

A Study of Students' Understanding on Sustainable Development Concepts at Faculty of Mathematic and Natural Sciences, State University of Jakarta

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Abstract

The objective of this research is aimed at obtaining the students' understanding of the Faculty of Mathematic and Natural Sciences, State University of Jakarta about Sustainable Development Concepts. The students learned these concepts in Environmental Education subject matter. There are five criteria for Sustainable Development: 1) renewability, 2) substitution, 3) Interdependence, 4) adaptability and 5) institutional commitment. The research is based on these five indicators. The research result reveals that the percentage of student's understanding: 4.7 percent is excellent, 29.17 percent is very good, 25.00 percent is good, 35.41 percent is quite good and 6.25 percent is poor. The research concluded that the students understanding about sustainable development concept good relatively, but needed improving through learning activities.

Keywords ; concept, sustanainable development, students FMNS SUJ

1. Introduction

Based on the Anthropocentrism point of view that humanity's needs and interests are of supreme and exclusive value and importance in nature, so dominates the thinking of most people in our culture that it is virtually preconscious. The nature was created for mankind's benefit, and it is his role to be the master of nature.

But what is going on, humans have developed their own understanding to their existence in this nature. They comprehend those who become the cynosure in this universe. Understanding anthropocentric has caused the human show superiorities they are to vicinity environments. Human exploit entire/all natural content for importance and prosperity of their life. They exploit all natural resources, because they feel that as heir of the world only.

Almost entire/all activity of the development instruct at growth of economics (economic growth) have influenced the environment condition because the activity convergent at exploiting various resources natural. Further economic growth actually doesn't only yield benefit, but have also produced the environment modification and waste. Meaning a number of economic activities

deliver the negative impact in environment. The concept damage of environment basically effect of the philosophy anthropocentrism, which is the understanding look into the environment from the aspect of importance of human.

Criticism against anthropocentrism, for example comes from deep ecology that looks into the environment as having the values, quit of values which have given it to human as human needs. According to this stream, separate values of the environment, also have to be entitled and opportunity to remain even having to be respected. Other being besides humans have the quit of life rights of the advantage that have given it at human. It means not only humans become important in this nature.

But conception of anthropocentrism tends to be more dominant. Activity of human in framework economic growth has developed behavior of important human of the loss and profit - having the character of tangible only. Humans have disregarded the things which have the character of intangible, that is the things having the character of the beauty of, pleasure, ruthless of air, and variety involve neglected even safety and health values.

Further conception economic growth in the end has impinged with concept development of having continuation (*sustainable development*) impressing more placing forward is continuation of environment (conservation) and the values which is intangible.

A broader accepted concept of Sustainaibility Development(SD) is the one given by the World Commission for the Environment and Development, and it is important in order to understand and to formulate the concept of sustainability. According to the report named “Our Common Future,” SD is defined as the development that meets the needs of the actual generations without compromising the needs of future one (WCED, World Comission on Environment and Development, 1987). A concept of SD more acceptable is the one based on the integration of economic, environmental, and social dimensions, designing the sustainability known as Triple-Bottom-Line (TBL), and it became widely known (Gimenez et al., 2012; Talbot and Venkataraman, 2011). In this way, DS is synonymous of rational society with clean businesses and consequently with economic development (Araújo and Mendonça, 2009). In 2001, the United Nations Commission on Sustainable Development (UNCSD) develops a guidelines and methodologies showing indicators of SD (UNCSD, United Nations Commission on Sustainable Development, 2001).

Furthermore, the World Business Council for Sustainable Development (WBCSD, The World Business Council for Sustainable Development, 2006) shows a diagram where SD is similar

to Corporate Responsibility (CR) and they are divided in corporate financial responsibility, corporate environmental responsibility, and corporate social responsibility. According to Araújo and Mendonça (2009), the concepts of SD and sustainability are distinct: SD is commonly associated with the expectation of a country entering in a growth phase and remain so over time, and sustainability is the ability to self-sustaining itself and self-remaining. Thus, we can relate SD with public policies and sustainability with all other actions promoted by the private sector. Furthermore, it can be designed the concept of corporate sustainability (CS), related to actions aimed at the business environment, which is also presented by Baumgartner and Ebner (2010) when they argue that “sustainable development when incorporated by the organization is called corporate sustainability (CS) and it contains like sustainable development, all three pillars: economic, ecological and social.

