



## The potency of green education-based blended learning in biology students at the Hindu University of Indonesia

I Made Dwi Mertha Adnyana \*, Ni Luh Gede Sudaryati

Departement of Biology, Faculty of Information Technology and Science, Universitas Hindu Indonesia, East Denpasar, Indonesia

\*Corresponding Author Email: [dwikmertha13@gmail.com](mailto:dwikmertha13@gmail.com)

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### Abstract

The impact of the COVID-19 pandemic on the field of education has resulted in a decrease in interest in studying biology students and a lack of concern for the surrounding environment. This study aims to determine the potential of a blended learning model based on green education for biology students at the Hindu University of Indonesia. The research method of systematic literature review uses 20 reputable journals and 24 supporting journals. The study was conducted for two months. A human instrument is used in this research in collecting, reviewing, and analyzing data. Determination of the sample using purposive sampling. Data analysis using meta-synthesis. The results of the meta-synthesis of the potential of blended learning in universities are based on research objectives: 50% to test the effect or effectiveness; 30% of research methods use R&D (Research & Development); 30% of data collection techniques use tests and questionnaires, and 30% of data analysis uses analysis descriptive. The potential implementation of the green education-based blended learning model has three main criteria and pillars, namely: 1) flexibility and ease of accessibility; 2) Alignment, enhancement, and enhancement of environmental quality; and 3) increasing student independence in the learning process. The green education-based blended learning model can be applied because it helps train students' skills in developing problem-based science, improving critical thinking skills, analyzing problems and making decisions quickly and objectively in providing solutions to problems in the surrounding environment.

#### Abstrak

Dampak pandemi COVID-19 di bidang pendidikan mengakibatkan penurunan minat belajar mahasiswa biologi serta kurangnya kepedulian terhadap lingkungan sekitar. Penelitian ini bertujuan untuk mengetahui potensi model blended learning berbasis green education pada mahasiswa biologi Universitas Hindu Indonesia. Metode penelitian *Systematic Literature Review* menggunakan 20 jurnal bereputasi dan 24 jurnal pendukung. Penelitian dilakukan selama 2 bulan. Human Instrument digunakan dalam penelitian ini dalam mengumpulkan, mengkaji dan menganalisis data. Penentuan sampel menggunakan *purposive sampling*. Analisis data menggunakan meta-sintesis. Hasil meta-sintesis potensi *blended learning* di perguruan tinggi berdasarkan tujuan penelitian, 50% untuk menguji pengaruh atau efektivitas, metode penelitian 30% menggunakan R&D (*Research & Development*), teknik pengumpulan data 30% menggunakan tes dan angket dan analisis data 30% menggunakan analisis deskriptif. Potensi implementasi model *blended learning* berbasis *green education* memiliki tiga kriteria dan pilar utama, yakni: 1) Fleksibilitas dan kemudahan aksesibilitas 2) Penyelarasan, perbaikan dan peningkatan kualitas lingkungan, dan 3) meningkatkan kemandirian peserta didik dalam proses pembelajaran. Model *blended learning* berbasis *green education* berpotensi diterapkan karena bermanfaat untuk melatih keterampilan peserta didik dalam mengembangkan sains berbasis masalah, meningkatkan keterampilan berpikir kritis, menganalisis masalah dan mengambil keputusan secara cepat dan



objektif dalam memberikan solusi terhadap permasalahan di lingkungan sekitar.

## A. Introduction

Education is undergoing significant shifts and changes in Indonesia (Syah, 2020). The outbreak of the COVID-19 virus resulted in the entire education process initially conducted face to face by teachers with students replaced by face-to-face online learning through teleconference media such as zoom, classroom meetings, learning management systems and e-learning Universities, respectively (Wardana, 2021). However, the application of online learning resulted in various elements of education decreased. It can be reviewed from various aspects such as: (1) decreased student interest in the lecture materials provided, (2) decreased understanding of students to lecture materials, (3) lack of student interaction with educators, (4) high level of absence in the learning process and (5) high technical constraints of online learning. This situation will result in a setback in the education sector, one of which is higher education (Ichsan et al., 2020; Zaharah et al., 2020).

