



# Analysis of the Implementation of ESD in Online Science Learning during the Covid-19 Pandemic

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**Abstract:** Education for Sustainable Development (ESD) is a program designed to achieve sustainable development goals. In the 2013 curriculum, ESD has been used as one of the bases for teaching science to students. However, the existence of the Covid-19 outbreak in Indonesia has had an effect on science learning activities in junior high schools, so that face-to-face learning has been shifted to online learning. This study aims to analyze activities in online learning, the obstacles experienced by teachers and students, and their effectiveness in implementing ESD principles. The method used is descriptive qualitative to describe online learning at one of the Junior High School (SMP) and Islamic Junior High School (MTs) in West Java. The Researchers used data from the analysis of the teacher's lesson plan and semi-structured interviews with 2 teachers and 2 students. Data analysis was performed by reducing data, presenting data, and drawing conclusions. The results show that online learning is less effective in implementing ESD values because the material presented is limited and learning is only one-way (teacher center). Online learning is carried out using WhatsApp, Google Classroom, and e-learning media with obstacles in the form of internet network instability and a lack of student motivation. Therefore, it is hoped that the teacher can use a learning model that is more attractive, student-centered, and can implement the principles of ESD.

**Keywords:** Education for sustainable development; Online science learning

## Introduction

The United Nations Educational, Scientific and Cultural Organization (UNESCO) has developed 17 Sustainable Development Goals (SDGs) and 169 targets which recognize that alleviating poverty and other deprivation must go hand in hand with strategies that improve health and education, reduce inequality, and promote economic growth. Each SDG has its own specific agenda, one of which is the 4th SDG known as Education for Sustainable Development (ESD). UNESCO states that "Education is a human right and a force for sustainable development and peace". This means that researchers around the world are striving to ensure these international goals are achieved at the local level.

The role of education is very much needed to help realize these international goals. Cultivating awareness of sustainability should be instilled from an early age. Why is that, because children's perceptions of the environment and environmental sustainability start at an early age; influenced by context; and built socially and culturally. Children can discuss issues related to environmental sustainability at the basic level by making use of personal experiences (Fantini, 1979; Razak 2017). Therefore, the secondary school level should be familiar with sustainability-based learning.

But unfortunately, according to the results of research (Clarisa et al., 2020) it shows that the facts in the field for sustainable based learning practices are still very rarely done, even only occasionally. This is in line with the results of research (Waltner et al., 2020), which

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states that education for sustainable development is still not being implemented in schools. As a result of the lack of application of the principle of sustainability in schools, students do not have the awareness to practice a sustainability attitude (Clarisa et al., 2020). According to Putri et al. (2019), students only have an awareness of the value of sustainability at an emotional level without practicing it in their daily lives, and it is even said that students never behave that reflects the value of sustainable awareness. Students are emotionally aware of their responsibility towards the environment and care about environmental problems, but in terms of practice it is still lacking (Kollmus & Agyeman, 2015).

Success in achieving the goals of Education for Sustainable Development does not only depend on students, but will also really depend on teachers who teach (Danial et al., 2017). The teacher in question is a teacher who is competent and committed, as well as a teacher who is motivated to act as an agent of change (Bürgener & Barth, 2018). Therefore, it can be said those teachers' knowledge of SDG and ESD and their commitment to applying them to learning is one of the important factors for the success of SDGs in the education sector. The role of teachers in ESD through subjects is expected to invite students to know more about what sustainable development is and how to achieve sustainable development in Indonesia (Indrati & Hariadi, 2016).

The use of socioscientific issues in learning, especially those based on ESD, is highly recommended. socioscientific issues provide a strong performance framework to engage students and teachers in scientific discourse that is meaningful and relevant in the development of scientific literacy (Macalalag et al., 2020). It is further explained that teachers have limited knowledge about socioscientific issues and often feel less confident about teaching socioscientific issues. Whereas, according to Klosterman et al. (2010), socioscientific issues can provide something contextual for students to engage in learning experiences based on real, complex, and controversial problems that have the potential to improve various student competencies. Learning in schools by applying a problem-based learning model can encourage students to develop science process skills in the form of process performance (Maya et al., 2020; Monalisa et al., 2019). Besides that, it can also develop students' psychomotor skills (Hasanah et al., 2021).

