The introduction of green technology in increasing green ethos among students

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Abstract. Environmental issues have become global issues. The environmental damage that has been discussed in the world requires handling by increasing human awareness of the sustainability of the earth as the planet they live in. One of the efforts that can be done is through education by introducing green technology which is environmentally friendly from an early age. Therefore, a special way of education is needed to increase students' awareness to be more concerned about the environment, so the purpose of this study is to construct a learning communication model in introducing green technology to improve green ethos among students. The method used is an explanatory case study, with data collection techniques in the form of observation and focus group discussion. The results obtained include the need to provide material regarding the green technology work system to provide comprehensive understanding so that it will raise awareness of students to participate in environmental conservation activities through the use of green technology.

1. Introduction
Damage to the natural environment has entered an alarming condition. Conditions of damage to land, water, and air that exist on earth, if allowed to drag on at a certain point can threaten the survival of living things on earth, including humans. Therefore, human awareness and effort as intelligent people are needed to deal with problems that can eat away their habitat. As intelligent people, humans have tried to develop a number of technologies that are expected to reduce, avoid, and overcome further damage to nature. This kind of technology is called green technology. Green technology refers to one application, equipment or system that has characteristics that prioritize the preservation of the surrounding environment and are environmentally friendly [1]. The existence of green technology is based on human awareness to maintain natural sustainability which affects the sustainability of human life.

However, so far the existence of green technology has not been utilized optimally, especially in developing countries such as Indonesia. There are various factors that have led to the utilization of green technology optimally, ranging from technical factors such as costs to more basic things such as public awareness of the importance of protecting the environment. Therefore, it is necessary to introduce green technology to the community from an early age, for example through green ethos education activities for students at the junior high school level.

In principle, green technology is carried out by applying a "green concept" which contains aspects of ZEB (Zero Energy Building) and 3R (Reuse, Reduce, Recycle) [2]. The characteristics of Green Technology include: sustainable, using reclaimed natural resources, producing products that can be re-
used, reducing waste products and pollutants and can be used in the recycling process (recycle), innovative and not harmful to health and the environment, creating activities and products that are beneficial to the environment and can protect the earth [3].

However, this simple concept of green technology has not been well socialized, so communication networks are needed through communication technology, as well as other communication activities to facilitate the adoption of green technology among the general public, because the characteristics of network technology and communication have an influence on the application of green technology [4]. Therefore communication activities are needed to spread the importance of the role of green technology as an effort to increase public awareness to be more concerned about the environment. One of them is through educational activities.

Until now, the issue of preservation of the new environment has become a discourse and movement initiated by a group of people and has not become an important point of thinking in the minds of most Indonesian people. Because the issue of development in developing countries such as Indonesia, on average is still struggling in the area of economic development and infrastructure which in fact does not pay attention to environmental conservation factors. Therefore, this change in the development model towards environmental awareness requires specific mechanisms and strategies. Among other things, through education that plays an important role in order to educate professional educators in the context of civic education and other aspects of life [5]. Here lies the importance of the position of green ethos education for the people of Indonesia, especially for the younger generation. Thus, the concept of Green higher education emerged. Green higher education is about creating knowledge, skills, attitudes, and values related to the environment [6]. Planting values is not an instant result but require a continuous long-term education process.

There are environmental education targets that are cognitively and effectively developing community understanding through the dissemination of information about energy savings [7]. In addition to energy savings, environmental education can also be done by controlling waste such as waste material that can be recycled by using green technology. Such information delivery activities have been widely initiated and carried out by environmental activists from various walks of life, both academics and non-academics. However, because activities usually take place sporadically and are less structured, so often people, especially students, have not yet received a comprehensive picture of the use of a number of green technologies in their daily lives. Therefore, the purpose of this study was to construct a learning communication model by introducing green technology to improve green ethos among students.

