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DO VOCATIONAL SCHOOL STUDENTS HAVE GREEN SKILLS?: A SYSTEMATIC LITERATURE REVIEW

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Abstract: This study aims to describe the condition of the green skills of vocational students with 3 focus problems, namely the condition of the green skills of vocational students and their implementation in the curriculum, indicators of student green skills, and learning strategies used to improve students' green skills. The approach used in the research is qualitative. Data was collected through Google Scholars, ResearchGate, ScienceDirect, national journals, and international journals. Data were collected from 27 articles which were then analyzed to focus on this research issue. The results show that the green skills of vocational students have not met the challenges of the labor market because the dimensions of green skills have not been fully implemented in the curriculum. Green skills can be measured by indicators of the value of the technical skills, knowledge, and attitudes needed by workers in a green economy. Learning strategies to improve green skills use project-based and problem-based approaches that drive critical thinking, innovative, and responsible thinking.

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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 left behind. The global project emphasizes the integration of all parties, both government, private and community, and its implementation takes into account human rights. The 4th SDGs point in the Education 2030 agenda can be interpreted as a form of agreement that makes education a central aspect with an emphasis on educational inclusiveness, 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 help develop student potential in the midst of the turmoil and ambiguity of global conditions, so that students have the provisions to live and make a living in order to form shared prosperity in the future (OECD, 2018).

With regard to the SDGs project, several green concepts have emerged in an effort 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.

The need for 21st century work expects the availability of 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 meet the demands of 21st century skills, especially in vocational schools in the area of Business and Management expertise. Skill development is quite significant in articulating between education and rights as citizens, as well as between school and work (McGrath & Powell, 2016). Skills in sustainable development are a form of skill development that supports the concept of a green economy or also referred to as green skills for green jobs.

Vocational education is a priority in facing the challenges of the 21st century with the integration of green skills to help reduce poverty and promote economic growth (Ismail et al., 2017). The application of green skills in competency-based learning in vocational schools is expected to encourage the growth of students' deep understanding of teaching materials through problem-based learning and inquiry-based learning. Several countries have adopted and 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 foster skills that are relevant to environmental issues around students, thereby reducing unemployment and poverty. Vocational students are not only prepared to work, but also have jobs independently or 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 graduates who work have realized the need for green skills, but do not understand their application in the green economy so that it is necessary to develop green skills in studentsGreen skills in the 21st century are needed to meet the demands of a green economy transition that can only occur if graduates are able to 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 study is significant considering that the competence of vocational school students still does not meet the demands of the 21st century job market which has a significant impact on the unemployment rate of vocational school graduates.This systematic review of literature research will also provide an overview of several solutions that can be taken to improve the green skills of vocational students in the 21st century. Based on the researcher's review, no one has discussed the current condition of the green skills of vocational school students and learning strategies to improve the green skills of vocational school students by using a systematic literature study.

Research Method

The purpose of this systematic literature study is to provide an overview of the condition of green skills on the competence of vocational students in the 21st century. Based on the procedure suggested by Cooper (1988) the researcher solves the problem using a procedure according to the suggested literature synthesis. Referring to the systematic method of literature study, the research steps include formulating research topics, accumulating research data, determining relevant data based on criteria, analyzing and interpreting selected data, and organizing data in discussion of research results. 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 investigate the current condition of vocational students' green skills 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 can be done to improve the green skills of vocational students in facing the challenges of green jobs and green economy and reduce the unemployment rate of vocational school graduates in the future.

The second step after determining the scope of research, namely in the form of research data collection. The data collection uses a qualitative approach. Data is collected through Google Scholar, ScienceDirect, ResearchGate, and national and international journals. 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 established criteria, there are 27 relevant articles. Countries in Asia, Africa, and Europe are countries that investigate a lot about the topic of green skills on the competence of vocational school students. There were 11 articles that discussed the condition of students' green skills and their implementation in the curriculum, 5 articles that investigated green skills indicators, and 4 articles that investigated learning strategies that were sought to improve the green skills of vocational students. There are 2 articles discussing the condition of students' green skills and implementation of the curriculum and green skills indicators simultaneously, 4 articles discussing the condition of green skills and learning strategies to improve students' green skills, and 1 article discussing green skills indicators and strategies to improve students' green skills. Clarity regarding the use of article data can be seen in Figure 1.