This would be better used so that learning in schools is not dominated by teachers, because if the teacher dominates in learning, then during the learning process there will be some students who do not listen to the teacher's explanation, some are busy themselves (talking to their classmates), and may not fully focus on the explanation from the teacher (Nurmasitoh &

Rahayu, 2021). Furthermore, it is said that this method causes less interaction among students because the teacher dominates the learning process. According to Nurmasitoh et al. (2021), environment-based learning can foster an environmental care attitude and can make students more active, especially on environmental pollution material. However, this model has a weakness, which is that it requires times in the learning process. Through environment-based learning, it can improve environmental care attitudes in junior high school level students. Based on the results of research (Kusuma et al., 2017), the use of environment-based learning is very suitable for teaching environmental pollution material to students.

According to the results of our analysis of the 2013 Curriculum, which is now being used as a reference in developing learning strategies, it is known that the learning references in the curriculum have integrated the values of sustainable development although they are not explicitly explained. The competencies expected in the 2013 Curriculum refer to the values of sustainable development. Even KD 3.9 and 3.10 have been explicitly written about sustainability. Some of the research results above are the results of research related to learning in schools, especially on environmental pollution and learning materials based on sustainability or Sustainable Development, as well as the involvement of teachers and students in realizing sustainable development in schools. Seeing the results of this study, the authors will also analyze how learning about environmental pollution that occurs in schools today, whether it has implemented sustainability values in learning or not.

## Method

This research is the qualitative research with an exploratory descriptive method, namely using primary and secondary data to produce research data. Descriptive analysis was carried out on the data after carrying out the stages of exploration into the field to obtain information. We analyzed the lesson plan (RPP) made by the teacher and interviewed the teacher concerned, then the data from the lesson plan analysis were compared with the results of interviews with teachers related to the facts of learning at school. The data is strengthened by the results of interviews with students about their learning experiences, especially on environmental pollution material, and data about students' sustainability attitudes obtained through questionnaires. We conducted research in two schools in West Java, namely MTs Cirebon and SMPN Cipaku. Primary data were obtained from interviews and the results of lesson plan analysis from two teachers and the results of interviews from two students from each

school. In addition, the supporting data came from the student attitude questionnaire. Secondary data is obtained from literature review related to the results of previous studies which are still related to the topic that is the focus of this research.

The initial stage of the research was to analyze the teacher's lesson plan. Some of the aspects analyzed are the indicators and learning objectives made by the teacher, the methods used to teach the material, the teaching materials used, and the material content that is delivered to students. With the results of this analysis, we can obtain learning planning data made by the teacher. Then the plan is compared with its implementation in the field, where the data is obtained from interviews with the teacher concerned. Interviews were conducted with both teachers with the same questions. We interviewed the teacher via WhatsApp telephone, and the results of the interview were recorded to anticipate any unrecorded information. In addition to teachers, we also strengthened the data by conducting interviews with two students from both schools. The questions asked are not much different from the aspects of the questions asked to the teacher. After the interview, we gave students an instrument in the form of a questionnaire on student attitudes towards Education for Sustainable Development. Data analysis was carried out after all the data were collected, then the

data were presented in a simpler and easier to understand table form, then the data were interpreted and linked to the results of previous studies, until finally the conclusions of the research results were obtained (Sartopo, 2006; Sugiyono, 2019).

## Result and Discussion

Table 1 show the result of the teacher's lesson plan analysis. Overall, it appears that the teachers' lesson plans are quite complete. The learning objectives have also been able to achieve the basic competencies that are used as a reference, namely "Analyzing the occurrence of environmental pollution and its impact on the ecosystem" (KD 3.8) and "Writing about the idea of solving pollution problems in the environment based on observations (KD. 4.8). But unfortunately, the learning model and the activities carried out in learning do not support the achievement of learning objectives. So that learning seems still conventional and teacher centered. Students only act as listeners when the teacher explains the material. Learning like this will reduce interaction between students and even when the teacher explains that there are students who do not listen to the teacher's explanation during learning, they are busy chatting with their friends (Nurmasitoh & Rahayu, 2021).

