
HOW IS ESD (EDUCATION FOR SUSTAINABLE DEVELOPMENT) IMPLEMENTED AFTER COVID-19 IN INDONESIA TO REALIZE SDG's?

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Submit: 09 November 2023

Accepted: 15 Desember 2023

Publish: 30 Desember 2023

Abstrak:

Pembangunan berkelanjutan sangat penting untuk kemajuan negara. Guru memiliki peran dalam mendidik generasi muda agar menguasai keterampilan-keterampilan abad 21. Keterampilan abad 21 menjadi salah satu kunci dalam mewujudkan 17 SDG's demi kemajuan Indonesia. Penelitian ini bertujuan untuk mengetahui implementasi pembelajaran berbasis ESD (*Education for Sustainable Development*) setelah COVID-19 di Indonesia. Penelitian ini menggunakan pendekatan literatur review dengan teknik analisis deskriptif. Artikel dikumpulkan sebanyak 10 artikel yang terbit sejak 2021-2023. Kata kunci yang digunakan untuk mengumpulkan artikel adalah ESD. Langkah-langkah penelitian SLR terdiri dari tiga tahap yakni perencanaan, pelaksanaan, dan pelaporan. Hasil penelitian menunjukkan bahwa ESD diterapkan kepada siswa sekolah menengah bawah, atas, kejuruan, dan guru. Selain itu, ESD diteliti menggunakan metode campuran, qualitative, quantitative, quasi eksperimen, dan R & D. Pembelajaran ESD mampu meningkatkan keterampilan abad 21 siswa, pengetahuan, dan kesadaran lingkungan siswa. Penelitian berikutnya perlu mengkaji penerapan ESD di tingkat perguruan tinggi dan kesiapan guru untuk mengajar IPA berbasis ESD.

Kata kunci: ESD, COVID-19, SDG's, keterampilan abad 21

Abstract :

Sustainable development is very important for the progress of the country. Teachers have a role in educating the younger generation to master 21st-century skills. 21st century skills are one of the keys to realizing the 17 SDGs for Indonesia's progress. This research aims to determine the implementation of ESD (Education for Sustainable Development)-based learning after COVID-19 in Indonesia. This research uses a literature review approach with descriptive analysis techniques. The articles were collected from 10 articles published between 2021 and 2023. The keyword used to collect articles is ESD. The SLR research steps consist of three stages, namely planning, implementation, and reporting. The research results show that ESD is applied to lower, upper secondary, and vocational school students and teachers. In addition, ESD is researched using mixed methods: qualitative, quantitative, quasi-experimental, and R&D. ESD learning is able to improve students' 21st century skills, knowledge, and environmental awareness. Future research needs to examine the implementation of ESD at the tertiary level and teachers' readiness to teach science-based ESD.

Keywords: ESD, COVID-19, SDG's, 21st – Century Skill

Introduction

Sustainable Development Goals (SDGs), or sustainable development goals, are a series of goals created by countries that are members of the United Nations (UN) organization as guidelines for realizing sustainable development (Ali et al., 2018; Georgeson & Maslin, 2018). The SDGs were ratified on September 25, 2015, in New York City, United States. This global development plan will be valid until 2030, when it is ratified. The goals of the SDGs include social, economic, and environmental aspects. One of the social aspects of the SDGs that will be discussed in this research is the 4th SDG, namely quality education. Each UN member country is said to be successful in realizing quality education if it can ensure fair and comprehensive global access and can encourage lifelong educational opportunities for everyone. This is because education helps improve knowledge and technology (Pertiwi, 2022). Therefore, education in Indonesia should be directed towards education for sustainable development, or Education for Sustainable Development (ESD).

ESD is a form of quality education implemented by schools and universities (Tikly, 2019). ESD in Indonesia by implementing an independent curriculum with an ESD-based learning approach or sustainable development. ESD aims to develop integrated thinking, improve living standards and good decision-making, and improve patterns of action for environmental, cultural, social, and economic systems that are interdependent with each other (Al-Kuwari et al., 2022). According to Ssossé et al. (2021), ESD-based learning involves training students to master 21st century skills where students can solve various problems in various fields of knowledge mastered. ESD encourages better lifestyles for current and future generations.

