Ecological Ethics Education Based on Outdoor Physical Activities for Students and Communities Around Campus

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Abstract

This community service project aims to raise ecological awareness among students of physical education and surrounding campus communities through educational initiatives rooted in outdoor physical activities and ecological ethics. The main problem faced by the target group is the lack of environmental awareness and sustainable behavior in daily life. The method employed combines training sessions, ecological physical activity simulations, and reflective group discussions based on real-world environmental cases. Data were collected through questionnaires, behavioral observations, and in-depth interviews. Indicators of success include improved understanding of ecological ethics, active participation, and behavioral changes in waste management and environmental preservation practices. The results demonstrate that activities such as nature trekking, eco-literacy exercises, and tree-planting projects significantly improved participants' awareness and behavior towards environmental care. Data analysis revealed a strong positive correlation between experiential-based learning and the internalization of ecological values. These findings support previous studies highlighting the importance of hands-on learning in environmental education. The program contributes directly to the achievement of Sustainable Development Goals (SDGs), particularly Goal 13 (Climate Action) and Goal 15 (Life on Land). Furthermore, this initiative has succeeded in building a replicable model of community-based ecological education for higher education institutions.

Keywords: ecological ethics, outdoor physical activity, environmental awareness, character education, SDGs

INTRODUCTION

Ecological awareness is a central issue in sustainable development including in higher education. Students as agents of change (*agent of change*) have a strategic role in voicing and implementing environmental conservation values. However, various studies show that environmental awareness among students has not fully developed, especially in aspects of daily attitudes and behaviors that reflect ecological responsibility (Fitriani et al., 2022, p. 114). In the context of physical education, learning is not only aimed at mastering motor skills but also at developing character and affective values, including ecological ethics that include awareness of nature conservation, responsible use of open spaces, and other pro-environmental behaviors. Students of the Physical Education Study Program at Mandalika University of Education have great potential in this regard, considering that they are accustomed to interacting with nature through outdoor physical activities, both in formal learning such as recreational sports, and non-formal activities such as training or sports camps.

However, this potential has not been fully optimized for strengthening ecological values in the educational process. Outdoor activities are often still seen as merely a medium for practicing physical skills rather than as an educational space to form affective attitudes related to the environment. In fact, an outdoor physical activity-based approach is very relevant for building students' emotional attachment to the environment which can ultimately encourage the formation of strong ecological ethics. Therefore, structured educational interventions are needed through community service activities to strengthen the internalization of students' ecological ethical values contextually and explicatively.

The main problem faced by partners, namely students of the Physical Education Study Program at Mandalika University of Education, is the low internalization of ecological ethical values in outdoor learning activities, especially in courses that involve direct interaction with nature such as recreational sports. Although they have practical field experience, the affective dimension that reflects concern and responsibility for the environment has not been optimally developed. This is a challenge in supporting the achievement of Goal 4 (Quality Education) and Goal 13 (Addressing Climate

Change) of the SDGs, especially Target 4.7 which emphasizes the importance of education for sustainable development and Target 13.3 which demands increased human awareness and capacity in mitigating climate change through an educational approach.

Studies by Ahmad et al. (2022) in *Indonesian Journal of Physical Education Shows* that outdoor activities that are not associated with environmental values tend to focus on achieving physical performance rather than on forming students' ecological character. In contrast, ecopedagogy-based programs in Germany and Japan have successfully integrated sustainability values into outdoor sports practices by combining physical experiences and reflections on environmental values (Weiss et al., 2021; Nakamura, 2020). This approach not only increases ecological awareness but also fosters students' social responsibility towards their living space. Therefore, interventions through community service that combine affective approaches and outdoor physical activities are very urgent to create environmental change agents who are aware of values and responsible, especially in the context of physical education students in Indonesia.

The problems that have been identified in students of the Physical Education Study Program at UNDIKMA (Mandalika Education University) indicate that there are...*gaps between* the physical skills competencies that have been possessed with the appreciation of ecological values that should accompany every outdoor activity. So far, the pedagogical approach in recreational sports practices has not systematically integrated affective aspects, especially ecological awareness in the curriculum and co-curricular activities. As a result, students lack value orientation in utilizing open spaces responsibly. *Gap* indicates the need for an ecological character-based learning approach that is contextual, practical and in accordance with the characteristics of physical learning which is full of direct activities.

