IMPLEMENTATION OF EDUCATION ADDRESSING CLIMATE CHANGE IN INDEPENDENT CURRICULUM FOR TEACHERS

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ABSTRACT

Climate change is a global challenge that impacts various aspects of life, including the education sector. Therefore, teachers play a strategic role in conveying the concepts of climate change mitigation and adaptation to students. This training aims to improve teachers' skills, particularly in understanding climate change prevention strategies that can be implemented in schools. The activity was conducted offline using a lecture method with presenters from within and outside the country. It was attended by teachers from various schools in Jakarta and the surrounding area, allowing participants to directly engage in active discussions with the speakers and other participants. The training's outcomes include improving teachers' understanding of the basic concepts of climate change and mitigation strategies that can be applied in everyday life, encouraging the implementation of environmentally-based learning practices in schools through ongoing mentoring, and developing networks between teachers and educators. This will undoubtedly be even more effective with the support of school facilities and the development of an appropriate curriculum.

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INTRODUCTION

The increasingly uncertain climate conditions are one of the global challenges that have an impact on various aspects of life, including the education sector. Teachers have a strategic role in conveying the concept of climate change mitigation and adaptation to students. Although the Independent Curriculum emphasizes contextual learning and collaborative projects, the integration of climate change education is still minimal. A survey by the Ministry of Education, Culture, Research and Technology (2023) showed that only 40% of teachers in Indonesia understand the basic concept of climate mitigation, and 25% of them have difficulty linking it to the subjects they teach. In fact, UNESCO (2021) stated that climate change education must be a priority to build community awareness and adaptation skills, especially in vulnerable countries like Indonesia.

According to the IPCC (Intergovernmental Panel on Climate Change) report, climate change has caused an increase in global temperatures, changes in rainfall patterns, and an increase in the frequency of natural disasters. In the context of education, an understanding of climate change is becoming increasingly important to be instilled from an early age, especially for educators who are tasked with conveying this information to students (IPCC, 2021).

Several studies have also shown that effective environmental education can encourage changes in students' behavior towards the environment (Monroe et al., 2019). However, at the elementary and secondary school levels, the implementation of Climate Change Education still faces a number of obstacles, including limited relevant teaching materials, minimal training for teachers, and lack of support from the existing curriculum. In many schools in Indonesia, even though the Merdeka Curriculum has been launched, the integration of climate change education is still limited. Data shows that 65% of teachers do not understand how to effectively integrate climate change material into learning, even though UNESCO (2020) emphasizes that education is the key to forming awareness and behavior for mitigating climate change.

Based on the results of observations and discussions with partners, the main problems faced by teachers in teaching climate change include:

1. Low teacher literacy and minimal understanding of the concept of climate change, its impacts, and its relevance to the subjects being taught. Teachers are not accustomed to studying existing curriculum materials with climate issues. The Ministry of Education, Culture, Research and Technology (2022) shows that only 30% of science teachers are

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able to explain the impact of deforestation on carbon emissions. According to the OECD TALIS survey (2022), 65% of teachers in Indonesia have never received special training on climate change education.

2. Limited resources and contextual open materials that are in accordance with the principles of the Independent Curriculum to support environment-based learning. Open materials on climate change tend to be theoretical and do not raise local cases, such as the Jakarta floods, the Sumatra forest fires, or the air crisis in East Nusa Tenggara.
3. Unpreparedness of active learning methods can be seen from teachers who still predominantly use the lecture method, while the Independent Curriculum demands a project-based approach (PjBL) and problem solving.
4. The lack of environmental-based learning practices that can be applied directly in schools due to limited facilities and lack of support from school policies in implementing environmentally-based programs in a sustainable manner. Bappenas (2023) shows that only 15% of schools in Indonesia have routine programs related to climate mitigation, such as tree planting or waste management.

In an effort to overcome these problems, the following are solutions offered to solve the problems faced by partners according to problem priorities:

1. Training on the basic concepts of climate change and procedures for mitigating these conditions for teachers.
2. PPI integration workshop in the Independent Curriculum.
3. Mentoring the implementation of environmental-based learning methods.
4. Creating a network and community of environmentally conscious teachers.