Learning methods through telecommunication networks in various universities has been implemented for a long time, but not all universities have to learn media through the network or better known as e-learning (Dziuban et al., 2018). Changes in learning methods as a result of the COVID-19 pandemic in Indonesia are highly complained about by students because learning processes such as practicum, field studies, research and devotion cannot be done (Gong et al., 2021). Moreover, the use of teleconference media among students has not been applied. As a result, students' motivation to study is dwindling. Many technical challenges make it difficult for students to receive educational materials from teachers. Students struggle to understand the materials provided, and access to the materials is extremely limited and difficult to comprehend (Sholahuddin et al., 2021). Based on preliminary studies conducted on Biology students at the Hindu University of Indonesia related to the implementation of online learning during the COVID-19 pandemic showed that 91.7% (22 people) stated that with the application of online learning, students do not understand the materials provided, difficult internet access, lack of interaction with lecturers, and difficulty in using learning management systems. While, 8.3% (2 people) stated that online learning is more efficient in learning time, supporting the termination of the COVID-19 chain in the education sector, and the

learning process is carried out anywhere and anytime (Ali et al., 2021; Aryabkina et al., 2021).

Based on this phenomenon, it is necessary to find a solution to improve students' understanding of the online learning process and to improve learning skills along with the effectiveness of online learning during and after the COVID-19 at the college level, one of which is in the Biology Study Program, Hindu University of Indonesia. Efforts can be made to implement a green education-based blended learning model with the hope of improving the quality of learning in the time of COVID-19 (Charitas et al., 2021; Huang, 2021). The adoption of green education-based blended learning models was formed concerning students' deteriorating knowledge, interests, and abilities to engage in, improve and conserve the environment, one of which is biology students (Tasman et al., 2021; van den Bogerd et al., 2020). It is envisaged that students will apply it to their own family and community environment by improving knowledge through the concept of green education incorporated into the blended learning model outside and within the network (Sholahuddin et al., 2021; Tovar-Gálvez, 2021). This strategy has numerous advantages and strengths, ranging from reinforcing indigenous knowledge to integrating current efforts to manage, rejuvenate, and establish a green environment in all aspects of operations.

The concept of green education is developing a learning model focused on the environment's management, alignment, and rescue. The application of this concept is initiated by stagnation of student response, especially biology students in environmental development, lack of sense of student participation in maintaining environmental sustainability, and decreased response and role of students to human activities resulting in decreased ecological quality and increasing global warming. Prior research of Ardoin et al. (2020) and Toomey et al. (2017) stated that environmental education integration in the learning process could effectively improve ecological attitudes, values, and knowledge and build collaboratively in conservation efforts for learners. Blended learning and green education are two learning models expected to bring students into an effective, efficient, and targeted way of Learning while paying attention to the quality of learning outcomes and improving and training students' skills in facing, improving, and solving environmental problems in real life.

Blended learning technique is a mixed learning method that applies two learning systems, namely face-to-face learning system and e-learning system that focuses on improving accessibility and ease of learners or students in accessing learning materials, improving the quality of learning, and efficient learning costs (Handoko & Waskito, 2018; Zainuddin & Keumala, 2018). According to Margolis, Porter, & Pitterle (2017), the application of the blended learning method focuses on three conveniences that can be used by anyone, anywhere, and anytime. Prior research of Alsalhi et al. (2019) showed that blended learning positively impacts student achievement. The application of blended learning can significantly improve students' thinking skills, problem-solving, and activeness (Muhlisin et al., 2020). Thus, the blended learning model based on green education is the right solution and supports the demands of students in the 21st century, namely literacy, adequate competence, strong character and sensitivity to the environment. This study aims to determine the potential of a green education-based blended learning model for Biology students at the Hindu University of Indonesia.

## B. Material and Method

This research used a Systematic Literature Review method (Darwin et al. 2021). This method was chosen because the researchers wanted to study, analyze, and reinterpret the findings, scientific data, and results of previous research on the potency of blended learning based on green education, which has the potential to be a new learning concept in higher education during and after the COVID-19 pandemic. In preparing a systematic literature review, there are five drafting-flow presented in figure 1.