**Table 1.** The Results of the Teacher's Lesson Plan Analysis

Aspects Observed	Application of ESD	
	MTSN (Cirebon)	SMPN (Ciamis)
Learning objectives	Explain, Analyzing factors, Write down ideas	Explain, Analyzing factors, Write down ideas
Learning materials	Conceptual, about the concepts of pollution	Conceptual, about the concepts of pollution
Learning model	Conventional, teacher center	Conventional, teacher center
Activities in learning	Read material or view videos, Working on Student Worksheet	Read material or view videos, Working on Student Worksheet
Learning Resources	Textbooks, worksheets books, videos, and Student Worksheet	Textbooks, videos on YouTube, and Student Worksheet
Assessment technique	Student Worksheet and semester exam questions	Student Worksheet and semester exam questions

One teacher who was interviewed said that the lesson plans that were designed could not be implemented properly. One of the factors is the inactivity of students during learning, they are very passive. This was then confirmed and clarified in the results of interviews with students. Students explained that the reason they did not respond to the teacher's explanation was because they lacked confidence and were afraid to ask questions. It was further explained by students that when they did not understand the explanation or material presented by the teacher, they would try to understand it themselves by looking for information from other sources, rather than directly asking the teacher. In fact, according to the teacher, teachers would be happier if their students were

responsive and more active, both actively asking questions, having opinions, and so on. This is in line with research conducted by Yusida et al. (2014) that the higher a person's self-confidence, the lower the student's anxiety when asking questions in class. Conversely, the lower the level of self-confidence a person has, the higher the student's anxiety when asking in class. Then activeness in asking questions is also influenced by external factors, as according to {Formatting Citation}, those external factors that affect the level of student self-confidence are due to the influence of friends and teachers. Sometimes my classmates often shout and even make fun. This causes students to discourage questions.

Before discussing the application of ESD values in learning, researchers first dig up information related to

teachers' insights about ESD or Sustainable Development. Surprisingly, the two teachers interviewed answered that they did not know, or if they did, it was only fleeting. This can already illustrate to us how teachers will teach students the values of sustainable development if they themselves lack insights related to the values or principles of sustainable development and the contribution of the education sector in realizing sustainable development goals. According to Bürgener et al. (2018), the implementation of learning is very dependent on the competence of teachers and their commitment to participate in supporting educational programs for sustainable development. So, it is not surprising that students do not even know about sustainable development (SD) when asked about sustainable development. This is the same as explained by Burmeister et al. (2013) in his research, most teachers do not have knowledge of the topic of sustainable development, this is because teachers do not prioritize learning about sustainable development or about ESD. Most of the teachers stated that all the knowledge they obtained was generally not only from lectures, but also from the mass media and the internet.



- 1) Berdasarkan gambar diatas. termasuk kedalam pencemaran ?
- 2) Jelaskan penyebab pencemaran tersebut ?
- 3) Jelaskan bagaimana menanggulangi pencemaran tersebut ?

**Figure 1.** Student Worksheet made by the teacher for the task of making ideas without considering the principles of sustainability

Continues on the application of ESD values in learning in schools. The teacher cannot explain whether the learning they have done so far has referred to the principles of ESD or not. Based on the results of the teacher's lesson plan analysis, it shows that the learning activities have not applied the principles in ESD. This is the same as the results of research (Waltner et al., 2020) which show that the implementation of ESD in schools is still lacking. Looking at the Student Worksheet made by the teacher (Figure 1), it seems that there is still a lack of training in the competencies required in ESD, for example, the ability to think critically, think analytically, think creatively, solve integrated problems, and so on. Student Worksheet is more focused only on mastering concepts and less training students to think in a higher order (Suryaningsih et al., 2021). This is in line with the results of research (Cebrián & Junyent, 2015) which shows that environmental problem solving,

communication skills, critical thinking or a sense of concern for the environment are elements that are hardly considered by teachers in their learning practices.

Referring to the results of the teacher's lesson plan analysis (Table 1), it shows that the completeness of the subject identities is quite complete. However, the two teachers have not written the indicators of learning achievement directly on the learning objectives. This makes researchers confused in adjusting it to what is required in Basic Competence (KD) 3.8 and 4.8. If you look at the learning objectives written in the lesson plan, it shows that the KD achievements have been fulfilled. However, students are not asked to make ideas about solving environmental pollution problems that apply ESD principles, for example, by considering various aspects of the SDGs, including environmental, economic, socio-cultural, and legal. Students never even discuss environmental issues either with their friends or their families, so that their behavior and attitudes care about their environment on a moderate level (Clarisa et al., 2020).

