracts of 446 articles were read in the first screening. All of these articles were published by JPII from 2012-2021. In the second phase, we only used manuscripts indexed in Scopus until January 2021. All documents that did not meet the selection criteria were excluded; 428 articles remained for the next process of selection (18 articles excluded). In the third phase, we only selected articles published in English, so that the remaining 360 articles (68 articles were excluded). In the fourth phase, we selected articles containing the keyword "environment", resulting in a drastic decrease in the number of articles, namely 56 (304 articles excluded). In the fifth phase, we checked the remaining articles to make sure the articles were really in line with the Environment keyword, the remaining 49 articles (7 articles were excluded). In the sixth phase, which was the last, we only selected articles related to the topic of environmental education, leaving 26 articles. This means there are 23 articles that are excluded.

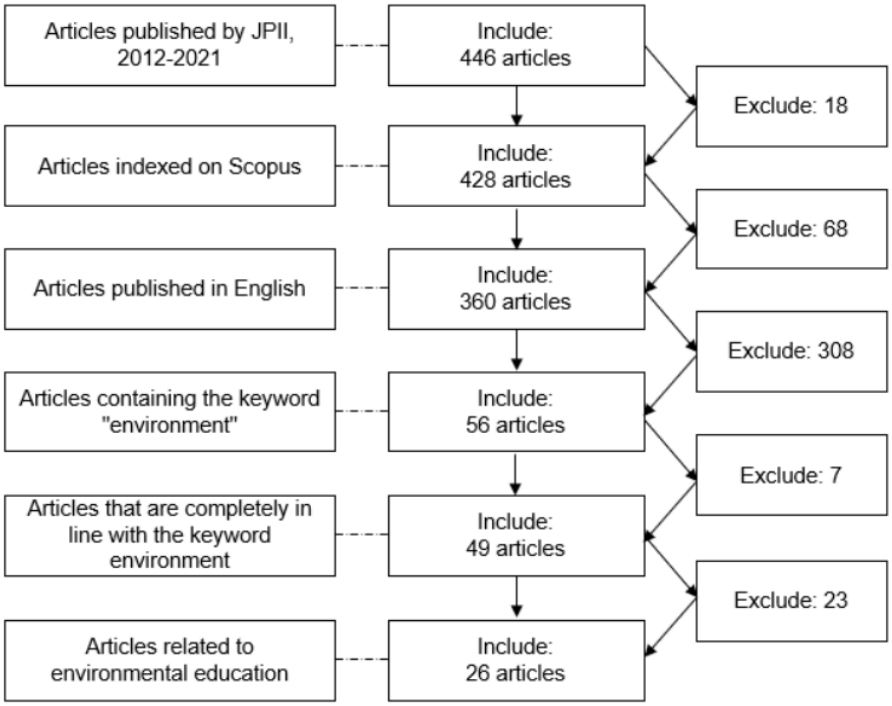

Figure 2. Review process for study selection

RESULTS AND DISCUSSION

JPII publication trend for 1 decade

Until 2021, JPII has published 10 Volumes. JPII has published 446 articles from 2012 to 2021 (see Figure 3). Since Volume 4 issue 1, JPII has been published in English as an internationalization effort. Previously, JPII was published in Indonesian only. Before being indexed by Scopus, there were inconsistencies in the number of articles published. The number of articles published in one-year (2 issues) ranges from 25 to 51 articles. After this journal was indexed by Scopus in 2017, journal management has become more professional. In 2018-2021, JPII published 4 issues, with a total of 60 articles per year.

The characteristics of good journal management are consistent in the number of articles, in addition to ensuring consistency with focus and scope. This is increasingly demanded for journals with international reputation (e.g., indexed by Scopus). Indeed, one of the most difficult things a busy journal editor has to do—usually apart from being an editor, they are also lecturers at a leading university—is to consistently take the time to re-evaluate the workflow of their journal or publisher. Most editors find it quite difficult to devote time

to all the manuscripts they have to put in the flow through peer review. However, whatever the reason, this is the consequence of a good journal management mechanism. Routines are moreover to analyze their team's daily routine. But we all know that routines and habits are “just one hop, skip, and a jump away”. Editors need to periodically take time to look at the bigger picture of the journal and consider ways to optimize the journal's operations (Altman et al., 2021).

The large number of articles does not indicate low quality, but on the contrary shows professionalism in management and is very strategic in scientific development. In this case we can follow the example of a big publisher like MDPI, one of the quality and aggressive publishers (Crosetto, 2021). In this regard, it is better for editors to also read about the best management journals. One interesting reference to read is the article Clark et al (2017) which discusses in detail about the mysteries of the review process, getting the right methodology, interdisciplinary publishing, open access journaling, publishing ethics, utilizing peer review, targeting specific issues, maintaining a publication career. , and understand journal ratings. Then, one of the things that must be considered by the editor is related to "understanding authorship in scholarly publication". As according to Editage Insights (2018), scientific publications can be a rather confusing concept, especially for novice authors. In the context of collaborative research and publication, it is important to understand the ethical aspects of writing to avoid conflicts and fraud related to writing.

In line with that, journal management must adhere to the principle of "trust". Editors trust peer reviewers to provide fair and in-depth (quality) reviews. Authors trust editors to select capable peer reviewers. Readers also put their trust in the peer-review process so that they can read articles that are useful for their interests. Good decisions and a strong editorial process designed to manage these interests will promote a sustainable and efficient publishing system, which will benefit all parties involved. So, it must be realized that good publicity practice is not formed by chance or by chance. All need process, patience, and consistency, and will become established only if actively promoted (Graf et al., 2007).

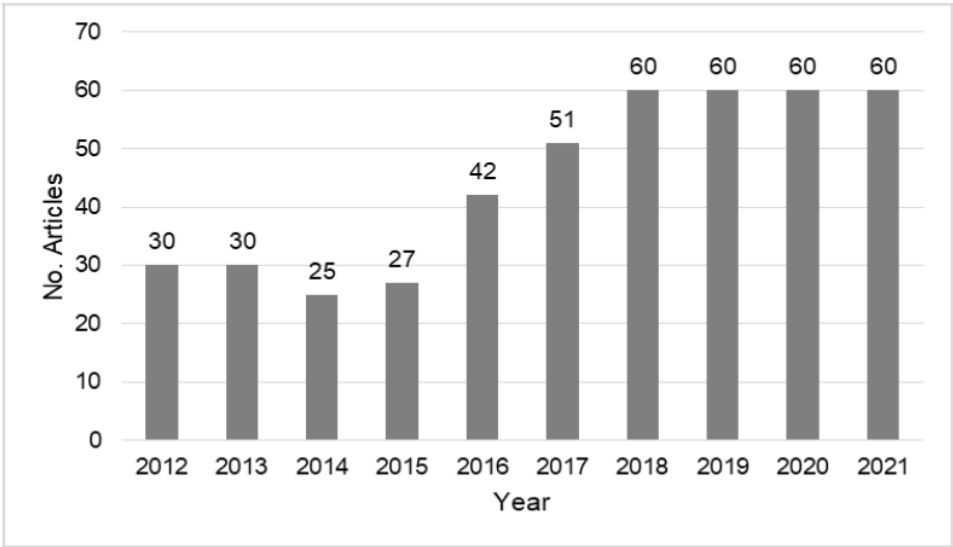

Figure 3. Trends in the number of article publications in JPII for a decade

Types of research related to the theme of environmental education

The results of the search process as well as inclusion and exclusion criteria were only taken 26 papers that have complied with the criteria for journal articles published in the 2015-2021 (in English) and has discussions related to the theme of environmental education. The trend of types of research related to the theme of environmental education, as presented in Table 1.

