Education Framework 2030: Do Vocational School Students Have Green Skills?

[1*]Fadhilah Mahanani Saputri, [2]Suryo Ediyono
[1*]Faculty of Teacher Training and Education, [2*]Faculty of Cultural Science,
Universitas Sebelas Maret
*Corresponding Author. Email: fadhilah.mahananis@student.uns.ac.id

Abstract: This study aims to analyze the condition of the green skills of vocational students with three focus problems, namely the condition of the green skills of vocational students and their implementation in the curriculum, indicators of green student skills, and learning strategies used to improve skills of vocational students. green skills. The approach used in this research is qualitative. Data was collected through Google Scholars, ResearchGate, ScienceDirect, Sinta, and Scopus. Data were collected from 27 articles which were then analyzed using thematic analysis techniques. The results showed that the green skills of vocational students had not met the challenges of the job market because the dimensions of green skills had not been fully implemented in the curriculum. Green skills can be measured by indicators of the value of technical skills, knowledge, and attitudes required by workers in a green economy. Learning strategies to improve green skills use a project-based and problem-based approach that encourages critical, innovative and responsible thinking. The results of this study are expected to have implications for the vocational education process which is more oriented towards green competence in accordance with the demands of DUDIKA. Thus, the quality of SMK graduates increases and unemployment decreases.

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Introduction

Quality education is one of the sectors targeted by the global project, namely The Sustainable Development Goals (SDGs) as a sustainable development agreement by taking into account the principles of universality, integration, and no one is left behind. This global project emphasizes the integration of all parties and its implementation considers human rights. The 4th SDGs point in the Education 2030 agenda is interpreted as a form of agreement that makes education a central aspect with an emphasis on inclusive education, equality without harming one party, and lifelong learning opportunities (McGrath & Powell., 2016; McGrath, Alla-Mensah, & Langthaler, 2018). Vision Education 2030 is in the form of a commitment to develop student potential in the midst of the turmoil and ambiguity of global conditions, so that students have the provisions for living and making a living in order to form shared prosperity in the future (OECD, 2018).

Concerning the SDGs project, several green concepts have emerged to revitalize the direction of development that does not reject progress but abandons all concepts of injustice, inequality, and practices that are detrimental to society. Green economy emerged, one of which is the focus of the SDGs in economic growth with sustainable production patterns and creating decent jobs (McGrath, Alla-Mensah, & Langthaler., 2018). Aspects of the green economy in the framework of sustainable development, evidence is shown that the transition to green economy changes is able to create and enhance economic development (Ramsarup & Ward, 2017). The term green is not only attached to the economic concept, but can also be

implied in the education mechanism that produces quality resources. The demands of economic climate change in the concept of green economics need to be supported by human resources which ultimately have an impact on increasing students' skills and competencies through vocational education. The term green is not only attached to the economic concept, but can also be implied in the education mechanism that produces quality resources. The demands of economic climate change in the concept of green economics need to be supported by human resources which ultimately have an impact on increasing students' skills and competencies through vocational education (Pavlova, 2017). The competence of vocational students in Indonesia is actually being prepared to be ready to work. However, the reversed condition actually shows that SMK graduates are the highest contributor to the unemployment rate, with one of the causes being the inability of SMK graduates to fulfill skill qualifications according to the needs of the labor market (DPSMK, 2019). Referring to the research results of The Organization for Economic Co-operation and Development (OECD) in 2016 that 4.7% of workers in Jakarta are considered less skilled in their work (OECD, 2016). These results are sufficient to reflect that there is still a gap between the competence of graduates and the needs of the labor market.

21st century jobs require 21st century skills from the output of graduates of educational institutions. 21st century skills are new era learning skills that are needed and relevant to the challenges of green work (Ismail et al., 2017). The skills development system must be systematic and not separate from the education system as a whole or be interpreted as part of the education ecosystem (Nambiar et al., 2019). Based on The Assessment and Teaching of 21st Century Skills, it is determined that learning and skills are pursued towards complex thinking with communication and collaboration, while setting aside the concept of rote ability. Vocational school education must be in accordance with the demands of 21st century skills, especially in vocational schools in the field of Business and Management Skills. The development of skills in education is actualized as a citizen's right, both at school and at work (McGrath & Powell, 2016). Skills in sustainable development are the types of skills that support the concepts of green economy and green jobs.

