

Environmental Education Program: Enhancing Teacher Educators' Environmental Awareness and Understanding

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Abstract

Environmental issues related to human activities are increasingly becoming a serious concern. One way of preventing them is to promote environmental education in all sectors, starting with the academe, particularly in a teacher education institution. This study assessed the teacher educators' awareness and understanding of environmental education concepts and principles, which served as the basis for developing an environmental education program. It used questionnaires and tests to gather data from teacher educators in a university. Findings show that although they are highly aware of ecological principles, they only have an average understanding of environmental education concepts. The researcher designed an Environmental Education Program for teacher educators using non-threatening adult learning methodologies appropriate for their function as educators of future teachers. Activities in the program include an environmental audit of the teacher educators' immediate work environment, reviewing and clarifying current practices, and implementing solutions to the identified concerns. The experiences enhanced their awareness and understanding of environmental education concepts, which are crucial in their tasks as mentors to future teachers of the next generation of learners.

Keywords: *Environmental Education, Awareness and Understanding, Teacher Educators, EE Program, EE Concepts*

Introduction

As a sector expected to support Philippine Republic Act 9512 (2008), an act promoting environmental awareness through environmental education, the academe should take necessary actions to promote environmental education among its internal and external communities. Through formal, informal, and non-formal delivery modes, educational institutions can raise the community's awareness of ecological issues and partner with their stakeholders in promoting concern for the protection and preservation of the environment (Ibanez et al., 2020, Paraskeva-Hadjichambi et al., 2020). They can undertake capacity-building programs like training and seminars, produce environmental education materials, and design teacher education courses or livelihood programs (RA 9512, 2008). Teacher education programs can capacitate future teachers, who are the most potent human resources to promote environmental education and advocate stewardship among their students (Özonur, 2021). Teacher educators can raise the awareness of future teachers who will contribute to bringing society towards a higher level of ecological awareness and responsibility (Nazarenko & Kolesnik, 2018;). As such,

they must possess the competencies themselves. They must first acquire the necessary knowledge, skills, and attitudes to advocate responsible environmental behavior (El Savada et al., 2021).

Several researchers explored teachers' knowledge and awareness of environmental issues over the last decades. Some of the most recent ones involve preschool teachers, teacher trainees, preservice and in-service teachers. Studies show that the environmental awareness level of preservice teachers is above average (Ozonur, 2021), and they have a positive attitude towards nature and its protection (Orbanic & Kovac, 2021). In-service teachers have difficulty understanding the interconnectedness of environmental elements and lack confidence in their knowledge of concepts (de Sousa et al., 2019). Teacher trainees find the teaching of ecological concepts complex (Tapilouw et al., 2018), while preschool teachers' knowledge and understanding are limited and not associated with environment-friendly behavior (Sali et al., 2015). These point to the need to enhance learning and knowledge through environmental education (Debrah et al., 2021; Nazarenko & Kolesnik, 2018). Most studies, however, focused on preservice and in-service teachers. Very few

researchers examine the teacher educators handling the preservice teachers.

To equip the teacher educators with competencies they can pass on to the preservice teachers, educational institutions need to assess their current competencies and develop an environmental education program to address their competency needs. In the Philippines, Bicol University partnered with the Department of Environment and Natural Resources (DENR) in a research program involving a network of 10 Teacher Education Institutions (TEIs) in the country. One component of the program focused on teacher educators' environmental awareness and understanding of concepts and principles enhanced through an environmental education program. However, this particular study covers only the teacher educators at Bicol University. The study has the following objectives: assess the environmental awareness and understanding of teacher educators; develop an environmental education program (EE program) that considers their awareness and understanding, and determine the effects of the EE program in enhancing their awareness and understanding.

Table 1. Description of Levels of Awareness and Understanding in the Questionnaire

Description of the instrument	Rating
I know and understand this very well	4
I know this well	3
I know this partly	2

Materials and Methods

Research Design. This research on enhancing environmental awareness and understanding of teacher educators is a descriptive study using qualitative and quantitative data-gathering methodologies to attain the research objectives. It used a descriptive research method to describe some attributes of the respondent participants and describe a phenomenon (Sahin & Mete, 2021).