Law of The Republic Indonesia number 32 year 2009, regarding environmental protection and management defined environment as : the spatial unity of all materials, forces, situations, and living creatures, including humans and *their behaviors*, which influence the continuation of the life and welfare of humans and other living creatures. Based on this spirit and in order to prepare the students in participating at environmental protection and management, the chemistry department of the Faculty Mathematic and Natural Sciences, State University of Jakarta (FMNS-SUJ), entering this concept as a topic in environmental education subject matter.

Through these rationales the research problem is: Do students of FMNS-SUJ, having understanding to be a concept sustainable development?

The objective of this research is aim at obtaining the understanding students of the FMNS, SUJ about Sustainable Development Concepts.

The benefit of the research is for the lecturer who teaches at the FMNS-SUJ,; especially for lecture that teaches environmental subject matter. Besides that, various stakeholders are having attention to population and environmental problems, in getting information about real condition about the students how they behave and action to environment.

2.Sustainability Development

Sustainability is defined by Gladwin et al. (1995) as a process that creates a vision of community that respects the prudent use of the natural resources to ensure that the present generations achieve a high degree of economic security and can attain democracy and popular participation in the control of their communities while maintaining the integrity of the ecological systems and of life. For

Gimenez et al. (2012) and Kleindorfer et al. (2005), the term of sustainability is used to include environmental management, the closed-loop supply chains and a broad perspective on the triple-bottom line, thought that is part of the profit, people, and the planet in corporate culture, strategy, and operations.

On the other hand, social sustainability has focused on internal communities (employees) and external (Pullman et al., 2009). Social sustainability means that organizations provide equal opportunities, encourage diversity, promote connectivity within and outside the community, ensure the quality of life, and provide democratic processes and responsible governance structures (Elkington, 1998). In fact, companies need to engage in CSR activities as a way to improve their social reputation (Fombrun, 2005; Gimenez et al., 2012). The triple-bottom-line concept suggests that organizations do not only engage in social behavior and environmentally responsible, but also, that the positive financial gains can be obtained in the process

According to Savitz (2006), the TBL view captures the essence of sustainability by measuring the impact of organizational activities across the world. Based on this perspective, sustainability is not simply a management tool for organizations. In addition, for organizations to continue to operate in the long term, they must take measures to ensure that they contribute to the sustainable management of natural and human resources and contribute to the well-being of society and the economy as a whole (Mitchell et al., 2007). In this study, we intend to propose an approach that considers the sustainability in the TBL perspective

The Brundtland Commission definition of sustainable development cleverly does not limit itself to environmental matters. Instead, it places the focus on the human element, by coining the definition on the basis of meeting needs and placing that in the context of equity within and between generations. Environmentalists have added to this definition the aspect of maintaining ecosystem capacity to meet needs of society. There are five criteria in activity of that development can be told as sustainable development:

a. Renewability:

Renewability in fact is one of the nature from natural resources. That is nature of renewal as natural resources that is able to innovate. Natural resources able to be used over and over again and can be preserved.

b. Substitution

It means to go concerned development have to take place to continue and it is not broken by the time sustained by nature source, guaranteed with environmental quality and the human still going on.

c. Interdependence

It means among human and environment of course each other hinging and requires one another. Conception interdependence is important as base for development of having continuation.

d. Adaptability

Adaptation is ability or tendency of mortal in adapting to the new environment to be able to linger better. Adaptation character is important in development of having continuation, because this character symbolizes strength of mortal to stay and adapt to various situation.

e. Institutional Commitment

One of the characters of development of having continuation to be the existence of commitment governmental institute in this case along with interconnected institutes. Commitment here can be interpreted as a consistent attitude instruct at one purpose. Role of good institute is important as regulator and supervisor.

