

Research Article

Analysis of the Integration of SDGs Values in Learning Science Project in Vocational Schools to Build a Sustainable Lifestyle

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Abstract.

Vocational High School (VHS) students carry out a significant number of project activities as outputs of learning science projects, necessitating the use of large quantities of materials. In addition, the sustainability of the project products has not been thoroughly considered, as the focus often stops at the title of the work. This article aims to analyze the application of SDGs (*Sustainable Development Goals*) values in learning science projects in VHS to build a sustainable lifestyle. The study utilized a quantitative descriptive approach, examining the results of questionnaires filled out by respondents who are vocational teachers in Central Java. The results showed that, on average, each school had not applied SDGs values in learning science projects. Some carry out the principles of SDGs such as orienting to economic or environmental aspects, but they do not fully understand the essence of these values. These indicators are integral to the SDGs, and their application has not been optimal. In addition, in the application of science project learning, the determination of project themes and materials is still oriented towards product creation. Therefore, students have not been encouraged to align their thoughts with building a sustainable lifestyle. Thus, there needs to be an effective learning strategy to integrate SDGs values in learning science projects in VHS so that projects are oriented towards product production alone and pay attention to sustainability values.

Keywords: SDGs (*Sustainable Development Goals*), IPAS project, sustainable lifestyle, vocational High School

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1. Introduction

Sustainable Development Goals (SDGs) are essential keywords that underlie development frameworks today. Starting from the awareness that the earth and natural resources that exist today do not solely belong to the current generation but need to be preserved to ensure current needs without sacrificing future generations' development needs [1]. SDGs are a set of programs and targets aimed at future global development. The SDGs concept is needed as a new development framework that accommodates all world changes that have occurred, especially since 2000, regarding the issues of natural resource deflation, environmental damage, increasingly crucial climate change, social protection, food and energy security, and development that is more pro-poor [2].

These SDGs' values are implemented in education called Education for Sustainable Development (ESD). The essence of ESD is a transformative learning paradigm towards sustainability which is based on innovative teaching and learning practices, diversity of methods, problem-based learning, critical reflection, assessment, and clarification of existing self-values and conceptions, as well as context and action-based learning [3]. In educational units, ESD can be integrated into intracurricular and extracurricular activities. For ESD to be more effective in its implementation, educational units must integrate sustainability principles into their daily practices and facilitate the development of ESD [4]. ESD is not a new concept that can be applied in learning in educational units through curricular activities by integrating ESD concepts in learning processes or methods (project-based learning, inquiry, story-based, values, problems, and learning outside the classroom) in the curriculum and also through extracurricular activities (scouts, youth scientific groups and so on) [4,5,6].

ESD has eight competencies that students in ESD learning must master: systemic thinking, anticipatory, normative, strategic, collaboration, critical thinking, self-cultivation, and problem-solving abilities [4,5]. ESD is one of the most effective dynamic concepts to provide understanding and encourage and empower society to assume shared responsibility in creating sustainable ecological, economic, and social futures [4,7,8]. To create a more sustainable world, everyone must be able to become an agent of sustainable change. They need knowledge, skills, values, and attitudes that can lead them to participate in sustainable development actively. Therefore, education is needed that supports achieving sustainable development, known as Education for Sustainable Development (ESD) [9].

ESD is education that provides awareness and equips students to participate in sustainable development efforts [10]. ESD is not only an addition to education, but

ESD must be part of the formal education curriculum, both early childhood education, primary and secondary education, technical and vocational education, and higher education. One dynamic ESD application is in learning science and technology projects in vocational high schools.

The implementation of project-based learning is carried out at all levels of educational units. Vocational high schools as schools that produce work-ready graduates are one of the targets of this curriculum. Integrating science and social studies subjects into project-based science subjects is a new Ministry of Education, Culture, Research and Technology Policy. Science learning is packaged as a project (project-based learning) integrating several content/material elements. In line with the development of 21st-century learning, project-based learning can be done by applying STEAM (Science, Technology, Engineering, Art and Mathematics). In STEAM project-based learning, students are empowered to act as learning agents who collaborate to develop all their competencies.