Locale and Participants. The study took place in Bicol University College of Education, the primary teacher education unit of the university, for one semester in 2016. The study involved 32 teacher educators selected through purposive sampling using the criteria that all must be teaching professional and specialization courses in the teacher education programs for that semester (Taherdoost, 2016). There were 38 of them initially. However, six (6) could not

complete the study participation due to retirement, approval of study leave, designation in other offices, and illness. The characteristics of those who did not participate do not systematically differ from the final sample, eliminating the sampling bias (Rioux & Little, 2021).

Research Instruments. The researcher used three instruments: a questionnaire and test to assess environmental awareness and understanding, an audit checklist, and a focus group discussion guide. The assessment tool for environmental awareness and understanding has two parts: a self-assessment questionnaire and a test. Literature and studies on environmental awareness, like those of Mei et al. (2016) and Altin et al. (2014), informed the design of the assessment instrument used in the study. Part I (self-assessment questionnaire) has 15 statements related to environmental principles. For each given information, the respondents have to assess their level of awareness and understanding based on the descriptions in Table 1:

Part II of the instrument is a 25-item multiple-choice test with four plausible answers. It includes items related to environmental laws, challenges and problems, waste management practices, environmental protection and stewardship, and sustainable development. The researcher developed the test items taking ideas from Sarsour et al. (2015) for the format and the materials from DENR for the content. Professors from the university who were not involved in the program did the content validation of the instrument.

The researcher also prepared the tool for the environmental audit. It is a checklist of environmental conditions and practices on the campus. The teacher educators had to assess them for compliance or non-compliance with ecological principles and sustainable practices. The considerations for the environmental audit are the following elements: concern for safety, natural resource conservation and mitigation, energy conservation and use of renewable resources, and waste reduction and management. The environmental audit of facilities (Part I) covered the classrooms, offices, laboratory rooms, comfort rooms, grounds, library, faculty rooms, dormitory, corridors, home economics building, waste disposal facilities, and canteens. The audit of practices (Part II) covered material resource conservation, energy conservation, and waste management. Aside from the columns to check for compliance or non-compliance, there is also a provision for remarks or observations. The third instrument is a guide for the focus group discussion. It

is composed of five questions focusing on gathering the following information: insights about the experience as a participant in the EE program, the learning derived from the experience, ideas on applying new knowledge in practice, ideas on promoting environmental education among preservice teachers, and identifying good practices and areas needing further enhancement of the EE program. The project leader in the university-wide research checked all these researcher-made instruments.

Research Implementation. A month after the opening of classes in the semester, the identified respondents accomplished the assessment instruments. The researcher did an item analysis, and the result served as one of the bases for designing an environmental education program for teacher educators. Other bases in crafting the EE program are the role expectations for educators (UN SDG, 2012), literature on andragogy, and the context of the TEI. In a workshop with all researchers in the university-wide research program, the initial draft of the EE program was presented and critiqued. The researcher then presented the revised EE program to a panel of evaluators composed of the Vice President for Academic Affairs, the Director of Extension, and one expert from the Department of Environment and Natural Resources, the partner agency of the university in the research program. After coordinating with the officials of the College of Education, the EE program commenced. Activities during the EE program implementation include (1) orientation seminar on environmental education, (2) audit of facilities and practices in the work environment, (3) workshop on review and clarification of current practices, (4) workshop on action planning to address problems identified, (5) implementation of plans by department,

future implementations. The researcher also solicited learning insights from the participants to validate the data obtained from the quantitative assessment.

Data Analysis. In interpreting and analyzing the responses to the self-assessment, the researcher computed the mean rating for each topic and interpreted them based on the ranges presented in Table 2. For the test, mean percentage scores were computed per topic and interpreted as shown in Table 2.

The study included a test of significant difference in the mean rating/scores obtained using a t-test for paired samples interpreted at the alpha level of 0.05. It was to ascertain if the EE program has affected the environmental awareness and understanding of the teacher educators.