The education system after COVID-19 has experienced significant changes. One of them is the use of technology to encourage education, which is widely available and developed by technology experts. The existence of technology prevents limitations in implementing learning during COVID-19. Until now, technology has continued to be developed to support ESD-based learning. The research results of Du et al. (2020) show that VR and AR can be integrated into the ESD curriculum. The establishment of a smart classroom can facilitate the implementation of ESD processes because it allows the creation of a learning environment that is intelligent, sustainable, adaptive, resource-efficient, and personalized (Cebrián et al., 2020). This technology is an effective learning medium for improving students' 21st-century skills. ESD-based learning expects students to master problem-solving skills, critical thinking, creativity, communication, collaboration, and others.

After COVID-19, the Indonesian government continues to strive to create policies so that Indonesia can successfully achieve quality education. Not only the government, but teachers, lecturers, and researchers also play a role in achieving the SDGs, especially in the education aspect. Teachers directly transfer their knowledge to students and practice ESD-based learning. Lecturers and researchers continue to develop, research, study, and evaluate the implementation of ESD, especially in universities. This research aims to examine the results of research in Indonesia with the theme Education for Sustainable Development (ESD) from various levels of education. No previous research has examined ESD-based science education in Indonesia, especially after COVID-19.

Methods

This research uses a systematic literature review (SLR) research method. SLR is a type of research that aims to collect, synthesize, and evaluate relevant evidence from various published research sources (Yanti & Novaliyosi, 2023). SLR sources can be obtained from various databases selected according to research questions and keywords. The SLR research steps consist of 3 stages, namely planning, analysis, and reporting (Choifah et al., 2022), which are presented in Figure 1.

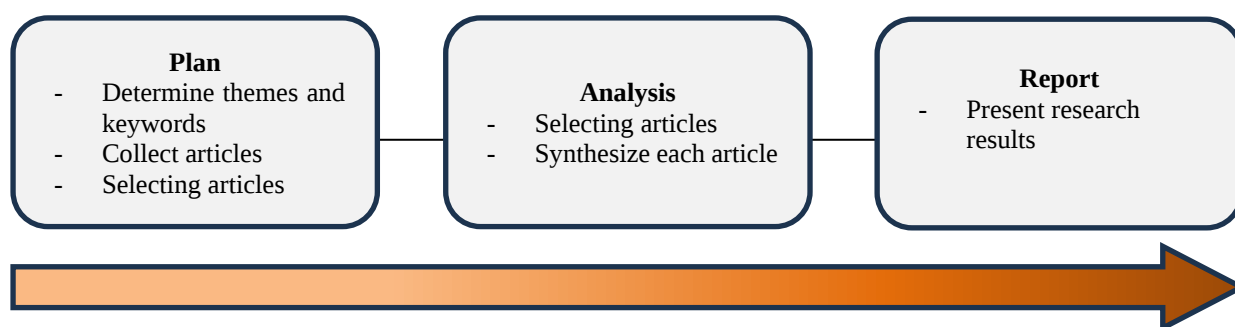


Figure 1. Steps of SLR

Planning

This stage begins with determining the research idea. These ideas are used as keywords when searching for articles. The keywords used in this research are Education for Sustainable Development (ESD). Then continue by searching for articles from the Google Scholar database. Because the aim of this research is to present the implementation of ESD after COVID-19 in Indonesia, the selected articles must have been published since 2021.

Analysis

The articles that have been collected are then reviewed for their titles and abstracts. The total number of final articles obtained was 10 articles. The components synthesized include the author's name, year of publication, journal, title, type of research participants, number of participants, type of research method or design, type of data collection instrument, and research results. Most of this information can be obtained from the abstract, but there are several components that must be read in the research methods section.