Based on Table 1, it can be seen that the 3 dominant types of research related to the theme of environmental education are R&D (6 articles), Quasi-experiment (5 articles), and mixed methods (3 articles). Meanwhile, other types of research each have 1 article. The data is in line with the efforts to implement environmental education. R&D is the door or path to educational innovation. A reference says that education

and innovation (through the form of R&D) are two activities that must always go hand in hand to ensure the progress of society/students. Education invests in knowledge and R&D seeks to turn this knowledge into greater well-being (improved quality of life and service to education consumers) for society with the power of better products/outcomes and services at lower costs (Bryk, 2007; Gustiani, 2019; Svensson, 2008; Tullao & Cabuay, 2015). In line with that, the encouraging thing is that in general the trend of R&D research in Indonesia continues to increase (Ridho, 2018).

Another thing that needs to be observed is the use of quasi-experiments in publications related to the theme of environmental education. Quasi experiment is widely used in educational research (Schneider & Rohmann, 2021). This type of research in education is critical to adapting these innovative interdisciplinary techniques to advance educational understanding, policy and practice (Gopalan et al., 2020). Higher quality quasi-experimental information can produce more convincing evidence for a causal relationship (Harris et al., 2006).

Table 1. Types of research on environmental education themes at JPII

No	Type of research	Number	References
1	Research and Development (R&D) method	6	(Amini, 2015; Martini et al., 2018; Rosana et al., 2019; Sharif et al., 2021; Taufiq et al., 2016; Usmeldi et al., 20
2	Quasi-experiment	5	(Husamah, 2015; Sueb & Damayanti, 2021; Syarah et al., 2019; Widiya t al., 2015; Wilujeng et al., 2019)
3	Mixed methods design	3	(Nursetiawati et al., 2020; Sholahuddin et al., 2021; Sulaeman et al., 2020)
4	Experimental research	2	(Atmojo et al., 2018; Fisenko et al., 2021)
5	Qualitative approach with descriptive statistical analysis	1	(Rusydiyah et al., 2021)
6	Descriptive research	1	(Putra et al., 2021)
7	conceptual framework that developed the nature of the science	1	(Gathong & Chamrat, 2019)
8	Survey method	1	(Suryawati et al., 2020)
9	Classroom action research	1	(Savitri et al., 2017)
10	ethnoecological study	1	(Rahayu et al., 2021)
11	Quantitative paradigm by the Rasch model	1	(Purnami et al., 2021)
12	Path Analysis continued to the Structural Equation Modelling (SEM)	1	(Susongko & Afrizal, 2018)
13	Cross-sectional research design	1	(Noh & Khairani, 2020)

The author's country of origin is in JPII

The author's tendency to write about the theme of environmental education is as presented in Table 2. The data in Table 2 is in line with the visualization of the VOS-viewer software, as presented in Figure 4. Based on Figure 4, it can be seen that the dominant author comes from institutions in Indonesia. This is in line with Table 2 that there are 14 articles written by authors, all of whom come from institutions in Indonesia, and 1 article each by an author from Malaysia, Thailand, and Russia. Figure 4 shows the line of relationship between Indonesia, with Malaysia and Japan. This means that there are several authors from Indonesia who write articles in collaboration with or collaborate with authors from Malaysia and Japan. This finding is in line with Table 2 which shows that there are 4 articles which are collaborations of authors from Indonesian and Malaysian institutions, and 2 articles which are collaborations of authors from institutions in Indonesia and Japan.

We can say that although JPII is published by institutions in Indonesia (UNNES), JPII has begun to be noticed by authors from abroad, both countries in Asia, Europe, and America. Although we cannot deny that authors from institutions in Indonesia are still very dominant. The existence of a good trend in the form of publication collaboration between institutions and between countries needs to be encouraged, to support the internationalization of JPII and improve the quality of the manuscript. Also, JPII needs to continue to promote to attract authors from various countries, if necessary, from five continents. This is because good journals are journals that are in demand by authors from various parts of the world, including Asia, Australia, Europe, America, and even Africa.

JPII needs consistency in the internationalization of journals, which has the main objective of global dissemination of journals in Indonesia so that they are recognized throughout the world. Therefore, JPII editors need to continue to maintain the quality of the substance of the articles published, the management and management of journals that continue to be internationally oriented, the composition of the editorial board and reviewers that are consistently international in scale, and the management of an open journal system that has international standards. In addition, optimizing the number of citations for scientific journals and strategic information also plays an important role in ensuring that JPII remains a journal indexed by reputable international indexers (Thamrin, 2013).

Table 2. The countries of origin of the authors who wrote on the theme of environmental education.

No	Country of origin		References	Amount
	One country	Collaboration between countries		
1	Indonesia		(Amini, 2015; Husamah, 2015; Nursetiawati et al., 2020; Putra et al., 2021; Rahayu et al., 2021; Rosana et al., 2019; Rusydiyah et al., 2021; Sholahuddin et al., 2021; Sueb & Damayanti, 2021; Suryawati et al., 2020; Taufiq et al., 2016; Usmeldi et al., 2017; Widiyanti et al., 2015)	14
2	Malaysia		(Noh & Khairani, 2020)	1
3	Thailand		(Gathong & Chamrat, 2019)	1
4	Rusia		(Fisenko et al., 2021)	1
5		Indonesia dan Malaysia	(Purnami et al., 2021; Sharif et al., 2021; Susongko & Afrizal, 2018; Wilujeng et al., 2019)	4
6		Indonesia dan Japan	(Savitri et al., 2017; Sulaeman et al., 2020)	2
7		Indonesia dan Taiwan	(Martini et al., 2018)	1
8		Indonesia dan Poland	(Atmojo et al., 2018)	1
9		Indonesia dan Slovakia	(Syarah et al., 2019)	1

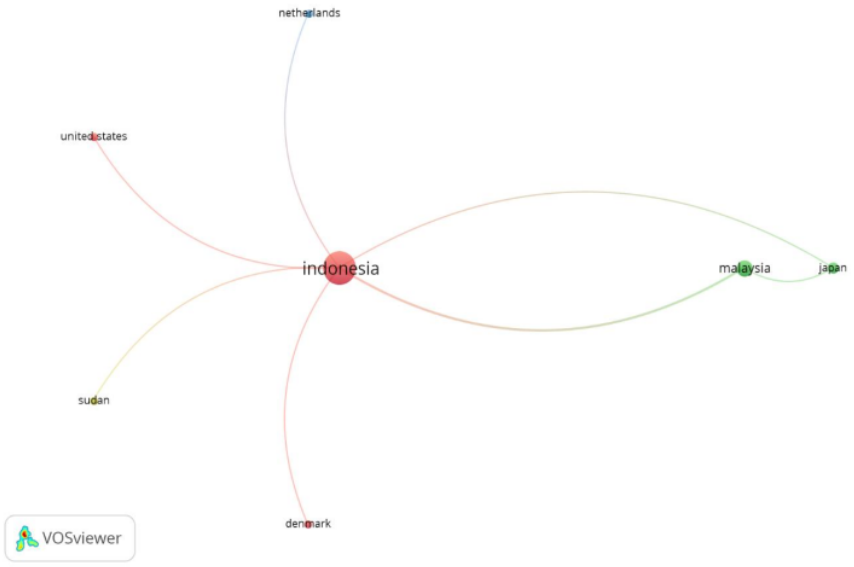

Figure 4. VOS-viewer display for type of analysis "Co-authorship→ country" based on Scopus source

Trending authors and frequently used keywords

The visualization of the VOS-viewer software as presented in Figure 5 shows the dominant author "named". Meanwhile, Figure 6 shows the dominant keywords used. There are 5 interrelated authors, namely S. Anggoro, A. S. E. Khair, T. R. Soeprobowati; A. Irsadi, and M. Helmi. These five authors cite each other or

collaborate with each other. This can be seen from the existence of a line between each author and other authors.