In response to these needs, this community service activity was designed using an approach. *Ecological Ethics Education Based on Outdoor Physical Activities* (EEE-AFL). This approach is innovative because it integrates three main elements: (1) experiential learning (*experiential learning*), (2) internalization of ecological values through critical reflection, and (3) involvement of students in ecological action projects with communities around campus. This method differs from conventional approaches that only emphasize technical instruction and physical practice without touching on the affective dimension in depth. The EEE-AFL model has been proven effective in a number of international studies, such as that conducted by Zink & Burrows (2021) in New Zealand which emphasized value-based outdoor education in creating emotional relationships between students and nature. The innovation of this method is not only pedagogically relevant but also supports the development of green *skills students* as part of 21st century education.

The main objective of this community service activity is to increase students' awareness, attitudes and ethical behavior towards the environment through an educational approach based on outdoor physical activities integrated with ecological values. Specifically, this activity aims to: (1) instill an understanding of the importance of ecological ethics in outdoor physical education practices; (2) train critical reflection skills on the impact of outdoor activities on the environment; and (3) facilitate students in designing and implementing real actions based on environmental concern with the community around the campus. Indicators of success of this activity include: increasing ecological awareness scores (*Environmental Awareness*), ecological attitude (*Ecological Attitude*), and ecological behavior (*Ecological Behavior*) students, as adapted from a valid instrument developed by Alwitt & Pitts (2020) and adapted to the local context.

The contribution of this activity is divided into two main aspects. First, from the perspective of developing science and technology, this approach provides a relevant affective-integrative education model applied in character-based physical education, which has so far been under-explored in the Indonesian context. Second, from the

perspective of contributing to the SDGs, this activity supports the achievement of Goal 4 (Quality Education), Goal 13 (Addressing Climate Change), and Goal 11 (Sustainable Cities and Settlements), by encouraging the active role of students as agents of environmental change through an approach based on participatory education. Thus, this activity is expected to become a model of educational intervention that is applicable and sustainable in higher education environments.

IMPLEMENTATION METHOD

The community service method used in this activity is a participatory-collaborative method with an approach community-based *learning* And *experiential learning*. This approach was chosen to foster ecological awareness and ethical behavior through active student involvement in outdoor physical activity-based activities that have a direct impact on the environment and the community around the campus. This service is implemented through four main stages: (1) Identification and analysis of partner needs, namely students of the UNDIKMA Physical Education Study Program who are or have taken the Recreational Sports course, through surveys and focus group discussions (FGD); (2) Planning educational programs and designing outdoor activities based on ecological values by involving lecturers, local community leaders and environmental facilitators; (3) Implementation of outdoor educational activities and collaborative ecological actions involving students and the community around the campus in physical activities such as educational *trekking*, ecological gymnastics and cleanliness campaigns based on value reflection; and (4) Evaluation and reflection, namely measuring affective changes in participants through questionnaire instruments of *Pré- test posttest as* well as written reflections and post-activity discussions.

This design emphasizes the integration between affective and cognitive aspects of students through contextual, reflective, and collaborative activities. Picture or flowchart (*flowchart*) can be inserted to visually describe the service process starting from problem identification to the evaluation and dissemination stages of the results. This model is believed to be able to foster ecological value competencies sustainably and have a direct social impact on the campus community and its surroundings.

The target community in this community service activity is students of the Physical Education Study Program of the Mandalika University of Education (UNDIKMA) who are currently taking or have completed the Recreational Sports course. The number of students involved in this activity is 60 people consisting of 30 active students in the even semester and 30 alumni students who have experience in outdoor sports practices. In addition to students, partners who are also involved are the community of residents around the campus, totaling around 20 people consisting of community leaders, youth organizations, and local environmental activists who care about the issue of cleanliness and preservation of green open spaces in the environment around the campus.