The activities that can categorize as sustainable, including:

a. Use materials in continuous cycles.

The cycles which bring the needed materials back for reuse must either occur naturally, like the cycles of water and carbon, or they must be maintained through mindfully recycling programs.

b. Use continuously reliable sources of energy.

These power sources are abundant, and can be harnessed practically anywhere. With the exception of the problems associated with large dams, these renewable sources of energy have little or no negative environmental impacts.

c. Come mainly from the qualities of being human.

They can provide pleasure, purpose and meaning to our lives without harming the Earth.

And the activities that can categorize as no-sustainable, including: .require continual inputs of non-renewable resources. Dependency on more at that point would be disastrous.

1) Cause cumulative degradation of the environment.

Through Small amounts of toxic materials (toxins biological accumulation), some poisons, although thinly dispersed, can be found in dangerous concentrations, for example, inside of the fish, people eat from polluted water. Require resources in quantities that undermine other

people's well-being. The cooperation needed to build a sustainable world order will not come about as long as some groups of people take unfair advantage of others. Inequity often leads to social strife and armed conflict. Furthermore, the people at the bottom of the pyramid of exploitation are often forced by desperation to degrade the environment around them for day to day survival. The degradation of their territories not only makes life worse for them; it undermines the global systems which provide for those at the top of the pyramid as well as for those below.

2) Lead to the extinction of other life forms.

If we maintain patterns of development which regularly destroy or significantly diminish the presence of other forms of life, we progressively undermine our own existence as a part of the global ecosystem. With the loss of species we also lose genetic possibilities for fighting disease, in people and in food crops, as well as potential new sources of food. In addition to the dangers and loss to people, one can also argue that other living things have their own.

4).Use renewable resources faster than their rate of renewal.

When the rate of use exceeds the rate of renewal, the stock will become depleted and problems will follow.

3.Material and methods

The purpose of the Study is to obtain information the understanding of student faculty of math and sciences (FMIPA) SUJ concerning concept development of having continuation to (sustainable development). Through this information the strategy in learning process could improve better for the next future. Research method used is survey with descriptive presentation technique. Venue and Time is FMNS-SUJ, in July and August 2012. Population and Sample of the research are students of FMNS-UNJ. The number of sample is 108 students selected randomly and purposive specified by the generation student of 2008 and 2009.

The principal data was collected using a structured questionnaire. In this study, the chemistry students' knowledge towards concept sustainability development such as ie substitution, adaption, interdependent and general were examined. The questionnaire consisted of four sections:

1. Social demographic data of the respondents;
2. Questions about students knowledge towards concepts sustanaibility development, has preferred future renewable energy sources , name of the results of a conference on environment and develoment and cultivate forests for sustainable development .Before the formal survey was

conducted, a pilot survey was delivered to twenty five student at studying at the students physic department . Based on the responses to the pilot survey, small revisions were made, including the inclusion of additional questions. A definition of sustanaibility development and the aims of this survey were introduced to the participants at the beginning of the questionnaire.

In the first stage about knowledge related concept sustanaibility development, four openended questions were asked of the students to determine: (1) the name of the results of a conference on environment and develoment, (2) renewable energy sources as a substitute for petroleum, (3) benefits of having a renewable energy, and (4) how to cultivate forests for sustainable development ?

4. Results

The percentage distributions of the student answers to the question, “What would the name of the results of a conference on environment and develoment?” are provided in Fig 1. According to the students' answers, 78% mentioned Agenda 21, while 83% described protocol Kyoto, 87.% described Rio 2012, and 52% described declaration Stockholm