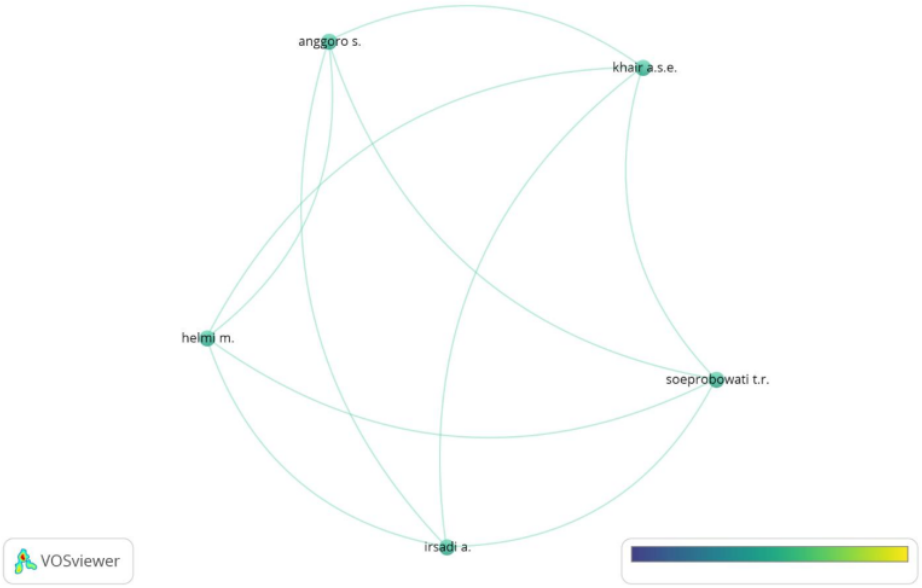

Figure 5. VOS-viewer output display for type of analysis "Co-authorship→ authors" based on Scopus source

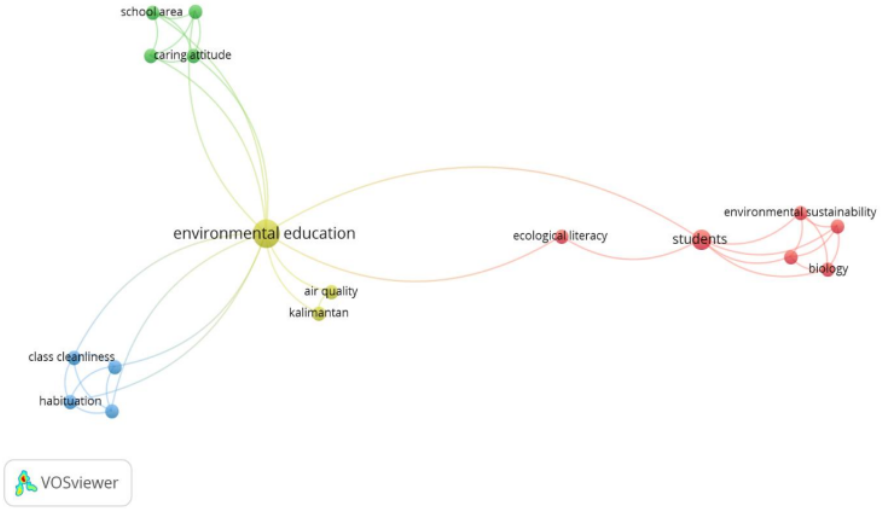

Figure 6. VOS-viewer display for type of analysis "Co-occurrence → keywords"

Based on Figure 6, there are 2 most prominent keywords, namely environmental education and students. Based on Figure 6, there is a relationship between the two keywords. The keyword "students" is related to ecological literacy, environmental sustainability, and biology. Meanwhile, environmental education is related to 3 important keywords, namely habituation, class cleanliness, caring attitude, and school arena. This is in line with the views of experts that ecological literacy, environmental sustainability, and students or education are related (Häggström & Schmidt, 2020; Ulfah et al., 2020; Wardani et al., 2018). The term can for example

be presented and used to compare and contrast frameworks across different dimensions of influence, knowledge, skills and behavior (McBride et al., 2013).

Contributions and important information for the development of environmental education

We reviewed 26 selected articles. The important information from these articles is presented in Table 3.

Table 3. Contributions and important information in chronological order (in order of year)

No	Important information	References
1	application of the scientific literacy-based natural science teaching set was effective toward the students' learning activities and outcomes	(Widiyanti et al., 2015)
2	Outdoor learning-based environmental education is effective in improving student learning outcomes, especially the attitude of caring toward the environment.	(Amini, 2015)
3	Blended Project Based Learning is effective to develop thinking skills about environmental sustainability of new students of biology education	(Husamah, 2015)
4	Mobile learning science applications of eclipse phenomenon in conception of conservation is developed and feasible to be used to study the concept of eclipse and support the efforts to reduce the use of paper (paperless)	(Taufiq et al., 2016)
5	The implementation of Research-based Physics Learning with Science, Environment, Technology, and Society (SETS) approach was effective in improving critical thinking skills and learning outcomes of the students.	(Usmeldi et al., 2017)
6	Green Learning Method (GeLeM) can improve student cognitive result and science process skill in science learning. Students are also able to find the concept that comes from the environment (nature), students can also love and care for the environment as a vehicle for learning.	(Savitri et al., 2017)
7	The implementation of thematic learning of Science, Environment, Technology, and Society (SETS) integrated with local wisdom was able to reconstruct and increase the disaster management knowledge.	(Atmojo et al., 2018)
8	The course of science, environment, technology, and society (SETS) could strengthen the students' characters and ecopreneurship	(Martini et al., 2018)
9	The environmental awareness of 15-old Indonesian students directly influenced positively	(Susongko & Afrizal, 2018)
10	The application of SETS (Science, Technology, Environment, and Society) approach through the Biophysics course has been proven as an effective solution to develop new literacy among students	(Rosana et al., 2019)
11	The pre-service teachers had a better understanding of the nature of science after studying with the statistical significance and were satisfied with the implementation of the teaching method	(Gathong & Chamrat, 2019)
12	Study showed a significant result in marine conservation knowledge of elementary school students in the experimental classes. The introduction to marine conservation could then be done using the latest technology that attracts children's learning interest.	(Syarah et al., 2019)
13	Education for Environmental Sustainable Development (EESD)-based student worksheets are useful to improve students' environmental literacy.	(Wilujeng et al., 2019)
14	Different types of tests show a different index of difficulty when measuring student achievement in scientific method aspects, including basic skills and process skills.	(Subali et al., 2019)
15	There is an urgency of enhancing science education with air quality discussion. Authors suggest a possible enhancement in substance and its transformation section and the Science-Environment-Technology-Society section in Science for Junior and Senior High School	(Sulaeman et al., 2020)
16	Student attitudes toward science, technology, engineering, and mathematics (S-STEM) as a three-factor multidimensional construct, namely attitude towards science, attitude towards technology/engineering, and attitude towards mathematics.	(Noh & Khairani, 2020)
17	The implementation of learning resources in the form of Local Environment-Problem Based Learning (LE-PBL) student worksheets strengthens students' environmental literacy in identifying, analyzing, evaluating, and planning actions and sensitivity to local and global environmental issues.	(Suryawati et al., 2020)
18	There is a difference between students who use the Problem Based Learning Module, which improves students' environmental attitudes than science textbooks	(Sueb & Damayanti, 2021)
19	The cycle of natural scientific disciplines has a great influence on the natural scientific thinking of foreigners studying at faculties of pre-university training of Russian universities	(Fisenko et al., 2021)
20	Despite the stress of a constantly changing environment and various restrictions and limitations, the ethnoecological knowledge in local wisdom is still maintained well.	(Rahayu et al., 2021)
21	The school area and the level of the "Adiwiyata" program were not the primary determining variable of environmental caring attitude education effectiveness.	(Sholahuddin et al., 2021)
22	The school community that has good environmental literacy will give a good influence on students' environmental literacy and knowledge	(Putra et al., 2021)

