Reinforcing National Character Education in Biology based on the Education for Sustainable Development Concept

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Abstract. This research aimed to know teacher perception toward national character education in learning Biology within the concept of sustainable developments. The data collection techniques employed in this research was survey technique with non-test instrument, and the samples of the research itself are teachers in private high schools and public high schools in Yogyakarta. Based on the findings of the research, it can be known that teachers in private and public high schools assumed that learning biology can be integrated with the concept of sustainable development in order to reinforce the students' national character education, resulting 80.17% for private high school and 79.12% for public school. The learning model assumed most corresponding for the learning with the concept were Problem Based Learning with 75% of the total and Socio-Scientific Issue with 24%. Also, as the most potential materials to be taught were Ecology and the Environment Changes.

Key words: Education for Sustainable Development, Character Education, Problem-based learning, Socio-scientific issues

Introduction

Globalization brings significant effects toward developments. The development, especially in the infrastructure’ improvement and fixes, can have a positive impact if it provides benefits for the nation. However, it can also have a negative impact if the development is not balanced with environmental conservation and management. Thus, this then challenges the education implementers in Indonesia to be able to educate the human resources in order they can play a role in the sustaining the development and being a responsible human toward the nation. These values can be introduced through education in the family environment as well as the education in schools which are integrated with subjects[4]. Educating people with moral and nationality is a duty for teachers, so they can score the future generation that can facilitate, play role and sustain development activities instead making destructions which than leads the nation into setback and failures of reaching the goal of the development itself. Problems arose in development activities proves the unsustainability of the development which still lacks of support for the activities themselves. According to UNESCO (2012: 5), the sustainability is a paradigm to think about the future by considering environmental, social and economy balance in pursuing the development and improvements of life quality [13]. Those three fields are interrelated and the influence cannot be separated from each other. To grant the activity of
sustainable development, it needs a good education system that is able to form human with characters and morality.

In Indonesian, character education system has become a government policy implemented in Curriculum 2013 [4,5]. Character education can be integrated in every subject. One of them is biology. Biology is a branch of science which studies the objects and the problems of life in its various levels. The problems in biology is closely related with environment. Through biology, the goals of education can be achieved because biology is an educational device to reach the national education goals. Biology is also one of studies in school which play role in building the national character through the material and lesson from teachers. There are many biology problems which can be related to national character education. The problem of the sustainable development and its relationship to environmental problems require the knowledge of environment to be its basis of the study. As the environmental problems related to social aspects getting more complex, it needs the learning of biology with the integration of national character education. Creating the biology learning that is able to build character is not easy. Thus, it needs learning model and method which are suitable with the theme and value that will be taught. The science and technology development improves teacher’s literacy skills in understanding problems. Teachers must acquire professional skills in developing the learning models. Karaaslan (2016: 3) mentions that education for the sustainable development is now part of education as a new vision [3]. UNESCO (2014) reports that the future challenges start from preparing teacher for sustainable development education, and all of the teachers have to prepare the students to be responsible civilians for the supports of the sustainable developments, so that there are two principals that determine the national standard for teachers that teachers have to acquire the knowledge of the sustainable development and competent enough to apply the knowledge in the subject. Teachers, in this context, play role as ESD educators that need to acquire the essential characteristics such as holistic approach, envisioning change, and achieving information. (UNECE, 2011)

Research Methods
This research employed survey method which used the non-test instruments in a form of questionnaire. This research aimed to know teacher perceptions toward the applicants of national education character in Biology as a subject which correspondence to the concept of sustainable development. The sample of the research were teachers from SMA N 7 Yogyakarta and SMA N 11 Yogyakarta, and also private schools’ teachers from SMA Islam Al Azhar Yogyakarta and SMA Muhammadiyah 7 Yogyakarta. The samples were chosen by purposive sampling technique which was based on certain criteria that was the school’ status as pioneering-Adiwiyata schools.

Findings and Discussions
Application of Character Education in Biology Subjects with the knowledge of Sustainable Development
Aspects which indicate teachers’ perception toward the application of character education as a strengthening effort in biology subject are as follows:
Table 1. Application of Character Education in Biology Subjects with the knowledge of Sustainable Development

| No | Aspect                                                                 |
|----|------------------------------------------------------------------------|
| 1  | Teachers’ perception about the urgency of character education in biology subject |
| 2  | Teachers’ attitude toward sustainable development’s issue               |
| 3  | Teachers’ ability to link on the topic of sustainable development’s issues with biology material. |
| 4  | Teachers’ perception about learning model which suits to sustainable development education in biology subject |
| 5  | The approach and learning model employed by teachers in biology subject |
| 6  | Teachers’ ability to participate on developing students’ nationality character through biology subject |

Follows are the analysis findings based on the data of teachers’ perception toward the application of character education in biology subject with sustainable development concept by teachers in private and public high schools in Yogyakarta.