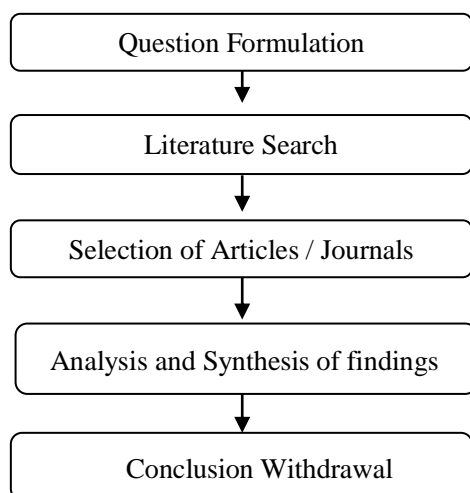


Figure 1

Script drafting flow with the SLR method (Darwin et al., 2021).

The Systematic Literature Review (SLR) method includes five steps, including (1) Formulation of the review question; in this study, the formulation of questions is formulated as follows: (a) Is green education-based blended learning efficacy applied to Biology students at the Hindu University of Indonesia? (b) What is the potential of green education-based blended learning implementation in biology students at the Hindu University of Indonesia? (2) Conducting a systematic literature search using databases such as Science Direct, Elsevier, Springer, ProQuest, DOAJ, EBSCO, Google Scholar, Garuda, and Research gate. (3) Screening and selecting appropriate research articles; at this stage, researchers select the following keywords: blended Learning, green education, green environmental, biology students, and environmental Learning. (4) Analyzing and synthesizing findings, at this stage, researchers synthesize and analyze data in the form of reviews of journals obtained related to the effectiveness and potential application of green education-based blended learning among biology students. (5) Conclude, at this stage, the preparation of results and draw conclusions related to the data and results that have been interpreted.

Materials, research sources, interpretation of results, and conclusions, this research used 20 reputable journals, 15 international journals, and five national scale journals, as well as 24 supporting journals to back up the findings and concepts presented. Journals appropriate to the research topic and published in the last five years (2016-2020) were selected using a purposive sampling technique—the presence of researchers in this study as a human instrument. Potential criteria are reviewed from 1) Flexibility and Accessibility; 2) Alignment, Improvement and Improvement of Environmental Quality; and Increasing the independence of students. The study took place over two months, from June to July 2021, at the Department of Biology, Faculty of Information Technology and Science, Universitas Hindu Indonesia. Approaches are used in the data analysis, namely meta-synthesis, meta-aggregation, and meta-ethnography. Tables, graphs, and narratives are used to present the information.

## C. Results and Discussion

The results of meta-synthesis are based on research objectives, research methods, data collection techniques, and research data analysis. Those are based on the results of meta-synthesis against 20 journals (15 international journals and

five national journals). Meta-synthesis analysis results are presented in figures 2-5.

Figure 2 shows that the highest percentage of 50% tests the influence or effectiveness of the application of Blended Learning at the college level. In this case, the test used two models, namely the control group and the treatment group; the results were declared effective if the value on the treatment model was more significant than the value of the control group (Khairani et al., 2019).

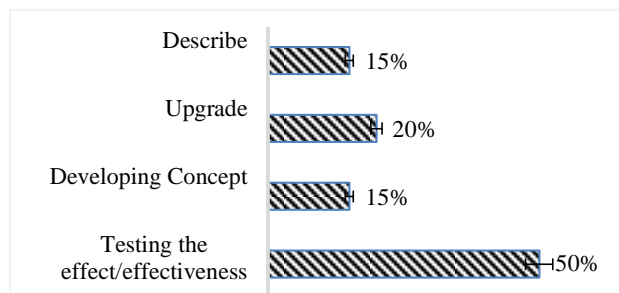


Figure 2  
 Meta-synthesis based on research purposes

Figure 3 shows the highest percentage of 30% using the R&D (Research & Development) research method. The use of R&D research methods aims to develop and validate educational products to improve the quality of learning for students (Hanafi, 2017; Ma'rifah, Hanafi, & Rizki, 2019).