No	Important information	References
23	An instrument of ecocritical thinking skills is a good fit instrument.	(Purnami et al., 2021)
24	There is a significant increase in the perception and implementation skill of the STEM learning environment in science education students after teaching internship	(Rusydiyah et al., 2021)
25	Lectrofun 2.0 (a simple green electrochemistry experimental kit) has a significant impact on enhancing learner comprehension of Electrochemistry topic, enjoyment in learning, and learning to care for the environment.	(Sharif et al., 2021)
26	The family's physical and non-physical environment dramatically determines and encourages students to optimize experimental science learning methods	(Nursetiawati et al., 2020)

Based on Table 3, it can be seen that there is a dominant method in relation to environmental education, namely SETS (Science, Technology, Environment, and Society). There are 4 articles that discuss this. "SETS (Science, Environment, Technology, and Society) utilize Science in forming technology to meet the needs of the society through the implications in the physical and mental environment" (Rosana et al., 2019). The SETS learning educated the students to linkage the science concepts with other elements (Atmojo et al., 2018). The SETS focus on problems from real and actual life (Kusumaningrum et al., 2021), so that students are able to minimize negative impacts of technology and science on the environment and society (Maknun et al., 2018). The SETS learning tools had six stages, namely: criticizing; planning; studying; creating; performing, and writing (Martini et al., 2018).

Another dominant thing based on Table 3 is the development and use of models, methods, techniques, and tools by the authors, for example Education for Environmental Sustainable Development (EESD)-based student worksheets, instrument of ecocritical thinking skills, STEM, Local Environment-Problem Based Learning (LE-PBL), Green Learning Method (GeLeM), Mobile learning, and Lectrofun 2.0. This is in line with the views of experts that the successful implementation of environmental education requires models, methods, techniques, and tools (Buchan, 2004; Maryono, 2015; Thomson et al., 2010). Experts need to compete and work hard to make their contribution in this regard.

CONCLUSION

For a decade, JPII has demonstrated its position as a pro-environment education journal. There are 26 articles that have been published related to the theme of environment education. The most prominent or frequently used keywords, namely environmental education and students, indicate that the solution to environmental problems is identical to student empowerment efforts. The articles published by JPII have an important contribution to the environmental education theme, for example by providing real examples of SETS implementation. It has also been emphasized that the success of environmental education depends on the success of experts in generating and implementing models, methods, techniques, and tools.

This Systematic Literature Review has limitations, namely, this research is generally based on limited keywords, in one journal (JPII only), and only the Scopus index (Web of Science is not included in the sources used). For further research, it is recommended to use a larger sample of reputable journals with expand the keywords used and other databases that can be accessed, both DOAJ, SINTA, ERIC, Scopus, and Web of Science. This, can also be used as a comparison of the results of different analyzes of the Systematic Literature Review related to environmental and environmental education themes which is able to provide a description in more detail, so as to inspire researchers in this field.

REFERENCES

Abdallah, T. (2017). Environmental Impacts. In T. B. T.-S. M. T. Abdallah (Ed.), *Sustainable Mass Transit Challenges and Opportunities in Urban Public Transportation* (pp. 45–59). Elsevier. https://doi.org/10.1016/B978-0-12-811299-1.00004-6

Acosta-Castellanos, P. M., & Queiruga-Dios, A. (2021). From environmental education to education for sustainable development in higher education: a systematic review. *International Journal of Sustainability in Higher Education*, *0*(ahead-of-print), 00–00. https://doi.org/10.1108/IJSHE-04-2021-0167

Adebayo, R. I. (2013). Abuse of religion and environmental pollution in Nigeria: An Islamic perspective. *Intellectual Discourse*, *21*(1), 109–121.

Altman, S., Dymek, C., Fradella, H., Harris, A., & Sørensen, J. B. (2021). *Academic journal management best practices: Tales from the trenches*. Scholastika.

Álvarez-García, O., Sureda-Negre, J., & Comas-Forgas, R. (2015). Environmental education in pre-service teacher training: A literature review of existing evidence. *Journal of Teacher Education for Sustainability*, *17*(1), 72–85. https://doi.org/10.1515/jtes-2015-0006

Amini, R. (2015). Outdoor based environmental education learning and its effect in caring attitude toward environment. *Jurnal Pendidikan IPA Indonesia*, *4*(1), 43–47. https://doi.org/10.15294/jpii.v4i1.3500

Anand, S. V. (2013). Global environmental issues. *Open Access Scientefic Reoprts*, *2*(2), 1–9. https://doi.org/10.4172/scientificreports.632

Ardoin, N. M., & Bowers, A. W. (2020). Educación ambiental en la primera infancia: una revisión sistemática de la literatura de investigación. *Educational Research Review*, *31*(January), 1–16.