This climate change curriculum implementation training provides several benefits for school teachers and academics, and will undoubtedly have a positive impact on students. The training can enhance teachers' knowledge of climate change and environmentally friendly activities, resulting from question-and-answer discussions and the sharing of experiences between schools. In addition, teachers will receive files containing climate change learning materials based on the Independent Curriculum, be trained in implementing environmentally-based learning strategies in the classroom, and expand their networks by establishing a digital community to share best practices.

LITERATURE REVIEW

1. Climate Change

Climate change is one of the issues in Education for Sustainable Development (UNESCO, 2019). According to the Law No. 31 of 2009 Concerning Meteorology,

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Climatology, and Geophysics, Climate change is a change in climate caused, directly or indirectly, by human activities that cause changes in the composition of the atmosphere globally and changes in natural climate variability observed over comparable periods of time.

Climate change is a change in the pattern and intensity of climate elements over a comparable period of time (usually a 30-year average). Climate change can be a change in average weather conditions or a change in the distribution of weather events relative to their average conditions (Aldrian et.al., 2011). Climate change is caused by both internal and external factors. The aspect of attribution of responsibility which is closely related to how individuals view the existence of causal factors of the parties responsible for climate change problems can be seen from two perspectives, namely whether climate change is due to natural factors alone (natural) or the effects of human behavior that is not friendly to nature. This understanding will basically affect the extent to which individuals' beliefs are related to situations that can be controlled or not (Haryanto & Prahara, 2019). According to Nurhayati et al., (2020) explained that the people who feel the most impact of climate change are people who depend on natural conditions for their lives such as farmers.

The main cause of climate change is global warming (Aldrian et al., 2011). The conditions of global warming and climate change that are occurring can have dangerous impacts (Cross & Congreve, 2021). The most critical impact is the one we are currently facing (Kurup, Levinson, & Li, 2021) this condition also occurs at the global level (Shin et al., 2022). According to Morales et al., (2021) This refers to the impact it causes, namely the environmental crisis and threatens the sustainability of life. If it has exceeded its limits, climate change has an irreversible impact on humans and nature for thousands of years (Botella et al, 2022). This condition requires responsible action by all countries and individuals (Kurup et al., 2021). In facing this problem, society needs to be given an understanding that climate change is not a specter to be feared but provides an opportunity to develop and can increase joint adaptive capacity in dealing with it (Aldrian et al., 2011). Climate change has an impact on human life, including economic, social and psychological impacts (Septiani, 2023).

2. Climate Change Education

Climate change has now become a global problem and poses challenges to the environment, so that various countries are becoming increasingly aware of the importance of climate change education (Ratinen, 2021). This shows that education related to climate change is also important. According to UNESCO (2017) the Sustainable Development Goals (SDGs) have also included climate change in their major agenda in an effort to meet current

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needs without reducing the ability of future generations to meet their needs. In line with that, the term sustainable is a concept of human life amidst natural limitations by maintaining a balance of life in three dimensions, namely from the social, economic, and environmental dimensions (Novidsa et al., 2020).

According to Mochizuki & Bryan (2015) advancing the issue of climate change in the context of Education for Sustainable Development (ESD) is very much needed in order to improve students' understanding of the causes and impacts of climate change and readiness to take action to overcome it. Actions to deal with climate change are divided into two, namely adaptation and mitigation. Adaptation action is defined as an effort to manage the unavoidable, so that it does not drag on in the negative impacts of climate change. While mitigation action is defined as an effort to overcome the causes of climate change (Aldrian et al., 2011).

Sustainable education is education that is carried out by emphasizing the ability of individuals or groups to consider the natural and social dimensions in the process of making social, economic and political decisions, so that they can meet current needs without harming future needs (Ermenc & Niemczyk, 2022). Individuals must also be empowered to do so, acting in complex situations in a sustainable manner. Knowledge about climate change needs to be taught to students in schools resulting in the development of an integrated and collaborative climate change-based curriculum (Siegner & Stapert, 2020). The development of teaching materials based on Education for Sustainable Development (ESD) can also be used in learning (Almualimah et al., 2022). In reality, until now, with various curriculum products and education systems, they have not succeeded in building awareness among students and parents regarding the importance of climate change and the environment (CNN, 2021).