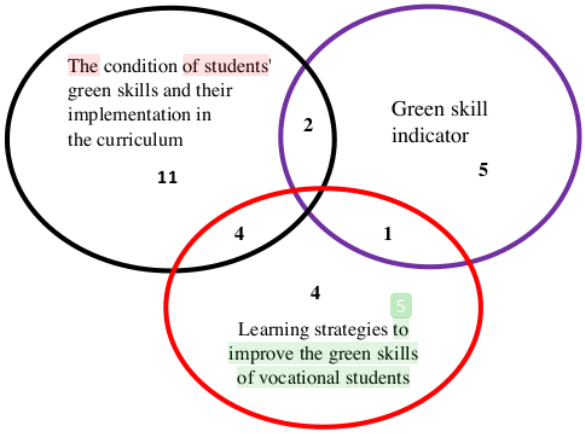

Figure 1. Articles relevant to the research problem

Result and Discussion

Based on a systematic literature review carried out 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 green skills in vocational schools..

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 skills	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), Pavlova (2017), Pavlova (2018b)

The condition of students' green skills and their implementation in the curriculum

Based on some literature it was found that there is a need to develop students' green skills in dealing with 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 been able to meet the output needs of graduates according to the demands of the labor market through providing students with green skills (McGunagle & Zizka, 2020)(McGrath & Powell, 2016)(Adebayo et al., 2020)(Bozo & Chilibasi, 2019)(Lethoko, 2014)(Dlimbetova et al., 2016). 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 is what causes the gap between the large number of graduates accompanied by 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 the fields of 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 the impact of globalization and the progress of industrialization are driving factors for the transition to greener jobs (Dlimbetova et al., 2016).

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Learning strategies to improve the green skills of vocational students

The need to improve green skills in vocational students refers to the results of the previous analysis. 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). The majority of literature shows that generic green skills have not been developed in vocational students. Learning models that can be used as references to develop generic green skills include project based learning and problem based learning (Ana et al., 2015) (Pavlova & Chen, 2019)(Fitriyanto et al., 2021). Development of generic green skills using digital-based learning using internet technology (Hamid et al., 2019). The development of generic green skills can also be done by developing learning strategies in collaboration with industrial partners through environmentally friendly industrial internship practices (Kamis et al., 2016). High-quality internships are needed to enhance students' self-confidence and skills and link academic skills to the world of work (McMurray et al., 2016). The development of green skills in vocational students can be integrated into the curriculum through intracurricular and extracurricular activities (Ramli et al., 2019).

Pavlova (2017) states that green skills are not only integrated in the curriculum but need to be emphasized in 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 enabling 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 the development of 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

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

The complexity of the education system makes policy makers have to 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 or known as transformative competence, which has 3 values, namely creating new values, econciling 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.

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 program of vocational education. 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 very important to harmonize efforts to meet the target needs by both vocational schools and agencies or work industries.

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 that involves critical, collaborative, and innovative thinking processes must facilitate the student learning process. The project-based learning model is one that can be used not only to increase the learning motivation of vocational school students, but also to increase experience in problem solving, collaboration, 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

The concept of green skills is part of the Framework of Education 2030 in the form of professional, vocational, and generic skills based on a sustainable development approach, problem solving, and innovation that allows all industrial sectors to be possessed in the midst of globalization. The Education 2030 target in the framework of green skills not only increases students' skills to be ready to work in their fields, but also prepares them for

independence to face global challenges and changing labor market demands. Based on the results of the study, 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, using appropriate learning models, for example with project-based learning and problem-based learning while still paying attention to the dimensions of student achievement in green skills.

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 more comprehensive value.

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