Ardoin, N. M., Bowers, A. W., & Gaillard, E. (2020). Environmental education outcomes for conservation: A systematic review. *Biological Conservation*, *241*(July), 108224. https://doi.org/10.1016/j.biocon.2019.108224

Atmojo, S. E., Rusilowati, A., Dwiningrum, S. I. A., & Skotnicka, M. (2018). The reconstruction of disaster knowledge through thematic learning of science, environment, technology, and society integrated with local wisdom. *Jurnal Pendidikan IPA Indonesia*, *7*(2), 204–213. https://doi.org/10.15294/jpii.v7i2.14273

Benítez, F. F., Paredes, M. E. R., Collado-Ruano, J., Terán, E. F. H., & Ibarra, G. D. L. (2019). Environmental education program in Ecuador: Theory, practice, and public policies to face global change in the anthropocene. *Ensaio*, *27*(105), 859–880. https://doi.org/10.1590/S0104-40362019002701950

Boyes, E., & Stanisstreet, M. (2012). Environmental Education for Behaviour Change: Which actions should be targeted? *International Journal of Science Education*, *34*(10), 1591–1614. https://doi.org/10.1080/09500693.2011.584079

Bradshaw, C. J. A., Ehrlich, P. R., Beattie, A., Ceballos, G., Crist, E., Diamond, J., Dirzo, R., Ehrlich, A. H., Harte, J., Harte, M. E., Pyke, G., Raven, P. H., Ripple, W. J., Saltré, F., Turnbull, C., Wackernagel, M., & Blumstein, D. T. (2021). Underestimating the challenges of avoiding a ghastly future. *Frontiers in Conservation Science*, *1*(January), 1–10. https://doi.org/10.3389/fcosc.2020.615419

Bryk, A. S. (2007). Ruminations on reinventing an R&D Capacity for educational improvement. *American Enterprise Institute Conference, "The Supply Side of School Reform and the Future of Educational Entrepreneurship,."*

Buchan, J. (2004). Successful environmental education: Adapting to the educational habitat. *Australian Journal of Environmental Education*, *20*(1), 45–55.

Camilleri, M. A., & Camilleri, A. C. (2020). *The sustainable development goal on quality education*. 261–277. https://doi.org/10.1007/978-3-030-21154-7_13

Castro, M. C., Baeza, A., Codeço, C. T., Cucunubá, Z. M., Dal'Asta, A. P., De Leo, G. A., Dobson, A. P., Carrasco-Escobar, G., Lana, R. M., Lowe, R., Monteiro, A. M. V., Pascual, M., & Santos-Vega, M. (2019). Development, environmental degradation, and disease spread in the Brazilian Amazon. *PLoS Biology*, *17*(11), 4–11. https://doi.org/10.1371/journal.pbio.3000526

Chepesiuk, R. (2003). Environmlental literacy: Knowledge for healthier public. *Environmental Health Perspectives*, *115*(10), 494–499. https://doi.org/10.1289/ehp.110-1240809

Chin, Y. S. J., De Pretto, L., Thuppil, V., & Ashfold, M. J. (2019). Public awareness and support for environmental protection-A focus on air pollution in peninsular Malaysia. *PLoS ONE*, *14*(3), e0212206. https://doi.org/10.1371/journal.pone.0212206

Chu, E. W., & Karr, J. R. (2017). Environmental impact: Concept, consequences, measurement. *Reference Module in Life Sciences*, *January*. https://doi.org/10.1016/b978-0-12-809633-8.02380-3

Clark, T., Wright, M., & Ketchen, D. J. (2017). *How to get published in the best management journals*. Edward Elgar Publishing.

Collins, T. W., & Grineski, S. E. (2019). Environmental Injustice and religion: Outdoor air pollution disparities in Metropolitan Salt Lake City, Utah. *Annals of the American Association of Geographers*, *109*(5), 1597–1617. https://doi.org/10.1080/24694452.2018.1546568

Crosetto, P. (2021). *Is MDPI a predatory publisher?* Paolo Crosetto Blog.

Dalida, C. S., Malto, G. A. O., & Lagunzad, C. G. B. (2018). Enhancing students' environmental knowledge and attitudes through community-based learning. *KnE Social Sciences*, *3*(6), 205. https://doi.org/10.18502/kss.v3i6.2381

Denyer, D., & Tranfield, D. (2009). Producing a systematic review. In *The SAGE Handbook of Organizational Research Methods* (pp. 671–689). SAGE Publications Inc.

Dost, G. (2021). A critical review of environmental education for sustainable development goals, the United

Nations convention on the rights of the child and child-friendly schools. *The European Conference on Education 202*, 1–15.

Editage Insights. (2018). *A complete guide to understanding authorship in scholarly publication*. Authorship in Research.

El-Sayed, A., & Kamel, M. (2020). Climatic changes and their role in emergence and re-emergence of diseases. *Environmental Science and Pollution Research*, *27*(18), 22336–22352. https://doi.org/10.1007/s11356-020-08896-w

Fielding, K. S., & Hornsey, M. J. (2016). A social identity analysis of climate change and environmental attitudes and behaviors: Insights and opportunities. *Frontiers in Psychology*, *7*(FEB), 1–12. https://doi.org/10.3389/fpsyg.2016.00121

Fisenko, O., Nikitina, V., & Satina, T. (2021). Natural scientific thinking in foreign students of pre-university courses in the context of integration into the Russian educational environments. *Jurnal Pendidikan IPA Indonesia*, *10*(4), 544–559. https://doi.org/10.15294/jpii.v10i4.31741

Gathong, S., & Chamrat, S. (2019). The implementation of science, technology and society environment (STSE)-based learning for developing pre-service general science teachers' understanding of the nature of science by empirical evidence. *Jurnal Pendidikan IPA Indonesia*, *8*(3), 354–360. https://doi.org/10.15294/jpii.v8i3.19442

Giesler, K. (2018). The plastic problem: Plastic pollution in Bali. In *Independent Study Project*.

Gopalan, M., Rosinger, K., & Ahn, J. Bin. (2020). Use of quasi-experimental research designs in education research: Growth, promise, and challenges. In *Review of Research in Education* (Vol. 44, Issue 1, pp. 218–243). https://doi.org/10.3102/0091732X20903302

Graf, C., Wager, E., Bowman, A., Fiack, S., Scott-lichter, D., & Robinson, A. (2007). Best practice guidelines on publication ethics: A publisher's perspective. *International Journal of Clinical Practice*, *61*(SUPPL. 152), 1–26. https://doi.org/10.1111/j.1742-1241.2006.01230.x

Gustiani, S. (2019). Research and Development (R & D) method as a model design in educational research and its alternative. *Holistics Journal*, *11*(2), 12–22.

Häggström, M., & Schmidt, C. (2020). Enhancing children's literacy and ecological literacy through critical place-based pedagogy. *Environmental Education Research*, *26*(12), 1729–1745. https://doi.org/10.1080/13504622.2020.1812537

Han, Y., Chong, W. K., & Li, D. (2020). A systematic literature review of the capabilities and performance metrics of supply chain resilience. *International Journal of Production Research*, *58*(15), 4541–4566. https://doi.org/10.1080/00207543.2020.1785034

Harris, A. D., McGregor, J. C., Perencevich, E. N., Furuno, J. P., Zhu, J., Peterson, D. E., & Finkelstein, J. (2006). The use and interpretation of quasi-experimental studies in medical informatics. *Journal of the American Medical Informatics Association*, *13*(1), 16–23. https://doi.org/10.1197/jamia.M1749

Holfelder, A. K. (2019). Towards a sustainable future with education? *Sustainability Science*, *14*(4), 943–952. https://doi.org/10.1007/s11625-019-00682-z

Hudha, A. M., Husamah, H., & Rahardjanto, A. (2019). *Etika lingkungan: Teori dan praktik pembelajarannya*. UMM Press.