For the qualitative data obtained from the environmental audit, experts' evaluation of the EE program, minutes of three workshops and one FGD conducted. The EE program outputs (audit reports, worksheets, long-term and short-term plans), the researcher did a conventional content analysis (Vespestad & Clancy, 2021) and integrated the data in the descriptions of the EE program and the insights of the participants.

As shown in Table 3, the teacher educators consider themselves fully aware or knowledgeable about the environmental principles, with a mean of 3.586 which means that they know and understand the principles very well. However, the computed mean is near the bottom of the range (4.49-5.00), indicating that the understanding could be higher. There is one

Table 2. Interpretation of Ratings and Scores in the Assessment of Environmental Awareness and Understanding

Self-Assessment			Test of Understanding		
Level	Range of Rating	Interpretation	Level	Mean Percent Score	Interpretation
4	3.50 - 4.00	High	4	76 - 100	High
3	2.50 - 3.49	Average	3	51 - 75	Average
2	1.50 - 2.49	Low	2	26 - 50	Low
1	1.00 - 1.49	Very Low	1	0 - 25	Very Low

(6) presentation of outputs or outcomes of the action taken, and (7) workshop on the formulation of policy guidelines, personal and departmental commitment to sustain the practices. At the end of the three-month implementation, the researcher administered the post-assessment and conducted a focus group discussion to identify the good practices, challenges, and areas for improvement in the EE program for adoption in

principle wherein the self-assessed level of awareness is only moderate, i.e., the principle on the finite nature of earth resources. Still, it is only a little below the high level. It indicates that although awareness and understanding are numerically at a high level, there is still expansive room for improvement. The respondents could be familiar with energy conservation measures and environmental campaigns widely disseminated in

Table 3. Level of Awareness and Understanding of Environmental Principles

Environmental Principles	Weighted Mean	Level
1. Nature knows best.	3.56	High
2. All forms of life are important.	3.64	High
3. Everything is connected to everything else.	3.53	High
4. Everything changes.	3.58	High
5. Everything must go somewhere.	3.64	High
6. Ours is a finite Earth.	3.48	Average
7. Nature is beautiful and we are stewards of God's creation.	3.66	High
Overall	3.586	High

schools and offices, print and broadcast media, and even social media. Still, they are not associating those with the finite nature of the earth (Mensah, J. (2019). They may be doing practice, but they may not fully understand the main reason behind it, their significance, or their connection to the environment (de Sousa et al., 2019; Gavrilakis et al., 2017)

On the 25-item multiple-choice test results, the teacher educators obtained a mean score of 16.91, comprising 67.8% of the perfect score. The mean scores per topic are presented in Table 4.

As shown in Table 4, the teacher educators have an average understanding of almost all concepts except environmental challenges and issues, where they got a high level of understanding (80.8%). They have more to learn about waste management (59.5%) and sustainable development concepts (55.6%). Although the teacher educators are fully aware of the issues, as indicated in their self-assessment, doing something to address them was unclear (Sali et al., 2015). The results confirm the vast room for improvement, considering that educators of future teachers should promote environmental responsibility (Ibáñez et al., 2020) and equip them with the necessary knowledge and understanding to establish their authority in the

classroom as they advocate environmental protection and management among their learners (Omoogun et al., 2014).

As shown in Figure 1, most teacher educators (above 50% of 32) have an average awareness and understanding of environmental education concepts. Although two (2) of them have a low level of knowledge based on the test, they only comprise a small percentage of the total number of respondents. It confirms the need for an environmental education program that will fully enhance the competencies of the teacher educators so they can educate preservice teachers to do the same in their classes (Nazarenko & Kolesnik, 2018)

The teacher educators can be classified by level based on the individual mean rating and total score in the self-assessment and test. Figure 1 shows teacher educators' frequency distribution according to their awareness and understanding of environmental education concepts.