Vocational education is a priority in facing the challenges of the 21st century integrating green skills to help reduce poverty and promote economic growth (Ismail et al., 2017). Applying the application of green skills in competency-based learning in vocational schools is expected to encourage students' deep understanding of teaching materials through problem-based learning and inquiry-based learning. Several countries have encouraged the growth of green skills for the advancement of vocational school education. For example, South Africa has focused on education on the demand for green skills in the job market, so that the training and education needs of employees also grow in line with the required green jobs (Lethoko, 2014). Green skills are expected to be relevant to environmental issues around students, thereby reducing unemployment and poverty. Vocational students are not only prepared to work, but are also trained to create jobs for their environment.

A review of the development of the green skills aspect is in line with the center of excellence vocational school program which is also a priority for developing vocational schools with certain skill competencies by improving the quality of performance that is strengthened through partnerships with the business world and the world of work. This study aims to explain how the concept of green skills is applied to vocational schools in the 21st century. The urgency of this study refers to several previous studies by Dlimbetova, Zhylbaev, Syrymbetova, & Aliyeva (2016) that most of the employed graduates have realized the need for green skills, but do not understand their application in a green economy. Green skills in the 21st century are needed to meet the demands of a green environment. The

economic transition can only occur if graduates can adapt and move from work-saturated fields to new industries (Jassel, 2018; McCoy, O'Brien, Novak, & Cavell, 2012).

This phenomenon encourages researchers to provide an overview of the current conditions related to green skills research in the 21st century in vocational schools. This research is significant considering that the competence of SMK students still does not meet the demands of the 21st century job market which has a significant impact on the unemployment rate of SMK graduates. This systematic review of literature research will also provide an overview of some of the solutions that can be taken to improve the green skills of SMK students in the 21st century. Based on the researcher's review, no one has discussed the current condition of the green skills of SMK students and learning strategies to improve the green skills of SMK students by using a systematic literature study. Therefore, the purpose of this systematic literature study is to explain the condition of green skills on the competence of 21st century vocational students.

Research Method

This research method used systematic literature review. Referring to the systematic method of literature study, the research steps adopted from Thome et al. (2016), namely 1) formulating the problem; 2) collecting and searching for literature; 3) collecting data and evaluating quality; 4) analyzing, synthesizing, and interpret data; 5) presenting the results of the research and review. Based on the phenomenon of the demand for green skills of vocational graduates in meeting the gap in the world of work, this systematic literature review will be used to answer three guiding questions. First, to determine the condition of the green skills of vocational students and their implementation in the vocational school curriculum. Second, analyze the indicators that need to be developed in the competence of vocational students. Third, describe learning strategies that can improve the green skills of vocational students. Guided by the answers to three research questions, the researcher bases on providing solutions that are carried out to improve the green skills of vocational students in facing the challenges of green jobs and reduce the unemployment rate of vocational .

The data collection used a qualitative approach. Data was collected through Google Scholar, ScienceDirect, ResearchGate, Sinta and Scopus. The third step, in the form of determining the criteria for the data used in the study, as follows.

Tabel 1. Inclusion Data Criteria

Type of publication	Inclusion
journal article	
Books	
Dissertation	
Green Skills for Vocational School Student	
Indicators of green skills	
Strategy to improve green skills of students	
Research Method	**Inclusion**
Qualitative	
Quantitative	
Research process	**Inclusion**
Empirical study	
Theoritical Study	
Access	**Inclusion**
Online paper	
Publication Year	**Inclusion**
2012-2022 (10 years)	