Hudson, S. J. (2001). Challenges for environmental education: Issues and ideas for the 21st century. *BioScience*, *51*(4), 283–288. https://doi.org/10.1641/0006-3568(2001)051[0283:CFEEIA]2.0.CO;2

Husamah, H. (2015). Thinking skills for environmental sustainability perspective of new students of biology education department through blended project based learning model. *Jurnal Pendidikan IPA Indonesia*, *4*(2), 110–119. https://doi.org/10.15294/jpii.v4i2.3878

Husamah, H., & Rahardjanto, A. (2019). *Bioindikator (Teori dan aplikasi dalam biomonitoring)*. UMM Press.

Husamah, H., Suwono, H., Nur, H., & Dharmawan, A. (2022). Sustainable development research in Eurasia Journal of Mathematics, Science and Technology Education: A systematic literature review. *Eurasia Journal of Mathematics, Science and Technology Education*, *18*(5), em2103. https://doi.org/10.29333/ejmste/11965

Ibáñez, M. E., Cid, I. V. L., Muñoz, L. V. A., & Claros, F. M. (2020). Environmental education, an essential instrument to implement the sustainable development goals in the university context. *Sustainability (Switzerland)*, *12*(19), 1–23. https://doi.org/10.3390/su12197883

Ikhsan, F. A., Kurnianto, F. A., Apriyanto, B., Nurdin, E. A., & Puji, R. P. N. (2019). The research based learning approach in Environmental Education. *IOP Conference Series: Earth and Environmental Science*, *243*(1), 012029. https://doi.org/10.1088/1755-1315/243/1/012029

IPCC. (2018). *Global warming of 1.5°C An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change,* (V. Masson-Delmotte, P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P. R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, & T. Waterfield (eds.)). Intergovernmental Panel on Climate Change.

Islam, M. S., Pei, Y. H., & Mangharam, S. (2016). Trans-Boundary haze pollution in Southeast Asia: Sustainability through plural environmental governance. *Sustainability (Switzerland)*, *8*(5), 1–13. https://doi.org/10.3390/su8050499

Janssens, C., Havlík, P., Krisztin, T., Baker, J., Frank, S., Hasegawa, T., Leclère, D., Ohrel, S., Ragnauth, S., Schmid, E., Valin, H., Van Lipzig, N., & Maertens, M. (2020). Global hunger and climate change adaptation through international trade. *Nature Climate Change*, *10*(9), 829–835. https://doi.org/10.1038/s41558-020-0847-4

Jianping, L., Minrong, L., Jinnan, W., Jianjian, L., Hongwen, S., & Maoxing, H. (2014). Global environmental issues and human wellbeing. In L. Jianping, L. Minrong, W. Jinnan, L. Jianjian, S. Hongwen, & H. Maoxing (Eds.), *Report on global environmental competitiveness (2013). Current Chinese Economic Report Series*. Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-54678-5_1

Karataş, A., & Karataş, E. (2016). Environmental education as a solution tool for the prevention of water pollution. *Journal of Survey in Fisheries Sciences*, *3*(1), 61–70. https://doi.org/10.18331/SFS2016.3.1.6

Keivani, R. (2010). A review of the main challenges to urban sustainability. *International Journal of Urban Sustainable Development*, *1*(1–2), 5–16. https://doi.org/10.1080/19463131003704213

Kostova, Z. & Atasoy, E. (2008). Methods of successful learning in environmental education. *Journal of Theory and Practice in Education, 4*(1), 49–78.

Kusumaningrum, Y. D., Budiasih, E., & Suharti, S. (2021). Effect of integration of SETS (science-environment-technology-society) in 7E learning cycle on students' critical thinking skills. *AIP Conference Proceedings*, *2330*, 020014. https://doi.org/10.1063/5.0043357

Lestari, P., & Trihadiningrum, Y. (2019). The impact of improper solid waste management to plastic pollution in Indonesian coast and marine environment. *Marine Pollution Bulletin*, *149*(August), 110505. https://doi.org/10.1016/j.marpolbul.2019.110505

Maknun, J., Busono, T., & Surasetja, I. (2018). Envisioning Science Environment Technology and Society. *IOP Conference Series: Materials Science and Engineering*, *306*(1), 012064. https://doi.org/10.1088/1757-899X/306/1/012064

Manisalidis, I., Stavropoulou, E., Stavropoulos, A., & Bezirtzoglou, E. (2020). Environmental and health impacts of air pollution: A review. *Frontiers in Public Health*, *8*(February), 1–13. https://doi.org/10.3389/fpubh.2020.00014

Mansoor, A., & Kounsar, I. (2020). Environmental education: An indispensable tool for public awareness. *International Journal of Research in All Subjects in Multi Languages*, *156*(April 2020), 4.

Mardiani, N. D., Husamah, H., Fatmawati, D., Miharja*, F. J., & Fauzi, A. (2021). Environmental literacy of students in al-rifa'ie modern islamic boarding school, Malang Regency-Indonesia based on gender differences and parents' occupation. *Jurnal Pendidikan Sains Indonesia*, *9*(2), 317–328. https://doi.org/10.24815/jpsi.v9i2.19316

Martini, Rosdiana, L., Subekti, H., & Setiawan, B. (2018). Strengthening students' characters and ecopreneurship through science, environment, technology, and society course. *Jurnal Pendidikan IPA Indonesia*, *7*(2), 162–171. https://doi.org/10.15294/jpii.v7i2.14338

Maryono, M. (2015). The implementation of the environmental education at "Adiwiyata" schools in Pacitan Regency (An analysis of the implementation of grindle model policy). *Journal of Education and Practice*, *6*(17), 31–42.

McBride, B. B., Brewer, C. A., Berkowitz, A. R., & Borrie, W. T. (2013). Environmental literacy, ecological literacy, ecoliteracy: What do we mean and how did we get here? *Ecosphere*, *4*(5), 67. https://doi.org/10.1890/ES13-00075.1

McMichael, A. J., Nyong, A., & Corvalan, C. (2008). Global environmental change and health: impacts, inequalities, and the health sector. *BMJ (Clinical Research Ed.)*, *336*(January), 191–194.

Mishra, J., Mishra, P., & Arora, N. K. (2021). Linkages between environmental issues and zoonotic diseases: with reference to COVID-19 pandemic. *Environmental Sustainability*, *4*(3), 455–467. https://doi.org/10.1007/s42398-021-00165-x

Nava, A., Shimabukuro, J. S., Chmura, A. A., & Luz, S. L. B. (2017). The impact of global environmental changes on infectious disease emergence with a focus on risks for Brazil. *ILAR Journal*, *58*(3), 393–400. https://doi.org/10.1093/ilar/ilx034

Nielsen, W., Andersen, P., Hurley, A., Sabljak, V., Petereit, A.-L., Hoskin, V., & Hoban, G. (2012). Preparing action competent environmental educators. *Australian Journal of Environmental Education*, *28*(2), 92–107.

Niño, A. C. M., & Romero, J. F. H. (2014). Environmental education in higher education: A necesary review. *Luna Azul*, *39*(2), 186–206.