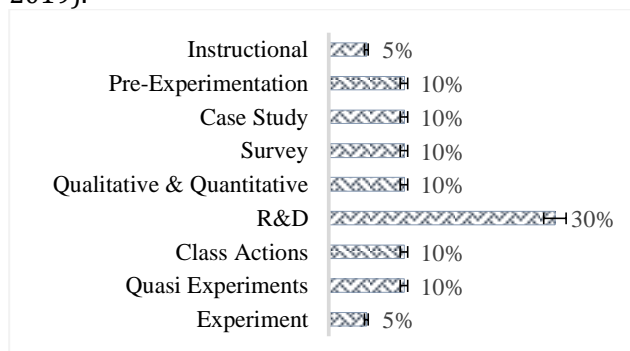


Figure 3  
 Meta-synthesis based on research methods

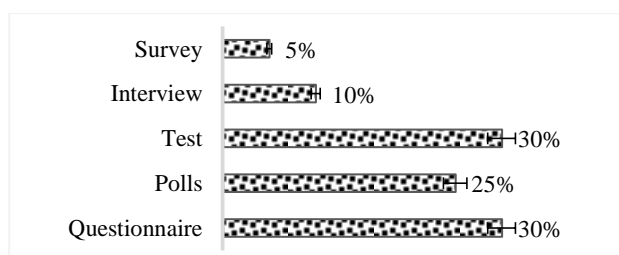


Figure 4  
 Meta-synthesis based on data collection techniques

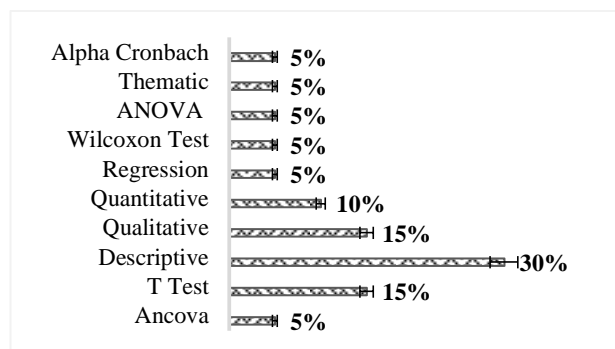


Figure 5  
 Meta-synthesis based on data analysis

Figure 4 show that the highest percentage of 30% use questionnaire tests and deployments. Data collection techniques using tests and questionnaires aim to measure, evaluate, and determine differences in learners' level of knowledge and understanding before and after treatment or program (Siswanto, 2012).

Figure 5 show that the highest percentage of 30% use descriptive data analysis. Research data using descriptive analysis aims to analyze the generalization of research results that test the relationship between variables to obtain a picture of the data of the study results and become a reference for the withdrawal of conclusions (Khoiron et al., 2020; Sriasih et al., 2019). Descriptive analysis is used to solve problems, interpret results and describe phenomena related to objects or research objectives (Muhlisin et al., 2020).

Based on the results of meta-synthesis on the application of blended learning in universities, the model of effective mixed learning is used to improve the understanding, especially of biology students, of the learning materials provided by educators. Various benefits can be obtained by implementing a blended learning model in universities. The benefits of blended learning implementation in higher education focus on learning outcomes and train students' skills and skills in using technology devices both in the real world and cyberspace (internet). The benefits of blended learning are presented in Table 1.