Environmental Education Program for the Teacher Educators

Based on the assessment results on the current awareness and understanding of environmental

Table 4. Level of Awareness and Understanding of EE Concepts

Topic	No. of items	Mean Score	Mean Percent Score	Level
Environmental Laws	3	2.22	74.0	Average
Environmental Challenges and Issues	5	4.04	80.8	High
Waste Management Practices	6	3.57	59.5	Average
Environmental Protection and Stewardship	6	4.30	71.7	Average
Sustainable Development	5	2.78	55.6	Average
Overall	25	16.91	67.6	Average

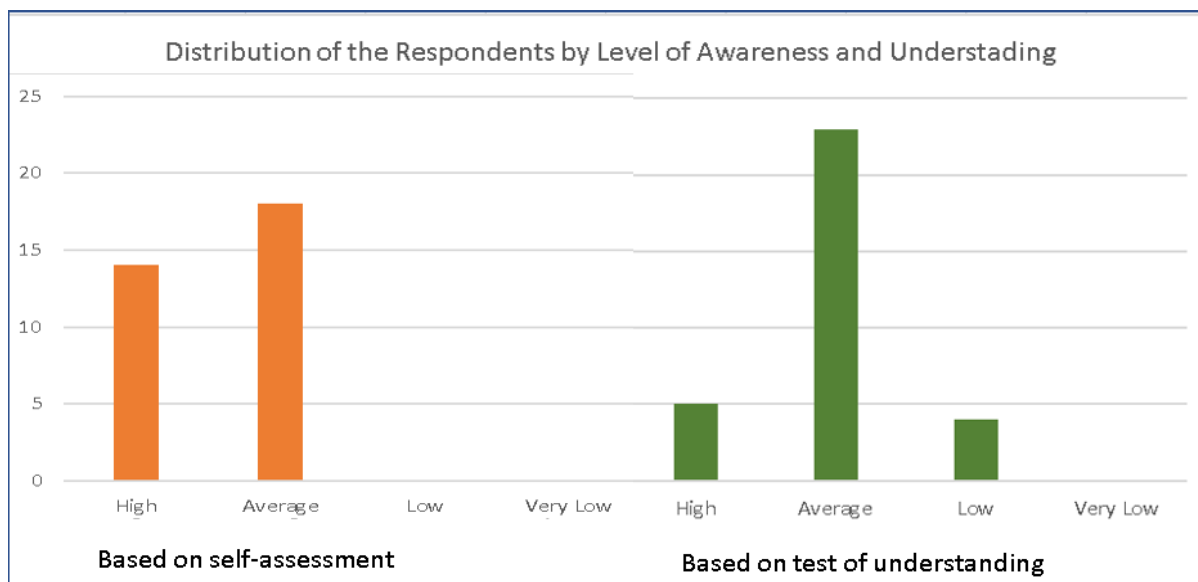


Figure 1. Frequency Distribution of Teacher Educators by Level of Environmental Awareness and Understanding

education concepts, the researcher designed the Environmental Education Program for Teacher Educators. The program implementation was from August to October 2016. The objectives of the program are as follows: (1) promote environmental awareness among the teacher educators; (2) enhance their understanding of waste management and waste reduction; (3) develop desirable values and environment-friendly practices in the workplace; and (4) initiate a sustainable environmental project.

The program utilized a combination of formal and non-formal education methodologies (Paraskeva-Hadjichambi et al., 2020) and strategies fit for adult and professional learners. It has the following features: problem-based, contextualized, experiential, collaborative, and reflective. It anchored the design of activities on adult learning principles that adult learners value independent learning and involvement in problem situations related to their existence (Purwati et al., 2022). Aside from the formal lecture of a speaker invited to conduct an orientation seminar on environmental education, the other activities in the EE program are non-formal and experiential, involving the teacher educators in activities that require them to be actively engaged (Paraskeva-Hadjichambi et al., 2020). The researcher also capitalized on the belief that professional teachers are familiar with environmental education concepts (Türkoğlu 2019). This belief stemmed from the analysis of responses showing that the respondents could answer the items in the test that involved concepts, principles, laws, and processes discussed in books. However, some failed to get correct answers on items that require the application

to actual practice without mentioning the concepts, like practices on waste management (Debrah et al., 2021) and environmental conservation (Mohamad et al., 2020), showing the difficulty in connecting theory and practice (de Sousa et al., 2019; Türkoğlu 2019).