2. Method

There are a number of research results related to green technology, which states that environmentally friendly technology has a positive and significant impact on the company's competitive advantage so that it can be said that the better environmentally friendly technology applied to the company, the more competitive advantage they will increase [8]. While other studies reveal that consumer investment in choosing energy-efficient vehicle products not only helps save money in fuel consumption, but also saves the environment [9]. But so far the awareness of environmental care behavior among students is still following instructions and has not become a personal awareness to actively participate in environmental conservation.

This study uses an explanatory case study method to describe the environmental education model conducted at the junior high school level in the city of Bandung, to further identify the constraints that led to the ineffectiveness of the environmental education model that had been carried out. Therefore, data collection techniques are carried out by observing learning techniques and focus group discussions to find causes and recommendations for solutions that can be used as alternatives.

3. Results and discussion

Sustainability has become a central talking point on the global stage [10]. This opinion shows how important the awareness of all levels of society in various parts of the world to actively participate in the process of environmental conservation, including the people of Indonesia. In addition, in recent years the problem of environmental and energy conservation has become a central issue in the global business arena [11], so that knowledge and competencies that show environmental concern are important factors
that can be considered by the younger generation before plunging in employment and entering business competition after they finish the study period. This is the reason behind the importance of effective environmental education model to equip students with knowledge and skills based on environmental awareness.

Basically, the environment is categorized into three groups namely natural environment, artificial environment and social environment [12]. Therefore, it is necessary to understand students as the next generation who will inherit the environment related to the preservation of these three categories of nature. Based on the results of the collection and analysis of data obtained from the field results, techniques and treatments are needed that can encourage the effectiveness of environmental education towards junior high school students in the city of Bandung. The stages include: (1) Introducing the concept of environmental conservation, (2) Informing about the conditions of natural damage that have occurred around the environment, (3) Submitting participatory options that can be done, (4) Looking directly at the concept of using green technology based on reuse, reduce and recycle, and (5) to push the emergence of participation through the provision of supporting facilities. While the flow of the technique can be illustrated in Figure 1 below:

![Figure 1. Flow of Introduction to Green Technology to The Students](image)

Environmental education patterns can be initiated by introducing the concept of conservation and the importance of human concern for the surrounding environment. The introduction of the concept of environmental preservation can be done not only in the form of verbal communication in the classes through the learning process but also through piloting by environmental activists and the like by utilizing elements of local wisdom values. Because, local wisdom can be used by environmental activists to educate the public about environmental conservation [13]. The environmental-based local wisdom that exists in the culture of Indonesian society, can be adapted to the context and conditions of the target audience.

Consideration of the context and conditions of the target targets in the pilot effort and the provision of environmental education materials occupy strategic positions. One of them is piloting and providing environmental education material for students and students requiring special and different emphasis, for example Construction of a green campus that has a new approach to emphasize green environmental protection and oriented towards the sustainability of the life cycle Green campus development must focus on the construction and operationalization of infrastructure and the development of people who are aware of a sustainable environment [14]. This means that the construction of a green campus that is
complex can only be done by institutions with target targets that have the knowledge and ability to capture certain strategic elements that can only be applied to certain target targets. Whereas for junior high school students, the introduction of the concept of environmental preservation can be carried out by conveying the types of environmental conservation activities along with the positive impacts that humans will obtain in the future with the help of visualization or audiovisual media.

The next step is to provide information about the impact of environmental damage that is detrimental to humans and other creatures in the future. At this stage it is necessary to support a variety of information and technology media to describe natural damage due to human ignorance, both sourced from research data, and shows in various media, including social media, because every new media such as film, radio, television, cable and The internet with its revolutionary capabilities can be used to improve education, reduce conflict, and empower people. Community aspirations can be facilitated by the emergence of social media. [15]. There is information on various social media that contains the environmental damage that is done and exposed consciously by the perpetrators through their social media accounts, for example about the arrest and torture of animals protected by law. This information display is expected to foster awareness and concern for students not to engage in similar activities.