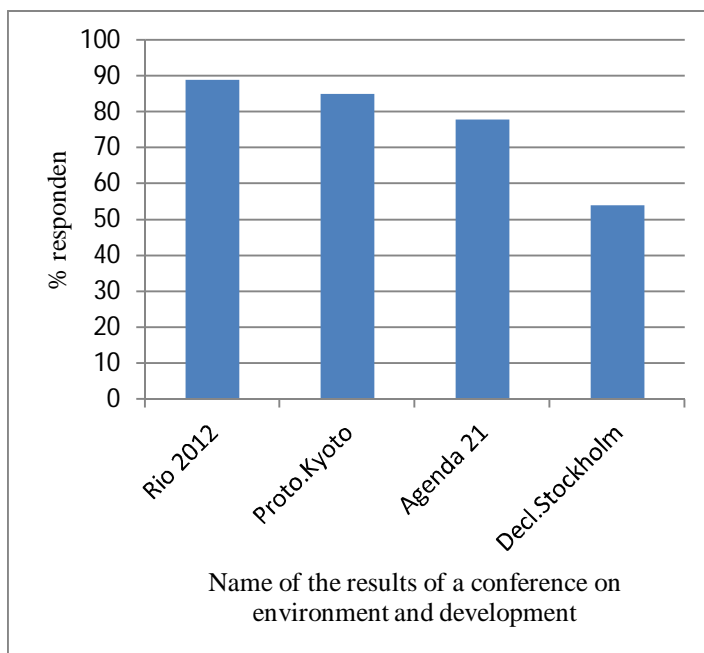


Fig 1 Student knowledge regarding name of the results of a conference on environment and develoment

The percentage distributions of the student answers to the question, “What are the source of renewable energy?” are provided in Fig 2. According to the students' answers, 92% described the waste cooking oil, , while 76.% described waste biomass, 7 8% described macroalga, and 85 % described the wind as renewable energy sources

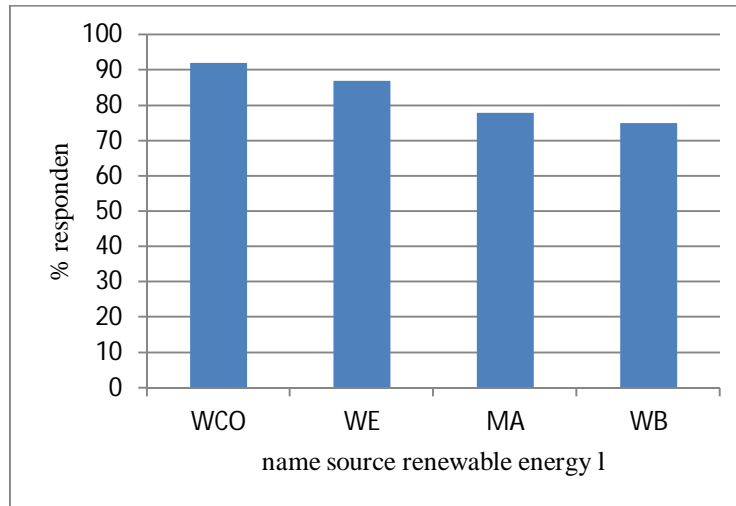


Fig 2. Student knowledge regarding sources of renewable energy: WCO = waste cooking oil, WE = Wind energy, MA = macroalga WB = waste biomass

The percentage distributions of the student answers to the question, “What would be the benefits of having a renewable energy ?” are provided in Fig 3. According to the students' answers, 87.% described non-toxic., while 85% described environmentally friendly, 72% decribed renewable, 54% described, biodegradable, and 48% reduced cost (economical, their family as their the benefits of renewable energy.

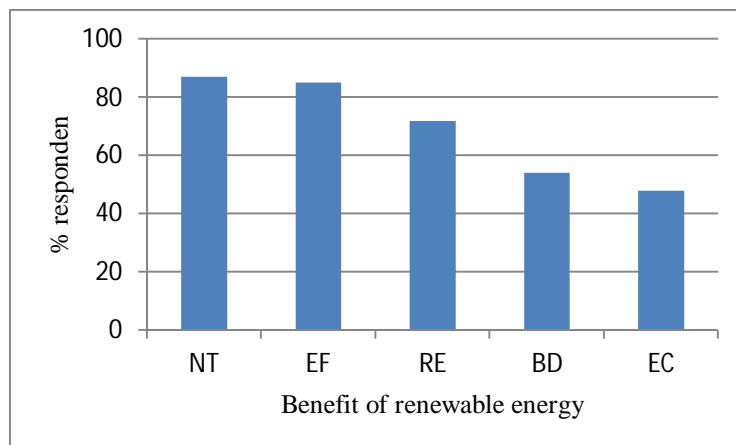


Fig 3. Benefits of having a renewable energy NT = non toxic, EF = environmentally friendly, Re = renewable, BD = biodgradable, EC = economical,