Noh, A. M., & Khairani, A. Z. (2020). Validating the S-STEM among malaysian pre-university students. *Jurnal Pendidikan IPA Indonesia*, *9*(3), 421–429. https://doi.org/10.15294/jpii.v9i3.24109

Nriagu, J., Udofia, E. A., Ekong, I., & Ebuk, G. (2016). Health risks associated with oil pollution in the Niger Delta, Nigeria. *International Journal of Environmental Research and Public Health*, *13*(3), 1–23. https://doi.org/10.3390/ijerph13030346

Nursetiawati, S., Josua, D. P., Atmanto, D., Oktaviani, F., & Fardani, A. L. (2020). Science education in the family environment with the experimental method of facial cosmetics plant fertilization in the covid-19 pandemic era. *Jurnal Pendidikan IPA Indonesia*, *9*(4), 561–573. https://doi.org/10.15294/jpii.v9i4.26563

Nurwidodo, N., Amin, M., Ibrohim, I., & Sueb, S. (2020). The role of eco-school program (Adiwiyata) towards environmental literacy of high school students. *European Journal of Educational Research*, *9*(3), 1089–1103. https://doi.org/10.12973/eu-jer.7.3.555

Parra, G., Hansmann, R., Hadjichambis, A. C., Goldman, D., Paraskeva-Hadjichambi, D., Sund, P., Sund, L., Gericke, N., & Conti, D. (2020). *Education for environmental citizenship and education for sustainability BT - Conceptualizing environmental citizenship for 21st century education* (A. C. Hadjichambis, P. Reis, D. Paraskeva-Hadjichambi, J. Činčera, J. Boeve-de Pauw, N. Gericke, & M.-C. Knippels (eds.); pp. 149–160). Springer International Publishing. https://doi.org/10.1007/978-3-030-20249-1_10

Pereira, J. C. (2015). Environmental issues and international relations, a new global disorder. *Journal of Ecosystem & Ecography*, *58*(1), 191–209. https://doi.org/10.1590/0034-7329201500110

Purnami, W., Ashadi, Suranto, Sarwanto, Sumintono, B., & Wahyu, Y. (2021). Investigation of person ability and item fit instruments of eco critical thinking skills in basic science concept materials for elementary pre-service teachers. *Jurnal Pendidikan IPA Indonesia*, *10*(1), 127–137. https://doi.org/10.15294/jpii.v10i1.25239

Putra, N. S., Sukma, H. N., & Setiawan, H. (2021). Level of environmental literacy of students and school community in green open space: Is there any difference between both of them? *Jurnal Pendidikan IPA Indonesia*, *10*(4), 627–634. https://doi.org/10.15294/jpii.v10i4.31083

Rahayu, M., Keim, A. P., Nikmatullah, M., Rustiami, H., Susan, D., & Sujarwo, W. (2021). The ethnoecology of sasak people in mandalika, lombok island: Local knowledge and wisdom in relation with land use. *Jurnal Pendidikan IPA Indonesia*, *10*(3), 407–415. https://doi.org/10.15294/JPII.V10I3.30343

Rao, P., & Patil, Y. (2017). Progressive trends in implementing climate change courses in higher education curriculum at Symbiosis International University, Pune, India. In *Higher Education Institutions in a Global Warming World: The Transition of Higher Education Institutions to a Low Carbon Economy* (pp. 59–76). River Publishers.

Rhodes, C. J. (2018). Plastic pollution and potential solutions. *Science Progress*, *101*(3), 207–260. https://doi.org/10.3184/003685018X15294876706211

Rickinson, M. (2001). Learners and learning in environmental education: a critical review of the evidence. *Environmental Education Research*, *7*(3), 207–320. https://doi.org/10.1080/13504620120065230

Ridho, M. (2018). *Analisis tren penelitian dalam bidang pendidikan/pembelajaran biologi di Indonesia*. IAIN Batusangkar.

Ritchie, H., & Roser, M. (2020). *Environmental impacts of food production - Our World in Data*. Our World in Data.

Rosana, D., Kadarisman, N., & Suryadarma, I. G. P. (2019). SETS best practice model: Growth optimization and productivity of organic food plants through iasmuspec application. *Jurnal Pendidikan IPA Indonesia*, *8*(2), 267–278. https://doi.org/10.15294/jpii.v8i2.19248

Rusydiyah, E. F., Indrawati, D., Jazil, S., Susilawati, & Gusniwati. (2021). STEM learning environment: Perceptions and implementation skills in prospective science teachers. *Jurnal Pendidikan IPA Indonesia*, *10*(1), 138–148. https://doi.org/10.15294/jpii.v10i1.28303

Savitri, E. N., Wusqo, I. U., Ardhi, M. W., & Putra, P. D. (2017). Enhancement of science students' process

skills through implementation of green learning method (GeLeM) with conservation-based inquiry approach. *Jurnal Pendidikan IPA Indonesia*, *6*(2), 237–244. https://doi.org/10.15294/jpii.v6i2.11286

Scherer, L., Svenning, J. C., Huang, J., Seymour, C. L., Sandel, B., Mueller, N., Kummu, M., Bekunda, M., Bruelheide, H., Hochman, Z., Siebert, S., Rueda, O., & van Bodegom, P. M. (2020). Global priorities of environmental issues to combat food insecurity and biodiversity loss. *Science of the Total Environment*, *730*(April), 139096. https://doi.org/10.1016/j.scitotenv.2020.139096

Schneider, V., & Rohmann, A. (2021). Arts in education: A systematic review of competency outcomes in quasi-experimental and experimental studies. *Frontiers in Psychology*, *12*(April), 1–13. https://doi.org/10.3389/fpsyg.2021.623935

Sharif, A. M., Ong, S. W., Rahim, N. A., Lee, T. T., Mustafar, S., Rosmi, M. S., Mahmood, M. Z., & Nuswowati, M. (2021). A green electrochemistry experimental kit: Student's achievements on lectrofun 2.0. *Jurnal Pendidikan IPA Indonesia*, *10*(1), 24–34. https://doi.org/10.15294/jpii.v10i1.25475

Sholahuddin, A., Fitriyana, R., Sya'ban, M. F., & Sadiqin, I. K. (2021). Students' caring attitudes to wetland environment: A case of environmental education in Banjar district Indonesia. *Jurnal Pendidikan IPA Indonesia*, *10*(1), 149–158. https://doi.org/10.15294/jpii.v10i1.27838

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*(July), 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

Stevenson, K., & Peterson, N. (2016). Motivating action through fostering climate change hope and concern and avoiding despair among adolescents. *Sustainability (Switzerland)*, *8*(1), 1–10. https://doi.org/10.3390/su8010006

Subali, B., Kumaidi, Aminah, N. S., & Sumintono, B. (2019). Student achievement based on the use of scientific method in the natural science subject in elementary school. *Jurnal Pendidikan IPA Indonesia*, *8*(1), 39–51. https://doi.org/10.15294/jpii.v8i1.16010

Sueb, & Damayanti, J. (2021). The effect of macrozoobenthos diversity module based on problem-based learning on junior high school students' environmental attitudes. *Jurnal Pendidikan IPA Indonesia*, *10*(3), 400–406. https://doi.org/10.15294/JPII.V10I3.30766

Sulaeman, N. F., Nuryadin, A., Widyastuti, R., & Subagiyo, L. (2020). Air quality index and the urgency of environmental education in Kalimantan. *Jurnal Pendidikan IPA Indonesia*, *9*(3), 371–383. https://doi.org/10.15294/jpii.v9i3.24049

Suryawati, E., Suzanti, F., Zulfarina, Putriana, A. R., & Febrianti, L. (2020). The implementation of local environmental problem-based learning student worksheets to strengthen environmental literacy. *Jurnal Pendidikan IPA Indonesia*, *9*(2), 169–178. https://doi.org/10.15294/jpii.v9i2.22892

Susongko, P., & Afrizal, T. (2018). The determinant factors analysis of Indonesian students' environmental awareness in pisa 2015. *Jurnal Pendidikan IPA Indonesia*, *7*(4), 407–419. https://doi.org/10.15294/jpii.v7i4.10684

Svensson, R. (2008). Growth through Research and Development - what does the Research Literature say? In *VINNOVA Report VR 2008:19* (Issue October 2008). VINNOVA.