Based on the criteria, there are 27 relevant articles. Countries in Asia, Africa and Europe are the majority that learn green skills in vocational students. There are 11 articles discussing the condition of students' green skills and their implementation in the curriculum, 5 articles discussing green skill indicators, and 4 articles discussing learning strategies that improve students' green skills. There are 2 articles discussing conditions and indicators of green skills, 4 articles discussing conditions and learning strategies, and 1 article discussing learning indicators and strategies. The clarity of the data is presented in Figure 1.
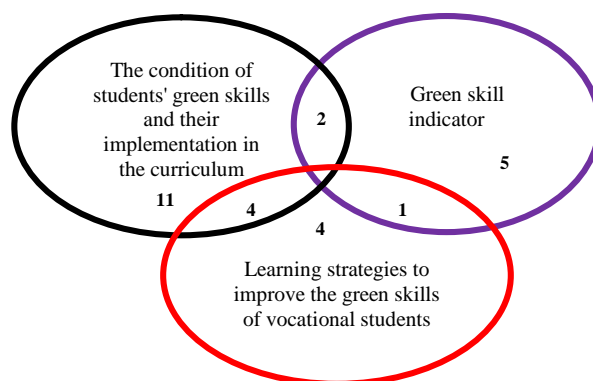
Figure 1. Articles Relevant to the Research Problem

This study uses thematic analysis techniques. The steps of thematic analysis techniques are interpreting inductively and deductively, emphasizing context, integrating manifest and latent content, developing a research theme framework, processing research using nonlinear analysis (Vaismoradi et al., 2013). Thematic analysis techniques are used to minimize ambiguity and improve data analysis quality based on several researchers' agreement regarding theme assessment (Vaismoradi et al., 2016). So that it can describe the green skills of vocational students in the 2030 education framework.

Results and Discussion

Based on a systematic literature review with a selection process according to the criteria, they were grouped into 27 articles analyzing green skills in vocational schools and the models used to improve them.

Table 2. References to Articles Relevant to the Research Topic

The condition of green skills of vocational students and their implementation in the curriculum	Mustapha (2016), Kamis, Mustapha, Wahab, & Ismail (2016), Ismail et al (2017), Bozo & Chilibasi (2019), Adebayo, Mayaleeke, Nuberu, Okun, & Clement (2020), Okereke (2018), Pavlova (2017), Sern, Zaime, & Foong (2018), Pavlova & Chen (2019), Nagaraja (2016), Langthaler, McGrath, & Ramsarup (2021), McGunagle & Zizka (2020), McGrath & Powell, (2016), Lethoko (2014), Dlimbetova et al (2016), Mcdonald et al (2012), Ping (2016)
Green skills indicator	Pavlova (2018a), Ismail et al (2017), Sern et al (2021), Handayani, Ali, Wahyudin, & Mukhidin (2020), Kamis, Mohammad Hussain, Che Kob, Nur Yunus, & Rahim (2018), Mcdonald et al (2012), Sern et al (2018), Hamid et al (2019)
Learning strategies that develop green	Kamis et al (2016), Adebayo et al (2020), Ana, Subekti, & Hamidah (2015), Pavlova & Chen (2019), Fitriyanto, Diplan, & Pribadi (2021), Hamid et al (2019), McMurray, Dutton, McQuaid, & Richard (2016),

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skills	Pavlova (2017), Pavlova (2018b)

The Condition of Students' Green Skills and Their Implementation in the Curriculum