Traditionally, climate change has only been discussed in the natural sciences, especially biology and geography. However, to understand the implications of climate change and encourage responsive action to climate change, it is also necessary to understand other sciences. Integrating multidisciplinary climate change education into schools is a challenge, as many teachers still view climate change narrowly, primarily as an issue related to natural sciences (Aarnio-Linnanvuori 2016). Several studies have found that teachers' knowledge of climate change is still lacking and fragmented, and that teachers have many misconceptions (Ratinen 2016). Therefore, training is needed for teachers to improve their understanding of climate change.

MATERIAL AND METHOD

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The implementation of international community service is an integral part of community empowerment efforts in order to improve the quality of life and support sustainable development. The purpose of this service is to improve teachers' understanding of the basic concepts of climate change and mitigation strategies that can be applied in everyday life, explaining the strategy for integrating climate change-related learning in the independent curriculum. The method of implementing this service program is designed so that the solutions offered can be applied systematically, measurably, and sustainably. The method of implementing this service consists of several stages, including socialization, training, application of technology, mentoring and evaluation, and program sustainability. Each stage is carried out by paying attention to the local context, so that the solutions provided can really touch the needs of teachers in schools. This stage will be described in more depth below.

1. Stages of Implementing Community Service

a. Socialization

Socialization is a very important initial stage to ensure that teachers who are partners understand the program to be implemented, as well as the benefits that will be obtained from the program. This stage aims to build awareness, gain support from all participants and related parties, and ensure active participation from target partners. The Socialization steps are carried out through: (1) Identification of Stakeholders, for example by identifying target partners who are relevant to the problem to be solved, in this activity the partners are teachers at DKI Jakarta State Senior High Schools who have implemented the independence curriculum and have learning related to climate change prevention for school students; (2) Socialization Meeting, namely by holding an open meeting with DKI Jakarta State Senior High School teachers, including other stakeholders, to explain the objectives, benefits, and how to implement the program. Furthermore, (3) Distribution of Socialization Materials by distributing materials containing information about the program, how to participate, and the activity schedule. This material can be in the form of brochures, posters, or using social media that can be accessed by the wider community.

b. Training

The training aims to improve teachers' understanding of the basic concepts of climate change and mitigation strategies that can be integrated with the implementation of learning in schools according to the Merdeka curriculum. The training will focus specifically on one of the sustainable development goals (SDGs), especially point number 13, namely Climate Action.

The steps in this training include: (1) Selection of Training Materials: Based on the results of

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the problem analysis, the training materials are adjusted to the needs of the partners. For example, the basic concepts of climate change, strategies for dealing with climate change, learning methods related to climate change for students at school, and others; (2) Arranging a training schedule by arranging training times so as not to interfere with the main activities of teachers at school, taking into account free time, for example carried out on weekends; and (3) Providing competent facilitators, so that the training is guided by facilitators who have expertise in the relevant field. In this training there are 2 speakers from national and international sources.

c. Application of Technology

The application of technology aims to improve the efficiency and quality of activities carried out by target partners, especially in overcoming the problems faced. The technology applied is adjusted to the level of partner needs. Steps for Implementing Technology are: (1) Identifying the Right Technology: Choose technology that is relevant and easy to implement, for example the use of learning media that will be applied in class in delivering material to students; (2) Demonstration and Direct Practice, namely providing practical training when climate change occurs, so that it can be applied directly in everyday life; (3) Provision of Supporting Tools and Infrastructure: If necessary, the community service team will help provide the necessary tools.

d. Mentoring and Evaluation

Mentoring aims to ensure that the training and technology implemented are running according to plan and have a positive impact. Evaluation is carried out to measure the results that have been achieved and identify areas that need improvement.