In addition, an introduction to green IT virtualization can also be carried out. Virtualization is one of Green IT that can help reduce infrastructure costs and maintenance, support learning and development of future generations [16]. Even so, enlightenment needs to be made about the difference between green technology and traditional technology which is still often misunderstood by ordinary people. There are differences between traditional technology and green technology that require joint efforts to reduce greenhouse gas emissions and to reduce climate change. Green technology is recognized as a tool that can be used to mitigate [17]. Understanding the differences between the two types of technology is important to minimize misunderstandings among the target audience.

The next step is the provision of participation options that can be carried out by the target at present or in the future. One environmental education can contain material about the use of organic materials to reduce soil erosion and fight the effects of drought [18]. Because this initial understanding will encourage student behavior to care for the environment until they are adults, regardless of their profession in the future. There are several studies that show that environmental education can increase environmental awareness, and attitudes toward environmental maintenance, such as preventing pollution. [19]. Therefore, environmental education can be carried out to invite target targets to start participating in activities to reduce soil, water, and air pollution and foster an attitude and eco-habit. This eco-habit can be expressed through savings in the purchase of several types of products, and other aspects that show an attitude of concern for the environment [20]. It is the habits and lifestyle based on the environment that is the final target of environmental education.

In the environmental education process, it is necessary to improve environmental awareness-based skills that can be pursued through co-curriculum activities focused on the formation of students' abilities so that environmental awareness is not only limited to understanding concepts. Students need to see practically the ongoing system. Activities The curriculum is expected to increase the sense of ownership of the environment so that they consider themselves as part of a social system that also has responsibility for environmental sustainability in the future [21]. Therefore, it is necessary for educational institutions to cooperate with relevant institutions that have a program of using green technology in their organizational activities.

This field trip activity was carried out in an effort to directly review the use of green as an effort to conserve nature which is important and caused by creative and innovative behavior that can be generated through activities that contain elements of interaction with the environment. This is in line with the statement which states that: interaction with the environment during the learning process will stimulate all the students' senses and encourage students to learn in creative and innovative ways [22]. Based on this, it is important that every party that can be involved opens the opportunity to create an interactive learning process through field trip activities.

Various efforts by educational institutions and other parties that encourage the formation of students' attitudes and behaviors to care for the environment, will not be effective when facilities that support the process are not yet available. For example, a trash can that divides the type of waste material so far has not been evenly available in the city of Bandung. This causes students to find it difficult when they want
to dispose of garbage in accordance with its designation. Therefore, there is an opinion which states that
government policies in waste management have so far not paid attention to environmental aspects and
local potential (local wisdom) of the community. Whereas community support is needed, both goodwill
and political will [23].

Based on this opinion, it is seen the importance of gathering the goodwill of the community to arouse
the bottom up political will of the government, because when public opinion shifts towards aspirations
that prioritize the environment, this has a significant and positive influence on the output of government
renewable energy policies in Europe [24]. Thus, if all parties already have awareness, knowledge, skills,
and facilities that support the creation of environmental care behaviors, then it can be expected that
Indonesian people will have a green ethos and an environmentally caring lifestyle, which creates nature
conservation that can be passed on to future generations, continuously.

4. Conclusions
Based on the results of research and discussion, it is known that there are stages that can be used in
learning techniques to increase students’ awareness of the environment. These stages include:
Introduction to the concept of environmental conservation, providing information about the conditions
of natural damage that have occurred around the environment, submission of participation options that
can be selected and done by students to show their concern for the environment, review and experience
and direct practice of the use of green technology based on reuse, reduce and recycle, and there are
efforts that encourage the emergence of participation through the provision of supporting facilities by
related parties.

This environmental education process requires the provision, packaging, and delivery of messages
in a persuasive and attractive manner so that it can encourage the formation of permanent environmental
awareness, attitudes, and behavioral concerns. Therefore, efforts and participation of various parties are
needed to play a role in providing supporting facilities that can channel participatory actions of students
in environmental care activities, so that environmental conservation efforts are shared goals not only as
seasonal discourses and activities but progress towards implementation and habits and also become a
pattern of everyday life.

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