Based on some literature found the need to develop green skills of students in the face of changing types of work in sustainable development (Mustapha, 2016; Kamis et al., 2016; Ismail et al., 2017; Bozo & Chilibasi, 2019; Adebayo et al., 2020; Okereke, 2018; Pavlova, 2017; Sern et al., 2018; Pavlova & Chen, 2019; Nagaraja, 2016; Langthaler et al., 2021. This is because vocational schools have not met the output needs of graduates according to the demands of the labor market through the provision of green skills (McGunagle & Zizka, 2020;McGrath & Powell, 2016; Adebayo et al., 2020;Bozo & Chilibasi, 2019;Lethoko, 2014; Dlimbetova et al., 2016). This condition shows that 10 articles believe in the need to develop green skills, and 6 articles explain the gap in the quality of graduates and job opportunities.
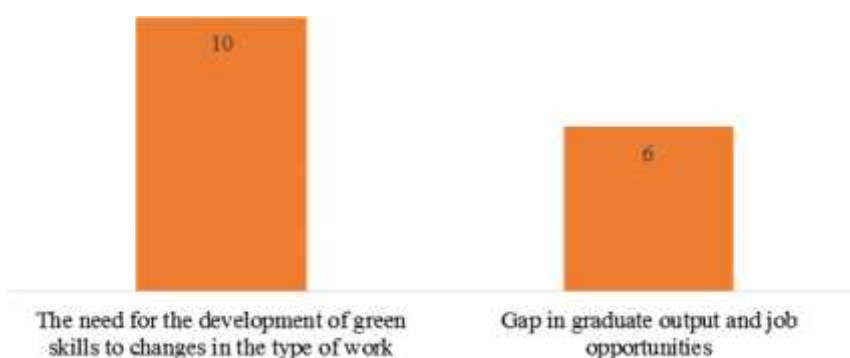
Figure 2. The condition of students green skills

However, several studies also reveal that there has been government support for developing green skills within the scope of vocational education, Mcdonald et al (2012); Ping (2016) stated that the government through vocational education has predominantly facilitated the development of green skills to support sustainable development. Based on the literature review, it can be concluded that there is an urgency in developing green skills in the competence of vocational school graduates, but the majority of the literature states that there is no integration between elements of green skills in the vocational school curriculum. Therefore, this causes the gap between many graduates and an increase in the unemployment rate for vocational schools.

Green Skills Indicator

Green skills are a range of skills that are specifically grown in students to deal with economic transitions so as to achieve environmentally friendly jobs, a green economy, and sustainable country development (Kamis et al., 2016; Pavlova, 2017). Indicators of green skills are reviewed from some of the previous literature as follows.

Tabel 3. Green Skills Indicator

| Pavlova (2018)	Indicators of Generic green skills are measured in 1) cognitive competencies, 2) technological competencies, 3) interpersonal competencies, and 4) intrapersonal competencies
Ismail, Kamis, Kob, Kiong, & Rahim (2017)	There are 10 elements of green skills in the development of vocational education in Malaysia, namely (1) communication skills; (2) intellectual skills; (3) interpersonal skills; (4) self-management skills; (5) learning skills; (6) career development; (7) environmental

	awareness skills; (8) green practice skills; (9) STEM skills; and (10) entrepreneurial skills.
Sern et al (2021)	Green skills have dimensions, namely 1) data collection skills, 2) management skills, 3) problem solving skills related to environmental issues, 4) investigating environmental phenomena, 5) analytical skills, 6) green technology exploitation skills, 7) interpretive skills about environmental phenomena
Handayani, Ali, Wahyudin, & Mukhidin (2020)	Green skills are measured through elements of 1) environmental awareness, 2) innovation skills, 3) communication skills, 4) adaptability, and 5) waste management
Kamis et al (2018)	Elements of green skills are measured through 1) communication 2) intellectual, 3) self-development, 4) learning, 5) career, 6) environmental awareness, 7) green practice, 8) STEM, and 9) entrepreneurship.
Mcdonald et al (2012)	The green skills dimension consists of the continuation of the attitudes, values, knowledge and technical skills of the workforce on the needs of green jobs.
Sern et al (2018)	Green skills consist of three dimensions, namely cognitive, psychomotor, and affective. The cognitive dimension includes the realm of knowledge. The psychomotor dimension includes the realm of skills and abilities. The affective dimension includes the domain of attitudes or values. These three dimensions are developed with sustainable development in the social, economic, social and environmental fields.
Hamid et al (2019)	Elements of green skills include soft skills and hard skills. Soft skills include non-technical skills (attitudes and abilities). Hard skills include technical knowledge and skills in the era of sustainable development.