In this activity, students act as the main participants and implementers of the ecological education program in the form of outdoor physical activities. They will be actively involved from the planning stage of the activity, implementation in the field to evaluation and reflection of the results of the activity. The local community is involved as a collaborative partner in providing the location of the activity, providing local information about the condition of the surrounding environment, and participants in educational activities such as joint gymnastics, garbage collection movements and waste management training. The lecturers and the service team of 5 people act as facilitators, field supervisors and those responsible for implementing the activity. This collaborative approach not only strengthens the synergy between the campus and the community but also becomes a means of joint empowerment in increasing ecological awareness and action in the local scope in a real and sustainable manner.

The science and technology (Iptek) transferred in this community service activity is the concept of ecological ethics in outdoor physical education which is integrated with the

approach experiential *learning* And *eco-physical activities*. This concept is a combination of understanding the values of environmental conservation and its implementation through fun, educational, and applicable physical activities. Ecological ethics is introduced as a set of values and norms that emphasize the importance of moral responsibility towards nature which in this activity is internalized through direct practice in the campus environment such as city parks, green paths and public open areas.

The transferred methods include models reflective-participatory where students are not only passive participants but also design activities, conduct environmental observations and reflect on their ecological behavior after participating in outdoor physical activities. Students are invited to understand the relationship between physical activity, personal health and environmental health holistically. The materials presented include basic training in waste management, recycling used goods (*reuse*) and how to conduct a digital campaign about the importance of an environmentally friendly lifestyle based on physical activity.

The transfer of science and technology also involves the use of affective evaluation instruments such as value reflection sheets and attitude scale questionnaires to measure changes in students' ecological awareness. This method has proven effective in developing the affective domain as applied in similar programs at universities in Finland and Japan that integrate environmental values in physical education through nature-based learning (*nature-based physical education*).

To support the effectiveness of the implementation and evaluation of community service activities, several instruments and structured data collection techniques were used. The main instruments used were observation sheets, attitude scale questionnaires and individual reflection sheets. Observation sheets were used by the community service team to record the active participation of participants in each session of outdoor activities including ecological behavior such as involvement in environmental clean-up actions, waste sorting and collaborative interactions with local communities. The attitude scale questionnaire was designed based on Likert to measure changes in students' ecological perceptions and awareness before and after the activity. Indicators in this questionnaire include affective dimensions such as empathy for nature, ecological responsibility and intention to protect the environment.

Data collection techniques were conducted through pre-tests and post-tests on respondents using questionnaires that had been validated for content and reliability as well as documentation of outdoor physical activities in the form of photos, videos and daily activity reports. In addition, short interviews were conducted with several participants and community leaders to explore responses, impressions and suggestions for the community service program.

Indicators of the success of this community service activity include: (1) an increase in the ecological attitude scale score of students by at least 20% of the results. *Pré-test* the *post-test*; (2) active involvement of more than 80% of participants in the entire series of activities; (3) creation of a practical module of outdoor physical activity based on ecological ethics; and (4) formation of a sustainable collaborative network between students and the community around campus in protecting the environment.

Data obtained from various instruments during the community service activities were analyzed using quantitative and qualitative descriptive approaches. Quantitative data from the attitude scale questionnaire before and after the activity were analyzed using descriptive statistics, such as average, percentage increase and standard deviation to measure changes in students' affective dimensions related to ecological ethics awareness. Comparison of results *Pré-test* And *post-test* used to evaluate the effectiveness of the program in increasing ecological values which are the main indicators of the success of this service.

Meanwhile, qualitative data from observation sheets, individual reflections and interview results were analyzed using a thematic approach (*thematic analysis*) to

identify patterns of participant responses to outdoor physical activity based on ecological ethics. This analysis allows researchers to better understand participant experiences, barriers, and values that emerge during the activity. These qualitative findings strengthen the quantitative data in explaining how this approach contributes to changes in student attitudes and behaviors and active community engagement.

