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Effect of Coral Reef Conservation Education on Students’ Social Sensitivity (A Co-Curricular Learning Experimental Study at SMKN 61 Jakarta Pulo Tidung Besar Regency, Kepulauan Seribu)

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Abstract. The use of the coral reef as a source of community livelihood on Tidung Besar Island has negative impacts on the coral reef itself. Students of SMKN 61 Jakarta are a small part of the Tidung Besar community that is involved in coral reef conservation efforts on Tidung Besar Island. Efforts to build social sensitivity can be conducted at schools through co-curricular education activities. Co-curricular activities are activities to add to, supplement or replace intra-curricular learning, which is according to the curriculum. This learning is in line with informal education, which has functions as a complement, supplement and substitute. This is in accordance with the Indonesian national education system, nonformal education and family education. Students are required to have social sensitivity to the environment so they will have a sense to maintain and improve coral reef sustainability. Conservation education, which is a nature conservation strategy, is essential for inclusion in school learning. The purpose of this research was to increase social sensitivity about coral reef conservation in students of SMKN 61 Jakarta through coral reef conservation education. This research was conducted on October 20th-21st, 2017 at SMKN 61 Jakarta. The research method was quasi-experimental with a one group pretest-posttest design. The sample consisted of 32 students. Hypothesis testing by t-test demonstrated that coral reef conservation education had an influence on the students’ social sensitivity to coral reef conservation.

Keywords: co-curricular activities, coral reef, conservation, student’s social sensitivity.

INTRODUCTION

Tidung Besar Island lies in the western part of South Kepulauan Seribu, approximately three hours journey from Kali Adem Dock by boat. Tidung Besar Island is the largest of the six islands in Kelurahan Pulau Tidung. Its 50.13 ha land area supports a population of approximately 4,391 consisting of 1,128 households. The coral reef ecosystem is one of the sources of livelihood for the Tidung Island people who work as tourism service providers and fishers. The use of the coral reef ecosystem has had an impact on the survival of the coral reef and other biota in the
ecosystem. The condition of the coral reef in Tidung Island is moderately damaged with a live coral coverage between 21.41% and 30.19%.{1} The solution to improve conditions is managing the Tidung Island environment, especially the coral reef, by collaboration between many parties both the law enforcers and the community, including students studying in the Tidung Island environment. The solution to overcome coral reef damage is conservation education. Theodore Roosevelt was the first American President to address the importance of conservation education. Conservation is the wise use of natural resources. This study was limited to the influence of coral reef conservation education on the social sensitivity of students living in the Tidung Island environment towards coral reef conservation. This study aimed to increase the social sensitivity about coral reef conservation of students at SMKN 61 Jakarta through coral reef conservation education as an extracurricular program.

**Conservation Education**

Education comes from the base word “educate”, which carries the meaning to nurture and to train.{2} Education can be defined as both direct and indirect efforts to help a child in his/her development towards maturity. Education is essential in building social sensitivity towards the environment to develop a conservation-aware citizen.{3} Conservation is active management of the biosphere with the purpose to maintain the sustainability of the maximum species biodiversity and maintain the genetic diversity within a certain species, including the maintenance of the biosphere functions, such as ecosystem functions and nutrient cycle. It can be said that conservation is regular maintenance and protection of something to prevent damage and extinction by preserving, preservation. From the two definitions above, it can be understood that conservation education defines efforts to train students, both directly and indirectly, so that they have a sense to maintain and protect nature from damage and extinction.{4} Environmental conservation education has not yet been explicitly stated in the curriculum. Therefore, conservation education should be conducted as co-curricular education, which is done outside the classroom, possibly directly in the marine environment and coral reef itself. Pertaining to time, it is more flexible, conducted at times agreed upon by the educators and students. The method is also more varied, for example using marine excursions supplemented by discussions on location at the coral reef. Moreover, the learning medium is more varied and innovative, namely the environment and objects related to conservation efforts, with learning sources from communities that are concerned with the environment and coral reefs. This type of learning method can make conservation education very interesting and fun for students. As the explanation above has pointed out, the nonformal education setting is more effective and relevant to conservation education. The characteristics of nonformal education are: 1) learning materials are contemporary issues faced at the moment, 2) learning is from various sources, with flexible times and venues, and 3) is in accordance with the learning aims, which are to find solutions for an urgent need.{5}

**Coral Reef**

Corals are an animal from the Anthozoa class. These animals are in the form of flower-shaped polyps. The polyps are supported by a calcium skeleton in the form of plates as scaffolding. The skeleton consists of inorganic materials and calcium that are secreted by the coral polyps. As with other animals, corals have neural tissues, muscles, digestion, reproductive, circulation and excretion systems, albeit very simple. Their passive movements make them reliant on other organisms to obtain food. Through mutualism with zooxanthellae that are able to perform photosynthesis, corals are able to obtain food. Coral reproduce sexually and asexually. Sexual reproduction is conducted by external fusion between male and female gametes, while asexual reproduction is done through the formation of buds.{6} The polyp’s structure and its skeleton are called corallites and these grow in colonies. Every type of coral has a different form of colony growth, some branching, others massive, submassive, mushroom, tabulate, foliose or encrusting. These colonies are the main structure of the coral reef ecosystem. Coral reefs are found throughout shallow seas in tropical to subtropical areas, between 32° north latitude and 32° south latitude around the Earth. Coral reefs can prevent coastal erosion and provide a source of food and a living for hundreds of millions of people in more than 100 countries.{7}
Social Sensitivity