Based on the discussion on the elements of green skills that are integrated into vocational education learning, it shows that the output targets to be achieved in Education 2030 have met all the needs of students and graduates in the 21st century. However, there are several obstacles regarding teacher quality gaps, quality of technological resources, partnership with DUDIKA (business world, industry, and the world of work), to operational funding need to be considered by all parties involved in vocational learning programs. The challenge of diminishing job opportunities in business and management expertise needs to be overcome by the existence of the concept of green economy, green jobs, and green skills. Pavlova (2018) revealed that the green economy has positive implications for the volume of labor, this is due to the large number of new jobs that are open and absorb vocational school graduates. New jobs based on green jobs cannot be fulfilled with conventional vocational skills. Environmental changes due to globalization's impact and industrialization's progress are driving factors for the transition to greener jobs (Dlimbetova et al., 2016).

Learning Strategies to Improve the Green Skills of Vocational Students

Green skills are mentioned as the added value of student competencies that are developed through curriculum, educational programs, learning, training, and coaching in vocational schools (Kamis et al., 2016). One of the challenges of developing green skills for vocational students is due to learning facilities, entrepreneurial practices, funding, and infrastructure that does not yet support the integration of green skills (Adebayo et al., 2020). Most literature shows that vocational students have not developed generic green skills.

Therefore, this sub-discussion reveals several learning strategies to improve students' green skills.
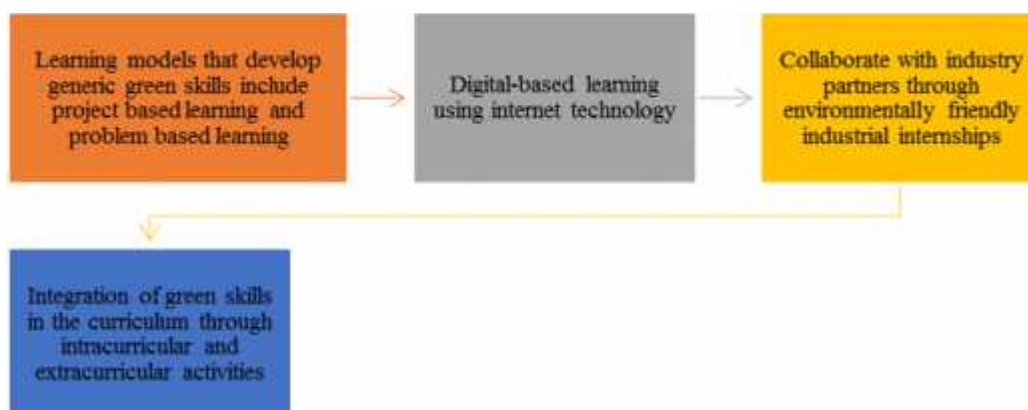
Figure 3. Learning Strategies that Improve Green Skills

Pavlova (2017) states that green skills are not only integrated in the curriculum but need to be emphasized into developing professional vocational education attitudes and practices through the development of values and attitudes through competency-based training. Pavlova (2018b) mentions that technical training can be pursued through partnerships between vocational education with industry and the government through the quintuple helix model as an innovation for developing green skills. Heong, Sern, Kiong, & Binti Mohamad (2016) states that learning based on higher order thinking skills enables the growth of green skills referring to the emphasis on aspects of knowledge, skills, critical analysis, and reflection on problem solving, decision making, innovation and creativity in working on projects. Based on the previous literature, it can be concluded that developing green skills in vocational schools can be done through project-based learning strategies and problem-based learning that emphasizes the power of critical analysis of environmentally friendly productive efforts.

Solutions to Improve the Green Skills of Vocational Students

1) The role of the government in implementing Green skills in competency-based curriculum policies as the goal of SDGs-4

The education system's complexity makes policymakers collaborate with industry to prepare students to be career ready to face the challenges of 21st-century jobs (DiBenedetto & Myers, 2016). The vocational school curriculum should be focused on developing student competencies. The progress of student competencies can be supported by competency-based training through certain assignments (Brightwell & Grant, 2013), indirect effect is obtained through quality teaching and feedback (Boahin & Hofman, 2014). The development of green skills as one of the competencies of vocational students is in line with the goals of SDGs4 – Education 2030 in the framework of lifelong learning by increasing and expanding access to education, based on inclusion and equity without gaps, as well as encouraging the quality and learning outcomes of students (World Education Forum, 2015). Referring to the SDGs-4 point, education must have a broader goal known as transformative competence, which has three values, creating new values, reconciling tensions and dilemmas, and taking responsibility (Taguma et al., 2018). The Education 2030 Program is exclusively proposed to ensure inclusive, quality and equitable education that promotes lifelong learning opportunities for people (Xia et al., 2020). The integration of green skills in the education curriculum can emphasize the direction of learning in responding to the needs of green jobs in the economy in the era of sustainable development. Pavlova (2017) states that the integration of green skills in vocational