Syamsussabri, M., Suhadi, & Sueb. (2019). The effect of environmental pollution module on environmental worldview in senior high school. *Journal of Physics: Conference Series*, *1417*(1). https://doi.org/10.1088/1742-6596/1417/1/012076

Syarah, E. S., Yetti, E., Fridani, L., Yufiarti, Hapidin, & Pupala, B. (2019). Electronic comics in elementary school science learning for marine conservation. *Jurnal Pendidikan IPA Indonesia*, *8*(4), 500–511. https://doi.org/10.15294/jpii.v8i4.19377

Taufiq, M., Amalia, A. V., Parmin, P., & Leviana, A. (2016). Design of science mobile learning of eclipse phenomena with conservation insight android-based app inventor 2. *Jurnal Pendidikan IPA Indonesia*, *5*(2), 291–298. https://doi.org/10.15294/jpii.v5i2.7375

Teksoz, G. T. (2011). Managing air pollution: How does education help? In M. Khallaf (Ed.), *The impact of air pollution on health, economy, environment and agricultural sources* (Vol. 1, pp. 397–422). IntechOpen. https://doi.org/10.1016/j.colsurfa.2011.12.014

Thamrin, D. A. (2013). *ITB gelar kajian internasionalisasi jurnal dengan DIKTI - Institut Teknologi Bandung*. Beranda Utama.

Thomson, G., Hoffman, J., & Staniforth, S. (2010). *Measuring the success of environmental education programs* (Issue 1). ABCEE.

Toomey, A. H., Knight, A. T., & Barlow, J. (2017). Navigating the space between research and implementation in conservation. *Conservation Letters*, *10*(5), 619–625. https://doi.org/10.1111/conl.12315

Tullao, T., & Cabuay, C. (2015). Education and human capital development to strengthen R&D capacity in ASEAN. *Draft Paper for Explicating Jakarta Framework of Moving ASEAN Economic Community (AEC) Beyond*.

Ulfah, M., Suyanto, S., & Aminatun, T. (2020). The completeness of environmental literacy aspects studied in the articles published in several countries. *JPBI (Jurnal Pendidikan Biologi Indonesia)*, *6*(1), 75–82. https://doi.org/10.22219/jpbi.v6i1.10813

United Nations Environment Programme. (2017). *Towards a pollution-free planet*.

Usmeldi, U., Amini, R., & Trisna, S. (2017). The development of research-based learning model with science, environment, technology, and society approaches to improve critical thinking of students. *Jurnal Pendidikan IPA Indonesia*, *6*(2), 318–325. https://doi.org/10.15294/jpii.v6i2.10680

Vågsholm, I., Arzoomand, N. S., & Boqvist, S. (2020). Food security, safety, and sustainability—getting the trade-offs right. *Frontiers in Sustainable Food Systems*, *4*(February), 1–14. https://doi.org/10.3389/fsufs.2020.00016

Vijeta, S., Shikha, S., & Anamika, S. (2021). The principal factors responsible for biodiversity loss. *Open Journal of Plant Science*, *6*, 011–014. https://doi.org/10.17352/ojps.000026

Voulvoulis, N., & Burgman, M. A. (2019). The contrasting roles of science and technology in environmental challenges. *Critical Reviews in Environmental Science and Technology*, *49*(12), 1079–1106. https://doi.org/10.1080/10643389.2019.1565519

Wardani, R. A. K., Karyanto, P., & Ramli, M. (2018). Analysis of high school students' environmental literacy. *Journal of Physics: Conference Series*, *1022*(1), 012057. https://doi.org/10.1088/1742-6596/1022/1/012057

WEF. (2017). The global risks report 2017, 12th Edition. In *Insight Report*. https://doi.org/10.1017/CBO9781107415324.004

Weiss, R. A., & McMichael, A. J. (2004). Social and environmental risk factors in the emergence of infectious diseases. *Nature Medicine*, *10*(12S), S70–S76. https://doi.org/10.1038/nm1150

Widiyanti, F., Indriyanti, D. R., & Ngabekti, S. (2015). The effectiveness of the application of scientific literacy-based natural science teaching set toward the students' learning activities and outcomes on the topic of the interaction of living organism and environment. *Jurnal Pendidikan IPA Indonesia*, *4*(1), 20–24. https://doi.org/10.15294/jpii.v4i1.3496

Wiedmann, T., Lenzen, M., Keyßer, L. T., & Steinberger, J. K. (2020). Scientists' warning on affluence. *Nature Communications*, *11*(1), 1–10. https://doi.org/10.1038/s41467-020-16941-y

Williams, B. A., Grantham, H. S., Watson, J. E. M., Alvarez, S. J., Simmonds, J. S., Rogéliz, C. A., Da Silva, M., Forero-Medina, G., Etter, A., Nogales, J., Walschburger, T., Hyman, G., & Beyer, H. L. (2020). Minimising the loss of biodiversity and ecosystem services in an intact landscape under risk of rapid agricultural development. *Environmental Research Letters*, *15*(1). https://doi.org/10.1088/1748-9326/ab5ff7

Wilujeng, I., Dwandaru, W. S. B., & Rauf, R. A. B. A. (2019). The effectiveness of education for environmental sustainable development to enhance environmental literacy in science education: A case study of hydropower. *Jurnal Pendidikan IPA Indonesia*, *8*(4), 521–528. https://doi.org/10.15294/jpii.v8i4.19948

Woodruff, D. S. (2010). Biogeography and conservation in Southeast Asia: How 2.7 million years of repeated environmental fluctuations affect today's patterns and the future of the remaining refugial-phase biodiversity. *Biodiversity and Conservation*, *19*(4), 919–941. https://doi.org/10.1007/s10531-010-9783-3

Wu, X., Lu, Y., Zhou, S., Chen, L., & Xu, B. (2016). Impact of climate change on human infectious diseases: Empirical evidence and human adaptation. *Environment International*, *86*, 14–23. https://doi.org/10.1016/j.envint.2015.09.007

Xiao, Y., & Watson, M. (2019). Guidance on conducting a systematic literature review. *Journal of Planning Education and Research*, *39*(1), 93–112. https://doi.org/10.1177/0739456X17723971

Zari, M. P., & Mainguy, G. (2014). Ecosystem services analysis in response to biodiversity loss caused by the built environment. *Sapiens*, *7*(1), 1–14.

Zhang, K., & Batterman, S. (2013). Air pollution and health risks due to vehicle traffic. *Science of the Total Environment*, *450–451*(2), 307–316. https://doi.org/10.1016/j.scitotenv.2013.01.074

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