Social sensitivity can be defined as the condition of an individual (student) in a community group that understands, feels and provides solutions for various social issues and phenomena around them. The presence of a willingness to understand and provide solutions for issues in the environment has an effect on the community, enabling the community to have a positive attitude and create a sense of collaboration within the community. Social sensitivity is important for students because education is basically an effort to build awareness. Social sensitivity to coral reef damage must be instilled in students as a part of the community. Students, as the future generation, are expected to contribute a gentle touch to involve the community in order to build an awareness to guard and preserve the environment. National development in the field of education, including conservation education, demands the participation of all community strata, for example through formal education, co-curricular subjects or in nonformal education forms. Nonformal education has become a fundamental need because formal education has not yet been able to overcome various issues in the community, including the coral reef issue. In certain areas, formal education is unable to supply the skills needed by the community be able to compete openly. On the other hand, in reality education must have a real contribution for the entire national development. Education must be able to influence, build awareness, change and shape the attitudes of both individuals and the community towards effectiveness, integrity and a communal attitude towards rationality for actual life issues, including coral reef conservation, to achieve a more functional life. Humans must have a harmonious and balanced relationship between themselves and the environment.

Students, in this case those studying at State Vocational High School 61 Jakarta (Sekolah Menengah Kejuruan Negeri (SMKN) 61 Jakarta), are a small part of the Tidung Island community, but are the next generation to be involved in the coral reef conservation efforts on Tidung Island. In order to face various issues in their lives in the future, students should have social sensitivity towards their environment so that they will constantly try to maintain it. The presence of social sensitivity will give the students a willingness to maintain and improve the coral reef on Tidung Island and, in the future, build an awareness to make Tidung Island a marine tourism attraction that is friendly for the coral reef ecosystem. Conservation education, which is one natural resource strategy, is very important to include in school curricula. It is expected to increase the students’ social sensitivity towards coral reef conservation issues, especially on Tidung Island. Tidung Besar Island is the largest of the six islands in Kelurahan Pulau Tidung. Its 50.13 ha land area supports a population of approximately 4,391, consisting of 1,128 households. The coral reef ecosystem is one of the sources of livelihood for the Tidung Island people who work as tourism service providers and fishers. The use of the coral reef ecosystem has had an impact on the survival of the coral reef and other biota in the ecosystem. The condition of the coral reef in Tidung Island is moderately damaged with a live coral coverage between 21.41% and 30.19%. In managing the Tidung Island environment, especially the coral reef, collaboration is required between many parties including law enforcers and the community, including students living in the Tidung Island environment.

RESEARCH METHODOLOGY

Study Location and Time

This study was conducted on October 20-21, 2017 on Tidung Island, Kepulauan Seribu, DKI Jakarta.

Research Method

The research method used by the author was a quasi-experimental method. The method of research was to solve the problem in a planned and meticulous way with the intent of obtaining facts and conclusions in order to understand, explain, predict and control the situation. Quasi-experimental design was used because it was difficult to get a control group in this study.
Research Design

The design in this study was a one group pretest-posttest. The test was administered to the samples twice. The first assessment (pretest) was conducted on samples selected from a certain population. Then intervention was made or a program was conducted on the entire population. Next, the second assessment (posttest) was conducted on the same population.

TABLE 1. The design of this study was a one group pretest-posttest

<table>
<thead>
<tr>
<th>Pretest</th>
<th>Treatment</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>O₁</td>
<td>X</td>
<td>O₂</td>
</tr>
</tbody>
</table>

Notes:
O₁: pretest before the treatment
O₂: posttest after the treatment
X: treatment on the experiment group

Sampling Technique

Samples were taken using a random sampling technique. Samples consisted of 32 SMKN 61 Jakarta students from four majors, namely 12 students from the Marshland and Marine Fishery Agribusiness major, seven students from the Fishing Vessel Nautical major, seven students from the Accounting major and six students from the Office Administration major.

Research Instruments

Research instruments were used to measure the variable studied, which was the SMKN 61 Jakarta student’s social sensitivity towards coral reef conservation. These instruments used the Likert scale with scores for each option, for instance “Strongly Agree” = 2, “Agree” = 1, “Not Sure” = 0, “Disagree” = -1 and “Strongly Disagree” = -2 for positive statements. On the other hand, negative statements were the opposite.