Table 1. Articles used for SLR research

No	Author	Journal	Title
1	(Ekamilasari & Pursitasari, 2021)	Indonesian Journal of Multidisciplinary Research	Students' Critical Thinking Skills and Sustainability Awareness in Science Learning for Implementation Education for Sustainable Development
2	(Rahmawati et al., 2021)	Jurnal Kualita Pendidikan	Potensi implementasi Education for Sustainable Development (ESD) dalam pembelajaran IPA di MTs Nahdlatul Ulama Mranggen Kabupaten Demak
3	(Paristiowati et al., 2022)	<i>Sustainability</i>	Developing Preservice Chemistry Teachers' Engagement with Sustainability Education through an Online Project-Based Learning Summer Course Progra
4	(Purnamasari et al., 2022)	JKPI: Jurnal Kajian Pendidikan IPA	Implementasi Education for Sustainable Development (ESD) dalam pembelajaran IPA di Kabupaten Garut: sebuah studi pendahuluan
5	(Kusumaningrum et al., 2022)	BIOPENDIX: Jurnal Biologi, Pendidikan dan Terapan	Pengembangan Modul Pembelajaran Biologi Berbasis Education for Sustainable Development (ESD) Berpotensi Meningkatkan Kemampuan Kognitif Siswa Kelas X
6	(Damayanti & Surjanti, 2022)	Buana Pendidikan	Penerapan Model PBL dengan Konteks ESD dalam Meningkatkan Hasil Belajar dan Sustainability Awareness Peserta Didik
7	(Setiawan et al., 2023)	Jurnal Penelitian Pendidikan IPA	Sustainability Awareness, Engagement, and Perception of Indonesian High School

8	(Sudarya et al., 2023)	BIOEDUKASI: Jurnal Biologi dan Pembelajarannya	Students during Sustainability Project Based Learning Implementation in Biology Education Implication of Problem-Based Scenarios on Students' ESD Anticipatory Competency on the Concept of Environmental Change
9	(Abdurrahman et al., 2023)	Heliyon	Impacts of integrating engineering design process into STEM makerspace on renewable energy unit to foster students' system thinking skills
10	(Fatimah et al., 2023)	Practice of the Science of Teaching Journal: Jurnal Praktisi Pendidikan	Implementation of the education for sustainable development (ESD) based predict, observe, and explain (POE) learning module to improve critical thinking skills

Reporting

The synthesized article data is then presented in table form. The synthesis of the article was carried out with the help of MS Excel manually. Any data obtained aims to provide information to readers about the implementation of ESD in Indonesia. The data is interpreted descriptively to provide meaning and connect it with previous research.

Results and Discussions

This research uses a literature review technique with the keyword ESD (Education for Sustainable Development). The most important stages in this research are planning, implementation, and reporting. The database used to collect articles is Google Scholar. The articles that have been selected are then reviewed for participant type, number of participants, research methods, data collection, and research results. The results of the review are displayed in Table 2.

Table 2. Article analysis based on school level, number of participants, research methods, data collection techniques, and research results

No	Participant	N	Method	Data collection	Finding
1	Junior high school student and Teacher	219	Mixed method	Not mentioned	Students' critical thinking skills are categorized as low and students' level of sustainable awareness in science learning is in the medium category.
2	Teacher	Not mentioned	Qualitative	Interview, observation, documentation	The integration of ESD in class VII SMP has the potential to be applied in science learning from socio-cultural, environmental and economic aspects.
3	Preservice chemistry teacher	26	Qualitative	Interviews, questionnaires, observations, portfolios and reflective journals	All students successfully engage in developing their sustainability views, environmental awareness, project development involvement, communication and collaboration skills.
4	Teacher	11	Qualitative Descriptive	Questionnaires	The percentage of ESD implementation in science learning carried out by teachers is 25%. The implementation of ESD