One of the problems that often arises and needs to be addressed in the learning environment for vocational school students is the lack of sustainable living. The results of observations carried out at SMK Negeri 1 Semarang showed a low level of sustainable lifestyle demonstrated by the school community. Sustainable attitudes and lifestyles have not been thoroughly ingrained in students or teachers. Observations at the school still found rubbish scattered inside and outside the classroom. Likewise, with an energy-saving attitude, students do not turn off the fans when leaving the classroom. Of the 16 (sixteen) theory rooms, there are five rooms where the fans are still left on when students leave the classroom. Likewise, with several teachers' rooms, observations showed that the air conditioner (AC) and lights in the teachers' and deputy principal's rooms were still on even though no one was active.

One of the project themes in science learning established in the vocational school science project subject curriculum is "Sustainable Lifestyle". This theme is very relevant to integrating ESD values into learning. Through this theme, it is hoped that students will have insight, paradigms, and ways of thinking about balancing the interests of the economy, society, and the environment to achieve sustainable development goals (Sustainable Developmental Goals). A sustainable attitude and lifestyle will grow if someone is caring and can find ideas to solve problems. This is in line with research by [11], which states that students' environmental caring attitudes increase in direct proportion to the increase in problem-solving abilities. Students' environmental caring attitudes can be improved through learning by integrating ESD concepts in specific learning models, such as research results from [12] show that students' sustainability

awareness profiles can be improved through learning models using ESD contexts. Looking at the problems that have been explained, it is necessary to carry out research that examines the integration of SDGs values in learning science and technology projects in vocational schools to build a sustainable lifestyle.

2. Method

This quantitative descriptive study is carried out by survey on 48 science project subject teachers in vocational high schools from various districts/cities throughout Central Java as respondents. The survey was conducted using an instrument that asked about understanding SDGs concepts, experience orienting natural and social sciences learning to SDGs values, concepts of natural and social sciences project learning, and student involvement in natural and social sciences project learning. The instrument is prepared in the form of questions with a four-scale rubric and is equipped with reasons for the answer choices from the rubric. The collected data was analyzed descriptively by calculating the percentage of respondents' answer tendencies, then linked to each reason, and the results were analyzed based on the characteristics of the school and each district/city area.

3. Result and Discussion

The research results show the profile of integration of SDGs values in learning science and technology projects at vocational schools to build a sustainable lifestyle. The research was conducted through a survey with a questionnaire in the form of a reasoned rubric. To find out the profile of the integration of SDGs values in learning science and technology projects in vocational schools which have the potential to build a sustainable lifestyle, data was collected based on the following aspects:

3.1. Understanding the SDGs concept

This aspect measures teachers' understanding of science and technology project subjects in vocational schools regarding SDGs' concept, scope, and values. The main emphasis of this aspect is how teachers understand the concept aspects of SDGs (environmental, social, and economic) as well as the 17 goals of SDGs. The survey results from this aspect are illustrated in Figure 1.

In Figure 1, it is interpreted that from 48 natural and social sciences project subject teachers in vocational schools throughout Central Java, 60.4% of teachers do not understand the concepts, aspects and objectives of SDGs in learning; 29.2% entirely understand that SDGs is an acronym for Sustainable Development Goals whose values must appear in learning, even though they are not integrated; 8.3% understand the concept of SDGs by having to orient learning towards the 17 sustainable development goals; and only 2.1% answered that they understand the need to integrate three aspects of SDGs in learning (environmental, social and economic); and has 17 sustainable development goals. This means that most teachers do not know and understand the concept of SDGs.