Based on the results of the RPP analysis and reinforced by the results of the interviews, it shows that the ESD principles have not been applied in learning, especially in environmental pollution material. As previously explained, learning activities still use conventional models. The learning objectives in the lesson plan are already a little bit towards integrated problem solving competencies, but, in fact, the teacher is not sure that all of the learning objectives can be achieved. For this reason, teachers are not sure whether they have applied ESD principles or not during the lesson. Teacher knowledge is something that is needed to improve subject matter and teacher theoretical knowledge about the concept of sustainability education and about ESD to be applied in learning (Burmeister & Eilks, 2013).

In addition to the objectives and learning activities that do not contain ESD principles, the materials and learning models do not contain ESD principles or values. It can be seen from the material taught by the teacher, whether directly explained or written in a reading, there are a lot of pollution concepts those students must understand, without relating them to the pollution phenomena that exist around their environment. Whereas the issues that exist in their environment are very meaningful and relevant in the development of students' scientific literacy (Macalalag et al., 2020). The teacher gives an example of a real pollution problem, but unfortunately, this pollution occurs in a place far from where students live (Figure 2). Learning about the environment so far has not received special attention, environmental learning that has been applied in schools

is more dominant in non-formal activities (Surakusumah, 2009).



**Figure 2.** One of the student worksheet which contains a phenomenon that is far from the student environment

The results of the questionnaire (Table 2) show that overall students have attitudes that support the SD program or attitudes that contain the principles in ESD. On statements that had a positive response, more than 50% of students responded that they agreed to strongly agree, meaning that they agreed with some of these questions. As for the statements that have negative answers, there are still many students who give negative responses (disagree to strongly disagree), less than 50% of students who respond negatively. So that when averaged, there are still two aspects that are not in accordance with the expectations of the researchers.

**Table 2.** Questionnaire Result Data

Attitude Aspects	Average Percentage of Attitudes (%)	
	Positive	Negative
Aspects of openness and respect for diversity	84	72
Aspects of active participation in making decisions	84	22
Aspects of commitment to solving problems around	91.3	52.2
Responsibility aspect as a duty bearer in implementing ESD	95	39

The two aspects referred to are the aspect of active participation in making decisions and the aspect of responsibility as a duty bearer in implementing ESD (Table 2). In the aspect of active participation in making decisions, only 22% of average the number of students who responded disagreed to strongly disagree. As for the aspect of responsibility as a duty bearer in implementing ESD, as much as 39% of the average number of students who responded disagreed to strongly disagree. Supported by the results of interviews with students, the students have not been able to

practice the principles of sustainable development in their daily lives. When disposing of garbage, they still put it together in one place, it seems that there has been no action by the students to sort the waste into two types of waste, namely organic and inorganic.

This is the same as what was found by Putri et al. (2019) and Kollmus et al. (2015) those students only have an awareness of the value of sustainability at the emotional level, without practicing it in everyday life. According to Nikolic et al. (2020), the low level of students' perceptions of responsibility for sustainability awareness stems from their misunderstanding of the concept of sustainable development and perceptions of sustainability issues. Given that this issue is still relatively new, it is likely that it has not been widely applied to learning in schools. Students recognize the importance of responsible behavior, but students free themselves from this responsibility. It is also possible that students at this point feel that their actions and decisions have no impact on society as a whole.

### Conclusion

Learning in schools, especially on environmental pollution material, is still dominated by conventional learning models, such as lectures. Teachers dominate in learning, so those students become passive. In fact, they feel afraid and lack confidence when asked to respond to teacher explanations, both in the form of questions and statements. Such learning is still very far from the criteria of the learning based on ESD. The models and media used by teachers as well as student involvement in learning play a major role in learning based on ESD. Teacher knowledge is also very necessary because without insight into ESD teachers, will find it difficult to implement learning based on ESD. Therefore, a learning design that is attractive to students is needed, involves a lot of students in learning activities (student center), trains various kinds of competencies in ESD, and improves students' skills in solving real problems in their environment.

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**Conflicts of Interest**

The authors declare no conflict of interest.

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