					in science learning is mostly integrated into biotechnology topics. One of the factors inhibiting the implementation of ESD in science learning is teachers' limited understanding of ESD and SDGs.
5	Lecture and teacher	Not mentioned	R & D	Literature study, observation, interviews, written tests, documentation, and validation sheets	The module validation results from the expert team's assessment are categorized as valid without revision. The results of the module practicality test are categorized as valid without revision.
6	Senior high school student	30	Quasi-experiment	Pre & post test and questionnaire	The experimental group (ESD context PBL model) obtained higher results than the control group (conventional model) with a significant difference of 11.6. Then, the sustainability awareness profile of students is in the high category with an average of 71% and the highest average score is in the emotional awareness category at 98%.
7	Senior high school student	56	Mixed method	Surveys, reflective journals, semi-structured interviews, observations, and documentation	ESD projects in biology learning can increase continued awareness of protecting the environment.
8	Senior high school student	19	Quasi-experiment	Essay and questionnaire	Problem-based scenarios influence students' anticipatory competence in environmental change material.
9	Senior high school student	67	Quantitative	Pre & post test	The performance of students taught with the STEM-EDP learning approach is better than students who study with the traditional STEM learning approach.
10	Vocational school student	10	Pre-experiment quantitative	Validity test and pre & post test	The ESD-based POE (Predict, Observe, and Explain) learning module effectively involves students actively in studying and applying the concepts they learn.

Based on Table 2, the participants in ESD research are diverse, namely teachers, junior high school students, high school students, vocational school students, prospective teachers, and lecturers. The number of participants in previous studies ranged from 10 to 219 people. Research methods that have been used include mixed methods, R&D, quasi-experimental, qualitative, and quantitative. Data collection techniques vary according to the type of research method. Data collection techniques include

interviews, questionnaires, pre-test and post-test questions, validation sheets, observation, documentation, portfolios, reflective journals, and literature studies. Previous research findings include increasing student skills, student awareness of protecting the environment, and student learning outcomes.

Education for continuing development, or ESD, needs to be taught to students at school. ESD can be taught through teaching media, learning models, learning approaches, and projects. The use of EESD (Education for Environmental Sustainable Development)-based worksheet can increase students' scientific literacy (Ekantini & Wilujeng, 2018) and students' environmental literacy (Wilujeng et al., 2019). The results of research by Ekamilasari and Pursitasari (2021) show that ESD only improves students' critical thinking skills in the low category. In contrast to the research of Rahmayanti et al. (2021), Worksheet-ESD can improve students' critical thinking skills.

ESD-based learning can also be trained through learning models. Samuji (2023) found that the PBL model can improve student learning outcomes in electrolyte and non-electrolyte solution materials. The ESD-based PjBL model is able to train students' awareness of protecting the environment (Setiawan et al., 2023). The ESD-based RADEC (Read, Answer, Discuss, Explain, and Create) learning model can improve students' sustainable development behavior starting from knowledge, awareness, and attitudes (Lestari et al., 2022). The STEM-EDP approach increases student activity better than the regular STEM approach (Abdurrahman et al., 2023). STEM accommodates students' scientific activities, for example, looking for solutions to real problems (Asrizal et al., 2022) and being active in learning (Mardian et al., 2023).

Sustainable development goals (SDGs) are dreams that can be achieved, one of which is through education. Teachers are expected to encourage students to practice environmental literacy in their behavior, attitudes, knowledge, and experiences. Efforts that teachers can make include implementing learning models based on ESD, projects, problems, STEM, etc. Effective ESD-based learning can improve students' 21st century skills such as critical thinking, creativity, problem solving, communication, and student collaboration.

Conclusion

Education for sustainable development (ESD) is a learning approach to increase students' awareness of sustainable development, or SDGs. ESD was found to improve student awareness, learning outcomes, and 21st-century skills. ESD research can use qualitative, quantitative, mixed, or R&D methods. The research findings are that ESD learning can increase students' activeness in learning science and environmental awareness. Future research can examine ESD research findings from various countries, not only Indonesia.

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