These serve as the basis for choosing contextualized strategies for implementing the EE program. Allowing teacher educators to focus on their immediate work environment promotes contextualization in identifying environmental conditions and practices and planning actions to address the identified problems (Purwati et al., 2022). Review and clarification of actual practices encourage reflection (Wamsler, 2020), while collaborative planning and implementing solutions to issues identified fosters a culture of collaboration and a sense of community among them (Paraskeva-Hadjichambi et al., 2020). Although the main objective of the EE program was to enhance the environmental awareness and understanding of the teacher educators, it also addressed other dimensions like attitudes and values to make learning holistic (Orbanic & Kovac, 2021). However, the analysis in this paper needs to cover the effect of the program on those dimensions of learning.

Orientation Seminar. The implementation of Environmental Education for teacher educators started with an Orientation Seminar on Environmental Education Concepts and Principles on August 24, 2016. The speakers discussed the following topics: environmental principles, environmental laws, pollution control, and waste management. The chosen subjects for the orientation seminar were based on the

assessment results and other studies that successfully raised awareness through formal methodologies (Debrah et al., 2021).

Environmental Audit. To further enhance the understanding of environmental education concepts and principles by applying them to a different situation, the researcher involved the participants in conducting a week-long environmental audit. In groups by department (5 departments), they did an ocular inspection and observation around the campus using the researcher-made audit checklist. They identified conditions and practices that are either compliant (C) or non-compliant (NC) to the environmental education principles. The audit included all rooms and grounds surrounding all identified buildings in its scope. In reporting the audit results, they had to cite specific cases or verifiable pieces of evidence. Some of the findings in the audit that became action items are as follows: accumulation of papers for disposal in the faculty rooms, mixing of garbage despite the presence of labeled bins, presence of stray cats on the campus that may harm students, littering on the corridors and classrooms, and disregard for electrical energy and water conservation measures.

Review and Clarification of Current Office and Classroom Practices. In a workshop, the participants analyzed the root causes of the problems identified during the environmental audit. They also reviewed their current practices and clarified them based on acceptable ecological principles. The workshop participant accomplished a worksheet on waste reduction and waste management, focusing on materials found in the faculty rooms since one issue identified during the audit was the accumulation of paper for disposal in the faculty rooms. Then group sharing and discussion were done to clarify the practices.

Action Planning. Based on the findings and observations gathered through the environmental audit, the faculty members were grouped (by department) and assigned to prepare a proposal for a project that would enhance the environmental compliance of the college. The project should meet the following standards: acceptability, effectiveness, sustainability, and cost-efficiency. For the long-term plans, the groups identified rainwater collection and filtration, solar power utilization for campus lighting, utilization of energy-saving devices for classroom lighting, and ongoing environmental education campaigns. However, most of these projects require a considerable budget for inclusion in the work and financial plan for the next fiscal year. Aside from long-term projects, they also identified doable action items for implementation

before the end of the semester. Each group identified things to enhance environmental compliance and promote a clean and green campus. The commitments of the groups are as follows: conduct of an information drive on proper waste segregation (group 1); printing and posting reminders on cleanliness and orderliness on the campus (group 2); putting up the stray cats roaming around the campus for adoption (group 3); converting the available space surrounding the Home Economics building into a vegetable garden (group 4 and 5).

Project Implementation. To put into action the concepts and principles learned related to environment protection and conservation, the groups of participants implemented action plans to address pressing issues and problems on the campus. They reported the accomplishments at the end of the program implementation.

Formulation of Guidelines and Commitment. The heads of the five departments initiated drafting guidelines to improve the practices on the campus that will contribute to attaining a clean and environment-friendly work environment, particularly in waste management and resource utilization and conservation. They also formulated personal and departmental commitments to sustain the practices for posting in their respective faculty rooms.