TABLE 2. Instrument framework for students’ social sensitivity

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Statement points</th>
<th>Number of points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Realize the function and benefits of coral reef for life.</td>
<td>1, 3*, 6*, 16, 15*, 18*, 28, 36*</td>
<td>8</td>
</tr>
<tr>
<td>Understand the definition and purpose of coral reef conservation.</td>
<td>2*, 7, 10, 26, 14*, 20*, 33*, 35</td>
<td>8</td>
</tr>
<tr>
<td>Identify environmental issues that cause damage to the coral reef.</td>
<td>4*, 5, 9, 11*, 13, 22, 31, 40</td>
<td>8</td>
</tr>
<tr>
<td>Suggest solutions for environmental issues that cause coral reef damage.</td>
<td>17, 27*, 24, 19*, 25, 32*, 37*</td>
<td>8</td>
</tr>
<tr>
<td>Conduct coral reef conservation activities.</td>
<td>8*, 12*, 21*, 23*, 34, 38, 39*</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

Data Collection Technique

Data were collected through filling a questionnaire that was given before and after the study. The questionnaire used social sensitivity instruments, containing 19 question points out of the 40 points that had been tested for validity.
Data Analysis Technique

Data analysis was conducted by validity and reliability tests using the Pearson product-moment and Cronbach’s alpha correlations. After that, the samples were tested for normality using the chi square and tested for homogeneity using the F test. If the samples were normal and homogenous, they were tested further using the t-test.

Hypotheses

\[ H_0: \mu_1 - \mu_2 = 0 \]
\[ H_1: \mu_1 - \mu_2 \neq 0 \]

Notes:

\( H_0: \) coral reef conservation education has no effect on the students’ social sensitivity to coral reef conservation.
\( H_1: \) coral reef conservation education has an effect on the students’ social sensitivity to coral reef conservation. 
\( \mu_1: \) the students’ average social sensitivity score after the coral reef conservation education.
\( \mu_2: \) the students’ average social sensitivity score before the coral reef conservation education.

RESULTS AND DISCUSSION

Based on the data analysis and hypothesis test, the t-score was 3.174. This value was greater than the t-table (df = 31, \( \alpha = 0.01 \)), so \( H_0 \) was rejected. This means that the coral reef conservation education had an effect on the students’ social sensitivity to coral reef conservation.

<table>
<thead>
<tr>
<th>Test</th>
<th>N</th>
<th>D</th>
<th>D'</th>
<th>t-count</th>
<th>t-table (Dr=31 ( \alpha = 0.01 ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preetest</td>
<td>32</td>
<td>80</td>
<td>80</td>
<td>3.174</td>
<td>2.457</td>
</tr>
<tr>
<td>Postest</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Description: \( N \)=number of sampel, \( D \)= posttest value difference and pretest

During the learning process, the students were conditioned to independently observe and analyze the conditions in the surrounding environment that could influence the survival of the coral reef with the facilitator as a guide. Together with their group, the students transplanted coral and observed the condition of the coral reef they found. These things helped the students determine the issues that influence the coral reef and to suggest solutions as a result of this activity. Activities where students build and assemble knowledge, consider alternatives, are involved in research, investigations, writing, detailed analysis and effective communication with the public have a positive effect on the learning process. The use of media such as pictures, videos and charts in delivering the concept of coral reef conservation can increase the students’ interest so that they could understand the materials more easily. Conservation education is considered a co-curricular education with a new configuration system, which is a series of ideas and creativity-filled learning models with more factual and innovative methods and media. Conservation education is a nonformal education setting that functions as a complement, supplement or substitute. Environmental awareness in students as a part of the community is the initial step towards community empowerment. The adolescents’ awareness of environmental conservation is an early investment for building the community’s awareness of the essence of life and a more educated community life pattern.\(^{13}\)

Vocational school students are in their adolescent years. Adolescents are social beings who must understand and follow the values, norms and rules in the society, which also include caring for the environment. Conducting coral reef environmental conservation efforts to build a responsibility toward the environment is the adolescents’ duty and responsibility. Adolescents who do not understand their developmental responsibilities in the society will lead to delinquency, such as damaging the environment around them.

Through co-curricular learning in vocational schools, the students will have their horizons expanded and their mental attitude and social actions guided through more flexible methods, such as contextual teaching and learning, and more appropriate media, the coral reef itself and an environment and community that are concerned with the preservation of the biophysical environment. The students must be aware of their developmental duty in community
life, including preserving the environment. The human population depends on its biophysical environment for its survival.\textsuperscript{14} The application of conservation education to early-age students could nurture values and students’ attitudes towards conservation efforts. The design of conservation education must be adjusted to the purpose of the activity and must use appropriate approaches, methods and strategies.\textsuperscript{15} For instance, interactive lectures or role-playing could be employed if the target for the conservation education is junior or senior high school students. The conservation education method should be adjusted to the students’ age level, for example through stories, coloring and hands-on demonstrations. In addition, outdoor activities such as beach walks, storytelling and direct experience caring for mangroves and clarifying water gives the students novel experiences.\textsuperscript{16}

\begin{figure}[h]
\centering
\includegraphics[width=0.5\textwidth]{chart.png}
\caption{Students’ pretest (a) and posttest (B) social sensitivity score data.}
\end{figure}

**CONCLUSION**

The results of this study demonstrated that coral reef conservation education had an effect on the students’ social sensitivity to coral reef conservation. This could be caused by the conservation education method design, approach and strategy, which were suitable for the predetermined purpose.

**ACKNOWLEDGEMENTS**

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**REFERENCES**