**Table 1 Benefits of blended learning implementation in universities**

Researchers	Benefits following the Results of Research
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Researchers	Benefits following the Results of Research
(Rizki & Daniamiseno, 2019), (Dziuban et al., 2018), (Akkoyunlu & Soyly, 2016)	Blended learning can improve learning effectiveness with cooperative principles directed between students and educators and improve interaction and communication style offline and online.
(Septiani & Putra, 2020)	Blended learning can improve student learning outcomes by 94% and increase learning satisfaction by 11%.
(Ma'rifah et al., 2019)	Blended learning can facilitate students' learning style; namely, 71.1% use the internet as a learning resource and 91.2% use smartphones in the learning process.
(Maimunah et al., 2020)	Blended learning can improve students' understanding of environmental education, local socio-cultural communities, and technology at the college level.
(Tobing & Pranowo, 2020), (Yapici, 2016), (Garcia et al., 2020), (Nazarenko, 2015)	Blended learning can maximize the quality of learning. Creativity and improve students' thinking power.
(Fitriyana et al., 2020), (Eka, et al., 2019), (Isti'anah, 2017), (Tu, et al., 2017), (van, et al., 2020), (Arslan, 2016)	Blended learning becomes a more educational learning medium, productive, provides a vast space for learners, improves learning insights, and material affordability can improve the quality of learning outcomes.

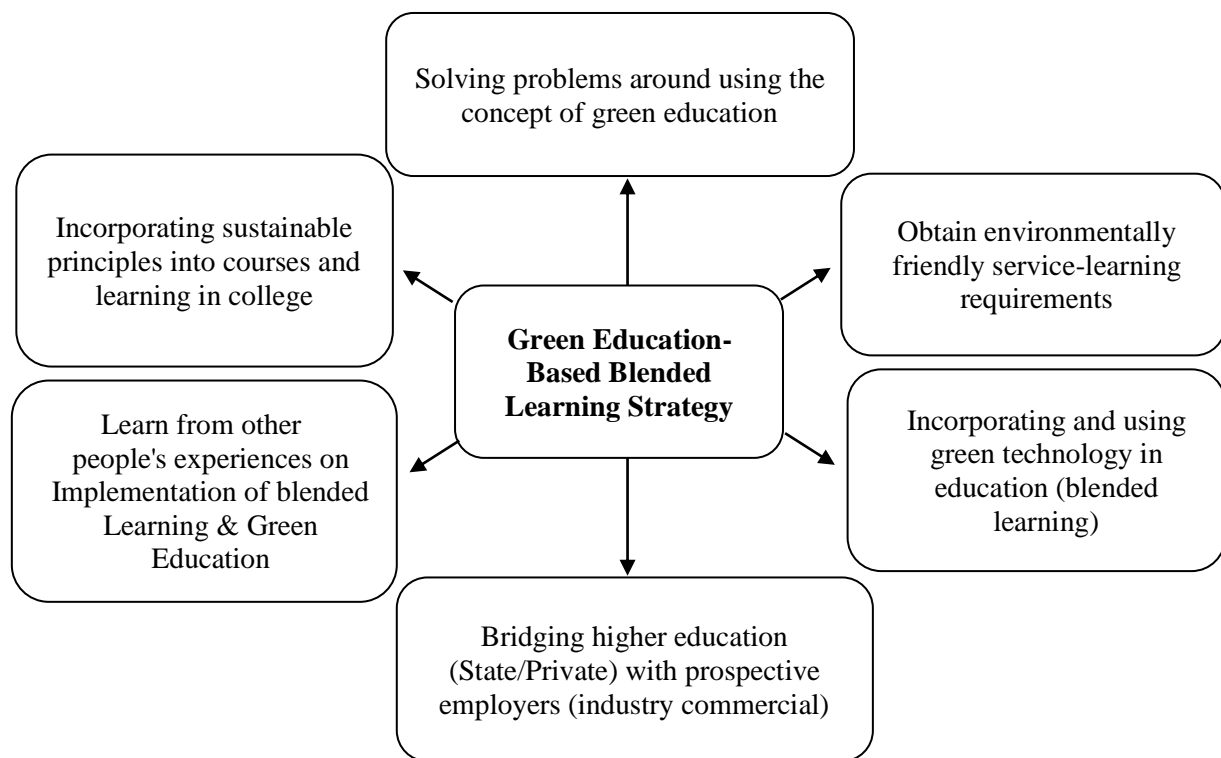


Figure 6  
 Green education-based blended learning implementation strategy

### The potency of blended learning based on green education in biology students

Based on the analysis results, the potency of blended learning based on green education in biology students at the Hindu University of

Indonesia has potential and deserves to be developed. The application of blended learning is an effective solution to deal with learning in the time, and after the COVID-19 pandemic and the application of the Green Education concept has a

considerable impact on the sustainability and sustainability of the ecosystem (Rao & Aithal, 2016). The introduction of combination learning based on environmental conservation is a new

effort in increasing students' sense of sensitivity, concern, and responsibility in maintaining environmental sustainability (van den Bogerd et al., 2020).