Environmental Awareness and Understanding of Teacher Educators after the Implementation of the EE Program

After three (3) months of implementing the environmental education program, the post-assessment revealed satisfying results. Table 5 shows the mean rating of the faculty for their awareness of environmental principles before and after the program implementation.

In terms of awareness of environmental principles, the teacher educators exhibited a much higher level of awareness and understanding (3.928) after the program compared to their previous one (3.586). The test of significant difference in mean scores revealed that the increase is significant, with all p-values lower than the alpha level of 0.05. The 25-item multiple-choice examination after the program implementation revealed improvement in scores, as shown in Table 6. From an average score of 16.31, they got a mean of 21.00 in the post-test. There is also a marked increase in the mean score in all topics, particularly environmental challenges, issues, and waste management. The teacher educators may have fully understood the concepts

because their active engagement in the activities made them apply them in real situations (Nazarenko & Kolesnik, 2018). There is one concept, environmental laws, where there is a slight decrease. It could be due to some confusion on the provisions of the law, which are also very important if teacher educators have to teach them to future teachers. Although there is an increased understanding of environmental protection, stewardship, and sustainable development, the increase is minimal, and the final value is slightly above average. This calls for sustained engagement in the program to attain more favorable results.

The mean scores were subjected to a statistical test (t-test for paired samples) to ascertain the significance of gain in awareness and understanding of teacher educators. The obtained p-values (lower than the alpha level of 0.05) in most topics, except environmental law, show a significant increase, implying that the experiences undertaken in the program have improved their understanding of environmental education concepts and principles, as supported by the study of Özonur (2021). The feedback from the EE program participants validated the numerical data. The insights on the experiences, the comments of evaluators of the EE program, as well as the minutes of the workshops are sources of information that support the analysis of experiences discussed in the subsequent paragraphs under the themes: embracing lifelong learning, contextualizing environmental education, integrating knowledge and practice, evoking a sense of responsibility and harmony with the environment, and taking action as a community.

Embracing lifelong learning. Teaching professional teachers basic concepts is more daunting than teaching younger students. Adults have their self-concept of being independent learners (Purwati et al., 2022). Introducing basic environmental education concepts may threaten their comfort zone and make

them unresponsive to new learning or re-learning. Breaking into that comfort zone and motivating them to engage in active learning may pose a challenge. Purwati et al. (2022) suggested establishing a climate setting to make the atmosphere comfortable. Thus, the researcher carefully considered the design of the EE program to ensure that methodologies are not threatening but encouraging. The activities made the teacher educators recognize and realize that knowledge, pedagogies, and learning spaces are changing (Chiappe et al., 2019). Opening oneself to new learning means embracing personal growth and commitment to lifelong learning (Paraskeva-Hadjichambi et al., 2020).

Contextualizing Environmental Education. Many practices and activities to protect the environment are described in books and information materials available in the library or on the internet. Reading about them is one thing, but implementing them in practice is another. Concepts written in books can be made more concrete through experiential learning, referred to by Paraskeva-Hadjichambi et al. (2020) as place-based education. Analyzing the real problems and concerns on campus was also a learning experience. Moreover, planning and implementing projects to address local issues developed a sense of ownership of ideas and subsequent actions to solve the problem in the local context (Dunkley, 2016; Herdiansyah et al., 2016).

They are integrating knowledge and practice. The exercise clarifying current office and classroom practices allowed them to reflect on what they do compare to what they should do in given situations. Without being told that what they are doing is not environment-friendly, they realize such things as they listen to the sharing of others. The exercise affirmed that some of their practices are already environment-friendly, like reducing the consumption of bond papers and printer inks, disposal of documents, and minimizing the use of disposable utensils. However, they realized