Table 2. The application of character education in biology subject with sustainable development concept by teachers

| Type of School | High School | Application Percentage | Average  |
|---------------|-------------|------------------------|----------|
| Public        | A           | 81.25%                 | 80.17%   |
|               | B           | 79.10%                 |          |
| Private       | C           | 77%                    | 79.12%   |
|               | D           | 81.25%                 |          |

Based on Table 2, it shows the data percentage of character education application in biology subject with sustainable development concept by Biology teachers. All of the teachers assumed that character education can be applied in biology subject and be agreed that it is integrated with the concept of sustainable development in order to improve the value of students’ nationality character. The percentage were obtained from totaling the aspects of the question item. The average percentage of public high school teachers is 80.17% and as for the private school teachers is 79.12%. This shows that the average obtained by public high school is higher that the private school. This is supported by the fact that both of the public high schools are Adiwiyata schools, and the private schools are the pioneering-Adiwiyata schools. Adiwiyata School is a government program in order to achieve the
goal of sustainable development. (Hari, 20017: 328) Through Adiwiyata Schools, it is expected to create schools which are cultured and care about the environment. This program invites the school management to be able to provide the learning that contains environmental conservation and management materials [6].

Besides of the survey on the application of character education in biology subject with sustainable development concept by high school teachers, another survey was conducted on the biology learning models with sustainable development concepts which are considered suitable to be used in the learning activities along with sustainable development concepts. The findings analysis are presented in the following graphic:

**Graphic 1. Findings of Survey on Teachers about Biology Learning Model with Sustainable Development Concept**

Based on Graphic 1, the learning model and approach that are more corresponding to be used in learning Biology with sustainable development concept is Problem Based Learning. There are 75% of the teachers employed PBL as the learning model in Biology which is more corresponding with the concept linked with the issues in society. However, there are 25% of the teachers considered SSI approach as more corresponding to be used in learning. In relation to the concept of Education for Sustainable Development (ESD), the teacher must acquire the competence in arranging the learning setting and using the methods that is corresponding with the learning application. Sustainable development is a concept that deals with environment, society and the economy. The learning model that correspondsences with Education for Sustainable Development (ESD) concept is Problem Based Learning model. Arends (2008: 380) states that Program Based Learning is a model that presents various situation of issues that are authentic and valued for students, which then functions as the jumping stone for investigation[1]. Using *problem based learning* directly involves students and supports them in the learning activities. The learning model that is suitable with the sustainable development concept is problem based learning model.

Besides problem base learning, another learning strategy that supports ESD is SSI or Socio-Scientific Issues. This approach presents social issues in society that are related to science literacy of the students. SSI has been integrated in many science curriculum in the world. (Talens, 2016: 271) SSI approach is potential to create scientific activities that are more realistic and humane because it relates with science literacy which can develop the awareness and the relationship between science and society, and also encourage students to engage as active citizens[11].
Talens (2016: 281) states that learning with SSI approach in class in form of realistic and concrete issues allows students to have the ability to:

1. Become aware toward social issues
2. Be able to strengthen students’ knowledge about the discussed topic including the strengths and the lack of the pros and cons in dealing with the issues
3. Be able to give solution and the right thought
4. Reflect that what happens in society can effects on every society member
5. Be able to identify the conflict, argument, and issue
6. Be able to make assessment and resume toward what is learnt
7. Apply the knowledge in analyzing issue which effects the society member[11].

The researches conducted by Gutierrez (2015) and Abdallah (2014) show that the SSI approach can improve the students’ ability in making decision. Through this method, learning by memorizing can be minimalized and students can be more responsible and aware to the solve problems related to biology issues. Scientific social issues are integrated with SSI-based learning through argumentation, debate, case analysis, and moral analysis in order to improve students’ ability in making decisions[2].

Teaching scientific content in social environment context helps in creating idea which is related to environment and social issues raised by science and technology based on students’ understanding. Another research has been conducted by Pomahac, Gunn, and Grigg (2007) in which they state that socio-scientific issues can build critical thinking skill which are deeper and make students respect the diversity among them and so they can express themselves freely.

To be conclude, the problem based learning and SSI model can be alternatives of the learnings which support ESD. Through the models, teachers can create the learning setting where students can solve problems related to unsustainable development problems. Students can solve the issues related to the environment and the society through their scientific understanding and so they can improve their skill to participate in the sustainable development with self-reflecting from the issues happened in society that arises characterizations within them.