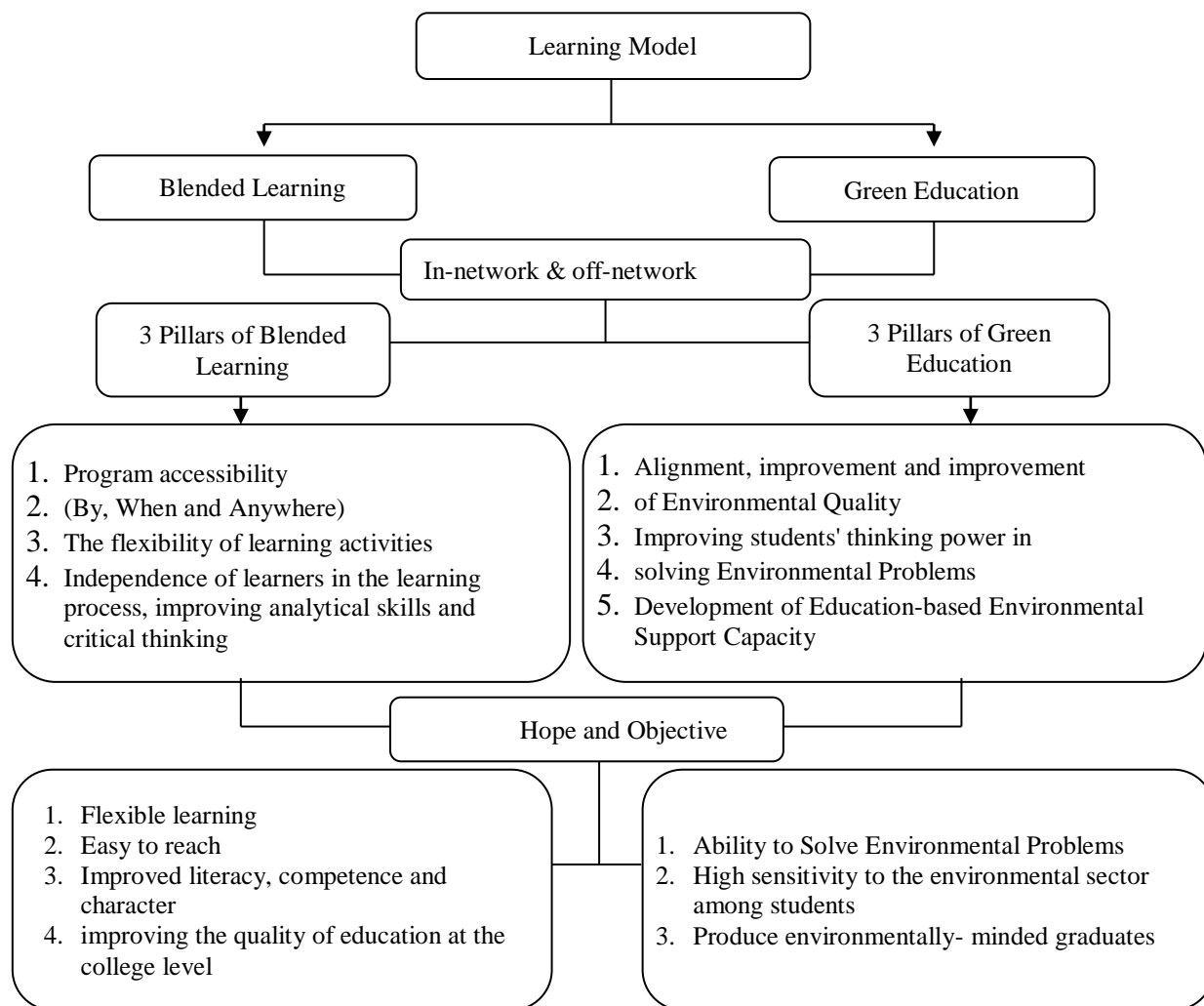


Figure 7  
 Concept green education-based blended learning model in higher education