education through the emphasis on competency-based learning is the basis for greening vocational and professional education Ramli et al (2019) revealed that greens skills in the Indonesian curriculum are used as the core of delivery in the development of hard skills and soft skills. Developed green skills add to one's core skills in meeting new job requirements (Pavlova, 2018a). Thus, it is necessary for the government's role to seek the integration of the green skills dimension in every goal of the vocational curriculum in meeting the demands of SDGs4.

2) Partnerships with industry on green work practices

Alignment of industrial competency needs with graduate competencies must always be carried out every new school year. The form of partnership can also be realized in the practice of internships. McMurray et al (2016) explained that the quality of work internships can influence the development of students' confidence and skills and connect students' academic abilities to the world of work. Quality internships can affect the success of job training which is the main vocational education program. Job training in vocational schools has a positive impact on improving the quality of work (Doufexi & Pampouri, 2020;Hirshleifer, McKenzie, Almeida, & Ridao-Cano, 2016). Referring to these needs, it is essential to harmonize efforts to meet the target needs by both vocational schools and agencies or work industries.

3) Implementation of relevant learning models

Vocational schools in the educational process always strive for students to acquire skills that are in accordance with the objectives of the educational program (Fitriyanto et al., 2021). Therefore, the learning model applied must be able to grow students' green skills in order to be able to face changing job challenges. The improvement of green skills must refer to the dimensions or indicators of achievement that have been described in the previous sub-study. The learning model involving critical, collaborative, and innovative thinking processes must facilitate student learning. The project-based learning model can increase vocational school student's motivation and experience in problem solving, collaboration, and disciplined work according to time and responsibility. (Chiang & Lee, 2016; Lizunkov, Politsinskaya, & Gazin, 2020). In addition, problem-based learning can also improve the green skills of SMK students (Fitriyanto et al., 2021). Improving students' green skills must be based on students' understanding of environmental issues, so that awareness grows about the efforts that can be made to adapt to new types of work and superior skills. Thus, a good learning model is a learning model that pays attention to the characteristics of students and learning materials so that green skills indicators can be achieved.

Conclusion

Based on the study's result, it was shown that the level of green skills of vocational school students still did not meet the demands of the labor market due to the unintegrated elements and dimensions of green skills in the vocational school curriculum. Furthermore, relevant learning strategies are formulated to improve students' green skills through learning that involves students' critical and innovative power. The results of the study provide some solution ideas. First, the government's role is needed to integrate the green skills dimension in competency-based school curriculum policies. Second, it is necessary to strengthen the partnership between vocational education and industry to harmonize the needs of each other. Third, use appropriate learning models, for example, project-based and problem-based learning, while still paying attention to the dimensions of student achievement in green skills.

Recommendation

Based on the study's results, there is a need for collaboration between the ministry of education and culture, schools, teachers, and DUDIKA, to improve the green skills of vocational students in meeting the needs of renewable employment. Alignment of the vocational curriculum must refer to the job requirements provided by DUDIKA. School cooperation with DUDIKA must be strengthened both for internships and distribution of workers. Green jobs in several vocational majors require students to have independent skills, so the teacher's role is vital in conditioning the competency-based learning process.

This research has limitations in implementation, namely the research targets are in all majors in vocational schools, both in business management and engineering skills. Further research can focus on more specific areas of expertise to better describe environmental issues and challenges of sustainable employment in specific areas of expertise. This study only used 27 articles as data collected according to the criteria. Therefore, further research can collect more literature so that the findings have total value.

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