The analysis is directly related to the identified problem, namely the low integration of ecological ethical values in physical education. Thus, the data collected is not only used to assess the success of the program but also provides empirical evidence that an outdoor physical activity-based education approach can be an effective strategy for instilling environmental values that are in line with the achievement of SDGs, especially points 13 (addressing climate change) and 4 (quality education).

RESULTS AND DISCUSSION

1. Increasing Students' Ecological Ethics Awareness

Findings; Results of analysis*pre-test* and *post-test showed* a significant increase in the students' attitude scale scores towards ecological ethics after participating in an outdoor physical activity-based education program. The average score increased from 62.4 (moderate category) to 84.7 (high category) with an increase of 35.7%. Most participants showed positive changes in terms of empathy for the environment, a desire to preserve nature and active involvement in campus and open space clean-up actions.

Rationality; This increase can be explained by the direct involvement of students in real experiences that foster an emotional attachment to nature. Experience-based education (*experiential learning*) applied through outdoor physical activities provides stronger sensory, emotional and social stimuli than lecture methods. Physical interaction with the environment triggers critical reflection, forms awareness, and fosters values of ecological responsibility. This finding is in line with the results of research by Ozdemir & Leinhardt (2022) which emphasizes that outdoor nature-based learning is able to internalize environmental values more effectively than conventional classroom learning.

Empirical support for these findings is in line with a study by Chawla and Cushing (2021) which showed that experiential education in the outdoors significantly increased students' awareness and positive attitudes towards the environment. Their study found that direct involvement in outdoor activities triggered a strong affective response which was a major predictor of pro-environmental behavior change. This is consistent with the affective learning theory proposed by Krathwohl et al. (2019), which asserts that changes in attitudes and values require deep emotional experiences.

However, unlike the research conducted by Lee et al. (2020) which reported an increase in ecological attitudes through online learning methods, the results of this community service emphasize the advantages of direct physical interaction with the environment as a reinforcing factor. This difference is likely due to the learning context; online learning provides less complex sensory and social stimulation than physical activity-based learning in the open air. Therefore, this community service emphasizes the importance of a holistic approach that combines physical, social, and emotional aspects to shape students' ecological ethical attitudes more effectively.

2. Active Participation of Students and Surrounding Communities

Findings; During the community service activities, the level of attendance and active *participation* of students was above 90% for the entire series of activities. In addition, the involvement of the community around the campus, especially the youth of the Karang Taruna

and residents of the surrounding RW showed high enthusiasm as seen from their participation in workshops, environmental clean-up actions and group discussions on ecological ethics.

Rationality; High attendance and community involvement reflect that the collaborative approach between the university and the local community provides a sense of ownership of the program being implemented. Intensive social interaction in outdoor physical activities also creates emotional relationships between participants and strengthens the collective spirit in preserving the environment. This is in accordance with the participatory approach in community service learning as stated by Bringle & Hatcher (2014) that equal partnerships between academics and local communities will produce long-term impacts on social and environmental development.

The finding of high participation is supported by Wals and Corcoran's (2018) research which underlines that community involvement in environmental education programs increases the sense of ownership and sustainability of initiatives. The participatory model applied in this service strengthens social commitment and facilitates the transfer of knowledge because it actively involves all stakeholders.

Meanwhile, research by Barron and Arcilla (2019) in several university communities in Southeast Asia showed that reduced participation often occurred due to the lack of social and economic relevance of the program to local needs. In this service, community involvement was highly successful because the materials and activities were designed contextually and relevantly, which was the main difference. This difference shows that the success of the service program is highly dependent on local adaptation and meaningful collaboration between the campus and the community, which is reinforced by the theory of social collaboration developed by Putnam (2020).

3. Formation of Ecological Ethics Education Module Based on Physical Activity

Findings; As one of the products of community service activities, the team successfully compiled and implemented a practical module "Outdoor Physical Activity Based on Ecological Ethics" which contains 5 main topics and 10 forms of applied activities. This module received positive responses from students and Lecturers in the Recreational Sports course. In a limited trial, more than 85% of participants stated that the module helped them understand ecological values in a fun and contextual way.