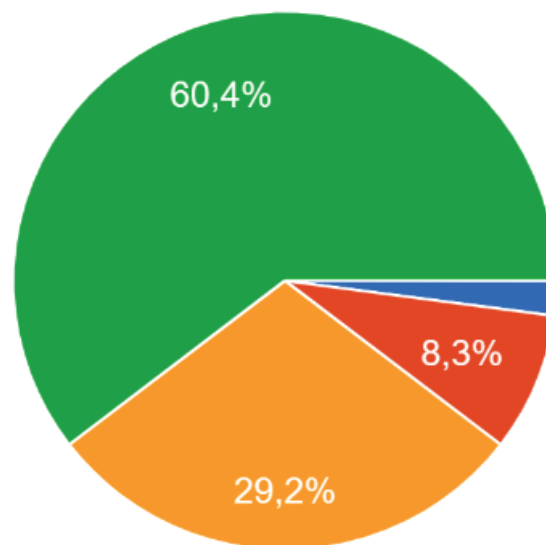


Figure 1: Understanding of the SDGs Concept by Natural and Social Sciences Project Subject Teachers in Vocational Schools.

This shows that provision must be given regarding the SDGs, mainly if applied in learning, so teaching natural and social sciences is not only project-oriented but needs to think about the downstream of the products produced and the use of resources that pay attention to environmental conditions. As the research of [13], so that the earth can be well maintained, it is recommended to pay attention to several important things, such as encouraging reforestation, consuming resources economically, reducing the use of perfume-deodorants and fossil fuels, and increasing awareness through experiments, activities, visual and practical solutions under professional solution advice. Apart from that, by providing SDGs to SMK science project subject teachers, they should be able to instill these SDG values in students so that science project learning activities can pay attention to three aspects (environmental, social, and economic) and the 17 goals embedded in SDGs principles. Corresponding research states that, among other things,

the analysis indicated that interactive learning would be beneficial, and thus, a role play, set in Cambridge and covering environmental, social, and economic aspects, was designed and run at two schools in Cambridge [14].

3.2. Experience Orients Learning in Natural and Social Sciences towards SDGs Values

In this aspect, survey data is shown regarding the experience of vocational school natural and social sciences project subject teachers in orienting natural and social sciences learning to SDGs values. This aspect is a continuation of the first aspect to see how conditions are in the field, whether teachers have implemented SDGs values in natural and social sciences learning, even though they do not yet understand the terms of the SDGs. To be more explicit, data regarding teachers' experiences in applying SDGs values in learning natural and social sciences projects is explained in Figure 2.

Figure 2 shows that of the 48 natural and social sciences project subject teachers, 52.1% have never integrated SDGs in natural and social sciences learning; 33.3% had implemented one of the SDGs components in science learning but did not comprehensively integrate both aspects and objectives; 8.3% had implemented one of the SDGs components in science learning, namely integrating 3 SDGs aspects in learning (environmental, social and economic); or orienting learning towards the 17 SDGs goals; and only 6.3% have ever implemented SDGs in natural and social sciences learning, namely by integrating three aspects of SDGs in learning (environmental, social and economic); and orienting learning towards the 17 SDGs goals. The survey data for this aspect can be interpreted to mean that most vocational school natural and social sciences project subject teachers have never applied SDGs values in natural and social sciences project learning. This shows the urgency of providing provisions for teachers to integrate SDGs values in project learning, especially science and technology at vocational schools. This situation is critical so that students who take part in project learning at vocational schools are not only oriented towards making products but also pay attention to their sustainability [15,16,17].

3.3. Student involvement in learning Natural and Social Science projects

This aspect illustrates the involvement of students in science project learning activities which the teacher usually carries out. The main emphasis in this aspect is how students

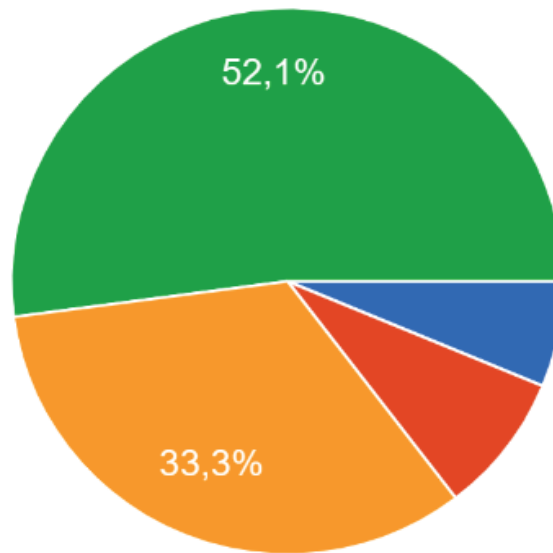


Figure 2: Teacher Experience in Orienting Science and Science Learning towards SDGs Values.