Table 5. Enhancement in Awareness and Understanding of Environmental Principles

Environmental Principles	Weighted Mean		Mean Gain	p-value
	Pre	Post		
1. Nature knows best.	3.56	3.82	0.26	0.011
2. All forms of life are important.	3.64	3.92	0.28	0.010
3. Everything is connected to everything else.	3.53	3.96	0.43	0.000
4. Everything changes.	3.58	3.96	0.38	0.004
5. Everything must go somewhere.	3.64	3.92	0.28	0.003
6. Ours is a finite Earth.	3.48	3.94	0.46	0.000
7. Nature is beautiful and we are stewards of God's creation.	3.66	4.00	0.34	0.002
Overall Mean	3.586	3.928	0.342	0.000
SD	0.33	0.13		

that most are unaware of how to dispose of discharged batteries, so they mix them with other residual waste for disposal. It means that environmental principles they can quickly memorize have yet to be fully internalized and ingrained in the value system that guides their actions and practices, indicating limited sustainability knowledge (Ibanez (2020). This has implications for the effectiveness of teaching methodologies in courses that integrate environmental education and sustainable development (Anyolo et al., 2018).

They evoke a sense of responsibility and harmony with the environment. The root cause analysis conducted during the workshop revealed that most of the problems identified, including those related to the repair and maintenance of facilities, are somehow connected to a lack of concern for the preservation of resources and a lack of understanding of the ultimate effects of current actions. As stewards of school resources and the environment, the teachers should take an active or lead role (Nazarenko & Kolesnik,2018). Aside from

They were taking action as a community. The various activities awakened the sense of pride and responsibility of teacher educators as school community members, referred to by Paraskeva-Hadjichambi et al.(2020) as a sense of place. After identifying the prevailing problems and issues on the campus, they felt the need to take action as one community to fix the issues and make everyone part of the planning and implementation measures to solve them (Purwati et al., 2022). Formulating statements of commitment (individually and by department) made them realize their role and contribution in attaining a clean and sustainable school environment and eventually promoting transformative environmental education (El Savada, 2021).

Conclusions and Recommendations

The study revealed that teacher educators are highly aware of environmental principles but only have an average understanding of environmental

Table 6. Enhancement in Awareness and Understanding of EE Concept

Topic	No. of items	Mean Score	%	Mean Score	%	p-Value
Environmental Laws	3	2.22	74.0	2.00	66.7	0.129
Environmental Challenges and Issues	5	4.04	80.8	4.71	94.2	0.000
Waste Management Practices	6	3.57	59.5	5.42	90.3	0.000
Environmental Protection and Stewardship	6	4.30	71.7	4.83	80.5	0.033
Sustainable Development	5	2.78	55.6	4.04	80.8	0.000
Overall Mean		16.91	67.6	21.00	84.0	0.000
SD		2.57		2.03		

Level of Awareness and Understanding

- 0-24% *Low*
- 25-49% *Very Love*
- 50-74% *Average*
- 75-100% *High*

telling students or janitors what to do or not to do, they should regularly monitor to check for environment-friendly practices. They should show concern even if taking care of the school environment and resources is not directly the responsibility of teachers—these things they realized as a result of involvement in the activities of the EE program. One participant in the EE program even jokingly expressed that they must believe they are one with the environment, so they will feel how it is to be neglected or abused. This remark indicates that somehow the EE program evoked an awareness of the need for them to take responsibility and be in harmony with the environment.

education concepts. The findings informed the design and implementation of an environmental education program for teacher educators using non-threatening adult learning methodologies appropriate for their function as educators of future teachers. The program involved the teacher educators in an orientation seminar and experiential activities like environmental audit, review of practices, action planning, and project implementation. Engagement in these activities developed a higher awareness and understanding of ecological principles and EE concepts among teacher educators that they can share with preservice teachers who will become future advocates of environmental

sustainability education. Since the EE program has shown positive results, the Teacher Education Institution can institutionalize the activities for sustainable effects and formulate policies supportive of ecological preservation and conservation. It can also expand the audit scope to include the practices of non-teaching personnel and students. The assessment can cover attitudes, values, skills, and behavior crucial in promoting a sustainable environmental practice. Lastly, the EE program can be replicated in other colleges or Teacher Education Institutions to validate the initial results.

Acknowledgment

This research was supported by the Department of Environment and Natural Resources – Philippines and Bicol University.

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