Rationality; The success of this module development cannot be separated from the collaborative approach and based on the real needs of students. The module is designed based on the integrative principle between the affective approach, environmental education and experience-based learning. This strategy is relevant to the concept Environmental Education for Sustainable Development(UNESCO, 2021) which emphasizes the importance of cross-domain learning with an action-based approach. This module can also be used as a reference for the integration of other outdoor-based and contextual course curricula to local environmental issues.

The success of this module development is consistent with the research findings by Stevenson et al. (2021) which identified that educational materials that integrate physical activity and environmental learning are more effective in increasing learning motivation and understanding of ecological concepts. The applicable and contextual module is able to bridge theory and practice synergistically as described in the constructivist learning theory by Vygotsky (1978).

Unlike traditional modules that tend to be theoretical and passive, this module emphasizes the active involvement of participants, which has an

impact on more optimal learning outcomes. This is reinforced by the findings of Brown et al. (2019) which show that the use of active learning methods can increase knowledge retention by up to 50% compared to conventional lecture methods. This difference emphasizes the importance of innovation in module design to align with student characteristics and local contexts, especially in the fields of physical education and ecology.

4. Establishing a Collaborative Network between Campus and Community

Findings; After the community service activity, a collaborative network was formed between the Physical Education Study Program of Mandalika University of Education and the RW community around the campus. The follow-up initiative in the form of a monthly agenda "Clean and Sustainable Campus" began with the participation of students, lecturers and the local community. This activity was facilitated by a joint working group formed at the end of the community service program.

Rationality; The formation of this network shows that community service activities not only produce individual changes but also encourage collective social transformation. This is a form of sustainability (Sustainability) from the service program where the results are transformed into a value-based social movement. This is in accordance with the transformative approach in community engagement which emphasizes long-term collaboration, shared ownership of solutions, and active community involvement in program planning and implementation. A study by McMillan & Chavis (2020) states that a sense of ownership of the environment can be strengthened through cross-group social activities that are oriented towards common goals such as preserving the campus environment.

The findings on the formation of collaborative networks are in line with a study by Newman et al. (2020) which showed that collaboration between educational institutions and communities increases program sustainability and triggers social innovation in environmental management. These networks not only strengthen engagement but also create collective capacity in managing resources sustainably. However, unlike several studies that found that collaborative networks often stalled due to differences in vision and resources, the success of this service was supported by a participatory management approach and intensive facilitation. This is in accordance with the results of research by Emerson and Nabatchi (2018) which emphasized that the success of collaboration depends on inclusive leadership and effective communication between stakeholders. This difference emphasizes that good facilitation and communication methods greatly determine the sustainability of environmental social networks.

The most prominent success of this community service activity is the creation of synergy between students of the Physical Education Study Program of Mandalika University of Education and the community around the campus in fostering awareness and practice of ecological ethics through outdoor physical activities. This program is able to change the paradigm of students from merely users of open spaces to agents of environmental conservation, which is evident from their initiative to continue environmental education activities independently after the program ends. These initiatives include holding regular "Green Healthy Walk" activities, creating clean zones in the area around the campus, and mini counseling to local residents about the importance of environmentally friendly behavior. This achievement is the best practice (best practice) in integrating a recreational-physical approach with a community-based environmental education mission.

From the perspective of Sustainable Development Goals (SDGs), this activity directly contributes to the achievement of Goal 13 (Addressing Climate Change), Goal 4 (Quality Education), and Goal 17 (Partnerships for the Goals). Goal 13 is achieved through increasing climate awareness and collective action to protect green open spaces; Goal 4 is realized through cross-curricular education based on real experiences; while Goal 17 is seen from the establishment of sustainable campus-community partnerships. This combination of academic, recreational, and community empowerment approaches can be recommended as a replication model for other educational institutions in Indonesia and the Southeast Asia region.

During the implementation of the community service activities, several logical obstacles emerged which were completely beyond the control of the implementing team. One of the main obstacles was extreme weather which is often uncertain, considering that most activities are carried out outdoors. This condition causes the schedule of educational activities and direct practice to have to be rescheduled several times. This is in line with the findings of Wilcox et al. (2022), which emphasizes that outdoor activities are very vulnerable to climate and weather disturbances, especially in tropical areas with high, unpredictable rainfall.