are fully involved in the entire series of project learning, starting from determining basic questions, designing products, preparing schedules, monitoring, testing results, and evaluating. Complete data regarding student involvement in science project learning is explained in Figure 3.

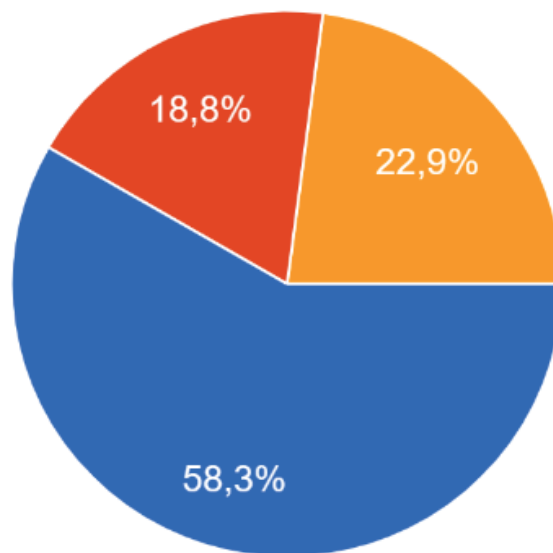


Figure 3: Student Involvement in Science Project Learning.

Based on Figure 3, 58.3% of the 48 VHS natural and social sciences project teachers have carried out comprehensive project flow learning by involving students starting from determining basic questions, designing products, preparing schedules, monitoring, testing results, and evaluating; 22.9% invite students to carry out projects independently

from start to finish, teachers assist with students' learning difficulties; 18.8% Involving students directly in learning activities when making products, because at the beginning the teacher provides the complete material content first; and 0% stated that learning in the natural and social sciences project was entirely controlled by the teacher to deliver the material. This data interprets the situation well. Most teachers have correctly involved students in learning science projects, guided from the beginning to the end of the Project Based Learning (PjBL) syntax. This is very positive, so teachers need to focus on material substance orientation and integration of SDG values in learning natural and social sciences projects [18,19].

Based on all the data that has been collected, in general, the teacher has carried out science project learning activities well by involving students more in each learning series. However, the instillation of SDG values in science and technology project learning at vocational schools is still poorly integrated. Most teachers do not understand the SDGs' concepts, principles, aspects, and objectives, mainly when applied to learning. This situation needs to be addressed immediately by providing provisions for integrating SDGs values in science and technology project learning. Therefore, vocational schools have unique learning characteristics, involving more students in projects and producing products. These learning activities must be balanced with the orientation of the projects carried out and the products produced sustainably [20,21]. In developing projects, students are more directed to use resources that can balance environmental conditions and pay attention to nature conservation [22]. Likewise, with the products produced, the downstream orientation must be clear; it does not just stop at making the product, but there is no sustainability [23,24,25]. So, the projects and products produced must consider environmental, social, and economic aspects. Thus, learning science and technology projects becomes the best practice in learning at vocational schools because it creates a sustainable lifestyle that is embedded in every student [26,27,28,29].

4. Conclusion

Vocational High School natural and social sciences subject teachers have implemented project learning well by involving students in each learning step. However, the project's learning has not been oriented toward integrating SDGs values. This is because teachers' understanding of the concepts and objectives of the SDGs is still lacking. So, it is recommended that further research be carried out to provide skills for integrating SDGs values in science and technology project learning. This urgency is driven by the

characteristics of learning in vocational schools, which are more project-oriented so students can create a sustainable lifestyle.

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