Learning using the blended learning model focuses on combining two learning methods to improve students' activities and abilities so that the stated learning objectives are achieved to the maximum. The results showed that blended learning models have very diverse objectives and maximum results if applied to higher education, especially biology students, Faculty of Information Technology and Science, Hindu University of Indonesia. In this study, the importance of integrating the blended learning model based on green education to increase awareness of learners in training sensitivity to the conditions and situations of the surrounding environment. The implementation of these models and concepts can contribute to the surrounding environment

so that the existence of the ecosystem is maintained and increase the interest of students in managing, developing and improving the quality of the environment in the learning process (Sugiharto, 2015; van den Bogerd et al., 2020)

The application of the concept of green education, one of which is in the Biology Study Program, Hindu University of Indonesia, is very feasible to produce graduates who have good competence in material mastery, mastery of the application of technology and produce environmentally-minded graduates. Implementing the green education-based blended learning model has 3 essential complements in its implementation: 1) Education creates awareness among the

community to achieve sustainable development, and there are adverse results if the community fails to do so. 2) Education that concentrates on green education curriculum by including knowledge and skills, especially environmentally friendly activities. 3) Education that applies the concept of the green process to maintain environmental sustainability (Rizki & Daniamiseno, 2019).

Sustainability of the implementation of blended learning model based on green education in students of Biology Study Program, Faculty of Information Technology and Science, Hindu University of Indonesia should be implemented optimally, maximally and integrated. The advantages of applying the concept include 1) producing effective, interactive and efficient learning models both face to face and or in the network (e- learning), 2) producing learners who have competence in the field of science and technology, 3) producing environmentally-minded students and 4) produce the next generation to conserve the environment with responsible consumption and production. 5) improving environmental sustainability due to student concern in the environmental sector. Several strategies can be applied to realize blended learning based on green education, often called green strategy. Green strategy is the strategy of an organization or individual divided into five types, among others: (1) Competing strategy (Red Ocean Strategy) (Desy & Setyoko, 2017), (2) Monopoly strategy (Blue Ocean Strategy) (Agnihotri, 2016), (3) Sustainable strategy (Green Ocean) (Markopoulos, Kirane, Piper, & Vanharanta, 2020) (4) Blue and Green Mixture (Purple Ocean) (Green & Shearer, 2012), (5) Strategy for one time (black ocean strategy and combined white ocean strategy) (Aithal, 2016). Concepts and strategies for implementing green education-based blended learning are presented in Figure 6.

### **Green education-based blended learning potential and model in biology students**

Based on the results of meta-synthesis shows that the application of the concept of green education-based blended learning in biology students has the potential to be developed and implemented to support the termination of the COVID-19 chain and improve understanding, skills and sensitivity to the environment among students. The potential of green education-based blended learning is an effective and innovative concept applied in delivering messages to students by combining face to face models and online models. The blended learning method combines direct instruction, indirect instruction, collaborative teaching, computer-assisted individual learning and the concept of

green education train students' skills in developing problem-solving science, improving critical thinking skills, analyzing problems and making decisions quickly (thinking analytical) and creative, active and objective in providing solutions to problems in the surrounding environment. The concept of green education-based blended learning model in universities, especially Department of Biology, Hindu University of Indonesia, is presented in figure 7.

## **D. Conclusion**

The potency of blended learning based on green education in biology students has the potential and feasibility to be applied in the time and after the COVID-19 pandemic. The potency of blended learning based on green education can train learners to develop problem-solving science, improve critical thinking skills, analyze problems and make decisions quickly (analytical thinking) and be creative, active, and objective in providing solutions to problems in the surrounding environment. The use of blended learning based on green education to improve education quality in Indonesia.

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