**Graphic 2. Findings of Survey on Teachers about Biology Material That Is Suitable with ESD Model and Concept**

Survey on Biology Materials

- Biodiversity
- Prokarya
- Fungi
- Plants
- Animals
- Ecology
- Environment Change
- Growth and Developments of Animal and Plants
- Evolution
Based on the Graphic 2, according to the survey conducted in private and high schools, the biology materials that can reinforce character education in learnings with sustainable development concept are ecology and environment change. Both of them place the same position and are higher than the other materials. However, it cannot be denied that the other materials have the same potency to be integrated with the concept. The potency in ecology and environment change materials to be integrated with the concept tend to be high. This correspondences with the development of ESD that was invented by teacher in environment field through his idea in Rio de Janeiro conference in 1992-2001. Furthermore, the other environmental education and other educational fields such as education for human rights, social, economic, and ecological, contribute fully to ESD pedagogic content. ESD teaches all fields related to environment, social, and sustainable economics under the prevailing cultural dimensions. (UNESCO, 2012: 41)

Education for Sustainable Development (ESD) is not only focused on one discipline, but also some materials in the science and biology scope that can relate to ESD. According to UNESCO in the Source book of Education for Sustainable Development (ESD) [17], they are:

1) Biodiversity
2) Prevention of Narcotics Use
3) Conservation
4) Prevention of Natural Disasters
5) Earthquakes
6) Ecology
7) Education about HIV and AIDS
8) Agriculture
9) Nutrition
10) Water
11) Waste Recycling
12) Sex Education

Conclusion

Based on the research findings, it can be concluded that teachers in public and private schools assumed that learning Biology can be integrated with sustainable development concept as the effort to reinforce nationality character education for students. The model and approach which correspondence to the learning is Problem Based Learning (PBL) and the most related materials to environment are materials about ecology and environment change. Both of these materials are considered most corresponding because they can present the environmental issues in the society which are then integrated with the material in learning Biology.
References

[1] Arends, Richard. (2007). *Learning to Teach*. New York: Mc Graw Hill Company

[2] Gutierrez, Sally. B (2014). *Integrating Socio-Scientific Issues to Enhance the Bioethical Decision-Making Skill of High School Students*. *International Education Studies*; Vol. 8, No. 1; 2015 ISSN 1913-9020 E-ISSN 1913-9039 Published by Canadian Center of Science and Education

[3] Karaarslan, Guliz (2016) *Integrating Sustainable Development Concept into Science Education Program is not enough; We Need Competent Science Teacher for Education for Sustainable Development*. *International Journal of Environmental & Science Education* 2016, Vol 11 No. 15 8403-8424

[4] Kesuma, Dharma. 2012. Pendidikan Karakter : Kajian Teori dan Praktik di Sekolah. Bandung : Remaja Rosdakarya

[5] Peraturan Presiden Republik Indonesia Nomor 87 Tahun 2017 tentang Penguatan Pendidikan Karakter (PPK).

[6] Prasetyo, Hari Sutanto. 2017. *Education for Sustainable Development in West Nusa Tenggara*. Balitbang : Kemendagri

[7] Raunch, Franz. Steiner, Regina. (2013). *Competences for Education for Sustainable Development in Teacher Education*. *CEPS Journal* Vol 3 No. 1

[8] Salim, Abdallah Zo Bi (2014). *The Effect of Using Socio-Scientific Issues Approach in Teaching Environmental Issues on Improving the Students’ Ability of Making Appropriate Decisions Towards These Issues*. *International Education Studies*; Vol. 7, No. 8; 2014 ISSN 1913-9020 E-ISSN 1913-9039 Published by Canadian Center of Science and Education

[9] Salim, Emil. 1988. Pembangunan Berwawasan Lingkungan. Jakarta : LP3ES P.T Media Surya Grafindo

[10]Scriven, M dan Paul, R (2007). *Defining Critical Thinking : The Critical Thinking Community, Foundation for Critical Thinking*. Tersedia dalam https://www.criticalthinking.org/pages/defining-critical-thinking/766

[11] Talens, Joy (2016). *Teaching with Socio-Scientific Issues in Physical Science : Teacher and Students’ Experiences*. International Journal of Evaluation and Research in Education (IJERE) Vol.5, No.4, December 2016, pp. 271~28 ISSN: 2252-8822

[12]Triling, Bernie and Fadel, Charles (2009). 21st Century Skills: Learning for Life in Our Times, John Wiley &Sons. Jossey Bass : Unites States

[13]UNESCO. 2012. *Education and Sustainable Development Sourcebook*. http://unesdoc.unesco.org/images/0021/002163/216383e.pdf diakses pada 20 Juli 2018

[14] United Nations. 2017. *Introduction And Proposed Goals And Targets On Sustainable Development For The Post 2030 Development Agenda*, http://unesdoc.unesco.org/images/0024/002477/247785e.pdf