The percentage distributions of the student answers to the question, “how to cultivate forests for sustainable development ? are provided in Fig 4. According to the students' answers, 91% described greening, while 86% described prevent illegal logging, 75% described prevent forest burning, as the other types of cultivate forest

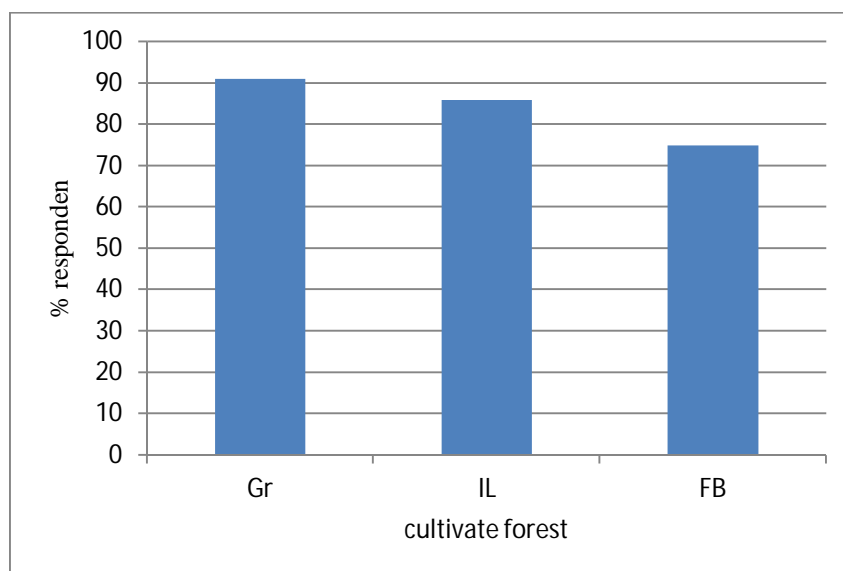


Fig 4. Student perceptions regarding the cultivate forest. F = fermentation
Gr= Greening, IL= Illegal logging, FB =Forest Burning

Data on Student Understanding of the Concept of Sustainable Development that obtained by filling a questionnaire consisting of 17 grains statement. With a score range of theoretical 0-17 and empirical scores range 5-17. Then based on the calculated average value is known the average rating (M) amounted to 11.17, mode (Mo) = 12.00, median (Me) = 11.00, standard deviation (SD) = 3.14, and Variance (Var.) = 9.85. Table 1 showed the frequency distribution of students understanding scores on the concept of sustainable development.

Table 1. Frequency Distribution Student Comprehension Score of Sustainable Development Concept

No.	Class Interval	Frequency		
		Absolute	Relative (%)	Cumulative (%)
1	4-6	3	6.25	6.25
2	7-9	17	35.41	41.66
3	10-12	12	25.00	66.66
4	13-15	14	29.17	95.83
5	16-18	2	4.17	100
Total		48	100	

The research result reveals that the percentage of student understanding: 4.17 percent is excellent, 29.17 percent is very good, 25.00 percent is good, 35.41 percent is quite good and 6.25 percent is poor.

5. Conclusions

Based on the study results, it was observed most of students believes that renewable energy have been benefit. In addition, the study also determined that renewable energy are environmentally friendly, non-toxic, biodegradable, renewable, and economical

While the majority of the students correctly named the the waste cooking oil, waste biomass, macroalga and, wind energy as sources of renewable energy. This illustrated that although most of the students knew about renewable energy sources. The large majority of the students could mention greening, illegal logging and fotrst burning as process to cultivate forest. This observation illustrated that these students had erroneous information regarding the types of cultivate forest.

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