The steps in this mentoring activity are carried out through: (1) Ongoing Mentoring which is carried out after the training, by means of the community service team continuing to assist the teachers who are the targets of the training through regular meetings to provide further guidance. This mentoring will also include monitoring the implementation of solutions and identifying problems that arise; (2) The community service team conducts periodic evaluations of the achievement of the desired results. This includes evaluating the learning process, or the level of participation and learning outcomes from the material presented, especially related to climate change.

e. Program Sustainability

Program sustainability is the main key to ensuring that the benefits obtained by the State High School teachers can continue to be felt after the program is completed.

Sustainability steps are by forming Groups and organizing the teachers into a group that can

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continue to collaborate after the program is completed. Thus, it can develop networks between teachers and academics to share best practices in teaching Climate Change Education.

2. Partner Participation in Program Implementation

Partner participation is a very important aspect in the implementation of this community service program. Partners will be involved in every stage of the activity. From the socialization stage to the sustainability of the program, they will be given the opportunity to contribute actively. Partners will be involved in selecting the right target group according to the objectives of the implementation of this training program. All partners play an active role in the training and application of the technology taught, as well as providing feedback on the challenges they face. In addition, partners will also play a role in forming groups or discussion forums that will continue after the program is completed.

3. Evaluation of Program Implementation and Sustainability

Evaluation is carried out at each stage to measure the results achieved and to ensure that the program provides significant benefits to target partners. This evaluation involves collecting data before and after the implementation of the activity, as well as feedback from partners about the impact they feel. This evaluation is carried out qualitatively and quantitatively using survey methods, interviews, and direct observation to assess the level of success. Furthermore, based on the evaluation results, the community service team will provide recommendations for improving or adjusting the program to make it more effective.

RESULT AND DISCUSSION

This international community service activity aims to improve the understanding of teachers in high schools in the DKI Jakarta area regarding the basic concepts of climate change and mitigation strategies that can be applied in everyday life, encourage the implementation of environmentally-based learning practices in schools, provide ongoing mentoring, and develop networks between teachers and educators to share best practices in teaching Climate Change Education.

This activity was carried out through cooperation from several community service groups. All committees from each group played an active role starting from the preparation stage, committee meetings, to organizing training events.

The activities carried out by the committee were in the form of workshops filled by speakers from each group with different training topics, but complementing each other and related to each other. Before the main activity took place, the service team carried out the event preparation process. The event preparation process consisted of preparing the venue, registering participants. In the initial session, the speaker presented the material.

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Figure 1. Presentation of material by the speaker

The material is delivered in the form of practical directions that can support teachers' abilities in implementing education related to climate change that can be related to everyday life. So that it is easy for students to understand and can be implemented in the activities they do. Furthermore, the explanation related to the material was deepened through interactive discussions and questions and answers by participants. The final part was closed with a question and answer session by enthusiastic participants, as seen from the many enthusiasm for Q and A and the atmosphere of life during the training.

In addition to Q&A between participants and speakers, in this training, teachers from different schools can also share their experiences in their respective schools in implementing climate change mitigation education and environmentally friendly student creativity activities. For example, there are schools that practice making traditional herbal medicine from natural ingredients to produce a product that has a selling price. There are also other schools that make flower vase crafts from used goods and others. So from this training, teachers can communicate with each other and build relationships.

CONCLUSION AND RECOMMENDATION

This community service program aims to improve teachers' understanding of the implementation of climate change education in schools. This initiative has significantly enhanced the skills of teachers trained in public high schools around Jakarta in understanding how to effectively deliver climate change education to students. This was evident in the teachers' enthusiasm during Q&A sessions and sharing experiences related to their practices in several schools. This included examples of environmentally friendly daily activities and

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students' practical experiences in creating environmentally friendly products by utilizing natural resources found in their homes and schools, creating products with market value and that can be sold to the community.

However, the implementation of this climate change curriculum faces challenges due to the lack of standardized guidelines, which significantly vary in the way teachers implement it in schools, depending on their individual creativity. Furthermore, a lack of awareness about environmental stewardship is also a challenge. Although teacher awareness has increased, continued support is needed to maintain implementation in the classroom. Future programs should also include student engagement and parent engagement modules so that the material can be easily conveyed and supported by students and parents, so that many parties play an active role in helping to achieve environmental sustainability as one of the practices in mitigating climate change that is occurring.

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