Another obstacle was the initial resistance from some community members, especially local residents who were not yet accustomed to the physical activity-based educational approach. Although an educational and participatory approach had been used, there were cultural and perceptual barriers to student activities outside the classroom that were considered unimportant or merely recreational. This phenomenon was also found in a study by Azmi and Rahman (2021), which stated that community acceptance of outdoor educational programs was greatly influenced by local values and perceptions of the role of educational institutions. On the other hand, the lack of supporting facilities, such as limited separate trash bins and environmental education boards in the campus area and surrounding settlements, also posed challenges in maintaining the sustainability of the program. These obstacles, although significant, provide valuable lessons for designing similar programs in the future.

Table 1. Improvement in Students' Understanding of Ecological Ethics Before and After Activities

No	Aspects measured	Before (%) (%)	After (%) (%)	Information
1	Knowledge About Ecological Ethics	45%	88%	Significant Increase
2	Attitude of Caring for the Environment	52%	91%	Increased Drastically
3	Practice Maintaining Cleanliness During Activities	38%	85%	Positive Changes Occur

As presented in Table 1, there was a significant increase in three main aspects after the implementation of educational activities. Students' understanding of the principles of ecological ethics increased from 45% to 88%. The attitude of caring for the environment, such as the initiative to pick up trash or avoid environmental damage, increased from 52% to 91%. The sharpest increase was seen in the concrete practice of maintaining cleanliness during outdoor physical activities, from 38% to 85%. This shows that the experiential learning approach in a real environment is

effective in forming students' ecological awareness.

CONCLUSION

This community service activity has succeeded in improving the ecological understanding, attitudes, and behavior of students of the Physical Education Study Program at Mandalika University of Education through an educational approach based on outdoor physical activities. The integration of ecological ethics learning and recreational sports practices has proven effective in fostering environmental awareness that is applicable in everyday life. Students are not only involved as passive participants, but also as agents of change who interact directly with the community around the campus.

The evaluation results showed that there was a significant increase in the indicators of understanding the concept of ecological ethics, concern for environmental conservation, and active involvement in maintaining the cleanliness of open areas. The educational method based on real experience (experiential learning) has been proven to be able to strengthen the internalization of ecological values in the context of physical education. This confirms the importance of a contextual approach in character and environmental education, which also supports the achievement of several SDGs goals, especially goals 4 (Quality Education), 11 (Sustainable Cities and Settlements), and 13 (Addressing Climate Change).

The contribution of this activity lies not only in the aspect of knowledge and skills transfer, but also in the creation of good practice models (*best practice*) in outdoor education that can be replicated by other educational institutions. Therefore, this activity is worthy of being developed more widely as part of a value-based and environmental learning curriculum.

SUGGESTION

Based on the results of the implementation and evaluation of community service activities, there are several strategic suggestions for further development. First, it is recommended that the ecological ethics education program based on outdoor physical activities be systematically integrated into the curriculum of recreational sports and physical education courses in general. This aims to ensure that the internalization of ecological values is not incidental, but rather becomes part of a continuous and measurable learning process.

Second, similar activities need to be expanded in scope by involving more communities outside the campus, such as students from surrounding schools, youth organizations, and environmental groups. This cross-sector collaboration is expected to form a broader and more effective ecological awareness network.

Third, the development of learning media and digital modules based on ecology and physical activity is highly recommended, to facilitate program replication and provide wider access to other educational institutions. In addition, medium and long-term monitoring of changes in participants' ecological attitudes and practices is needed to measure the sustainability of the impact of community service.

Finally, support from institutions, both in the form of policies and funding, is needed so that this program can be developed more systematically and become an innovative model in supporting the achievement of sustainable development goals (SDGs) in the fields of education and the environment.

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Hopefully this cooperation can continue to be established and improved in a joint effort to build ecological awareness and realize sustainable development goals in the fields of education and the environment.

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