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Project-Based Learning Approach and Environmental Awareness in Science in Congressional District IV, Batangas Province

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Abstract

This study examined the extent of utilization of the Project-Based Learning (PBL) approach in promoting students' environmental awareness among junior high school Science teachers. It explored the relationship between utilization and usefulness, and identified challenges faced by teachers. A descriptive-correlational research design supported by qualitative interviews was used.

The study involved 136 Science teachers selected through stratified proportionate random sampling across Congressional District IV, Batangas Province. Data were gathered using a validated researcher-made questionnaire and a semi-structured interview guide, with interviews conducted among 8 Science teachers. The data were analyzed using weighted mean and Pearson's r, while qualitative responses were treated through thematic analysis. Findings revealed that the PBL approach was highly utilized in promoting environmental awareness, particularly in experiential learning (3.79), critical thinking and problem-solving (3.73), and real-world application (3.74). PBL was also found highly useful in shaping students' environmental attitudes (3.79), behaviors and practices (3.78), and sense of responsibility (3.81). A significant positive relationship was established between PBL utilization and its usefulness. Also, the results revealed that science teachers agreed (3.39) that they encountered challenges in implementing PBL approach such as getting distracted by the classroom noise, insufficient confidence in using PBL approach and time management. While interviews revealed challenges including time constraints, limited resources, and limited student readiness.

The study concludes that PBL is an effective strategy in enhancing students' environmental awareness and recommends continuous teacher training, resource provision, and integration of community-based environmental projects to strengthen Science teaching.

Keywords: *Critical Thinking, Environmental Awareness, Experiential Learning, Project-Based Learning, Science Education*

Online ISSN: 3082-5121
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Volume 2 Issue 6 (2026)

Introduction

Environmental education is essential for cultivating awareness and responsibility in students about conserving natural resources and promoting sustainable development. In the Philippines, the National Environmental Awareness and Education Act of 2008 (Republic Act No. 9512) highlights the significance of incorporating environmental education across all educational levels. This legislation requires students to develop a solid foundational comprehension of environmental concerns, regulations, and sustainable practices. Moreover, national initiatives and programs support healthier communities by encouraging environmentally-conscious actions in educational institutions, offices, and communal areas.

Despite all these, the educational institutions of Batangas province are faced with environmental problems such as excessive waste generation, ineffective waste disposal practices, heavy energy consumption, and water pollution caused by poorly designed drainage systems. The unawareness of students regarding recycling and sustainable approaches contributes immensely to the aforementioned issues, especially with poor waste management systems in place in schools and adjacent communities.

In Congressional District IV of Batangas Province, students demonstrate a moderate level of awareness regarding environmental issues, as shown by various school- and student-led initiatives. At Padre Garcia Integrated National High School, however, the large student population contributes to a significant amount of waste, creating ongoing challenges in maintaining cleanliness across the campus. In actual observations, many students still scatter trash in hallways and open areas, trash bins are often not used properly or are filled with mixed wastes despite labels, and designated trash bags are sometimes left open or misplaced. Some plants in the school garden and mini-green zones are not well maintained, with several failing to grow due to irregular watering, trampling, and lack of student ownership.

The YES-Organization regularly proposes monthly cleanup drives that encourage learners to practice cleanliness and responsibility, along with programs such as collecting cartons and plastic bottles to promote recycling and reduce plastic waste. These activities not only help uphold a cleaner environment but also raise awareness about proper waste management and environmental protection. Despite these efforts, there remains a significant need for a more organized, cohesive, and formal environmental education program that will ensure long-term sustainability and active participation among students.

To advance toward a higher level of environmental awareness, a promising strategy for enhancing environmental education is the use of Project-Based Learning (PBL) approach, a teaching strategy that fosters active student involvement in real-world issues. In projects targeting science education, students analyze real-world problems, apply scientific principles, and create a physical product. This type of project brings the students deeper into any environmental issues while also fostering key abilities like critical thinking, teamwork, and efficient communication, in accordance with the student-focused model of the K-12 curriculum introduced by the Department of Education (DepEd).

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

In Congressional District IV of Batangas Province, several challenges and observations highlight the need for science teachers to adopt innovative approaches such as Project-Based Learning (PBL) to strengthen students' environmental awareness. In the area covered by the Padre Garcia Sub-Office, including Padre Garcia Integrated National High School, many learners exhibit limited understanding and concern regarding urgent environmental issues—such as climate change, pollution, and waste management—often perceiving these topics as distant and unrelated to their daily experiences. Traditional science instruction in the district remains largely teacher-centered, providing limited opportunities for hands-on exploration or real-life application of scientific concepts. As a result, student engagement is low and retention of environmental and scientific knowledge remains minimal.

Furthermore, students often struggle to connect classroom lessons with environmental problems in their own communities. These experiences highlight the urgent need for a more interactive, inquiry-based approach like PBL approach, which can make learning more meaningful by involving students in collaborative, real-world projects that not only deepen their understanding of scientific concepts but also empower them to take action toward environmental protection. Thus, science teachers are compelled to pursue this study to address these gaps and promote both academic achievement and environmental responsibility among learners.

Overall, effective environmental education is crucial in preserving the natural world. However, many public schools in Batangas Province, face growing challenges in delivering meaningful instruction, particularly when students remain passive during lessons. Traditional, teacher-centered methods often fail to sustain learners' interest, resulting in low engagement and limited participation in environmental initiatives. Science teachers also report difficulties such as limited training, lack of contextualized materials, and minimal administrative support.

Gorospe (2024) noted that educators in the Philippines struggle to integrate environmental topics due to insufficient resources and stagnant professional development, which lowers teacher confidence and instructional effectiveness. These challenges highlight the need for more engaging, student-centered approaches such as Project-Based Learning (PBL), which offers real-world applications that empower both teachers and students to become active contributors to environmental advocacy.

By addressing this problem, the study aimed to provide enrichment activities in the utilization of Project-Based Learning (PBL) approach in Science and the manifestation of usefulness of PBL Approach on environmental awareness to provide students with meaningful opportunities to explore, understand, and address real-world environmental issues. Through this, students develop a stronger sense of responsibility and empowerment to take action, fostering a lasting awareness of the impact of human behavior on the environment and the importance of sustainable solutions.

This study aimed to determine how the utilization of Project-Based Learning (PBL) approach as Science teaching method relate with the student's environmental awareness. Specifically, the study sought answers to the following questions:

Online ISSN: 3082-5121
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https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

1. How may the extent of utilization of PBL Approach be assessed in terms of:
    1.1 engagement in experiential learning;
    1.2 development of critical thinking and problem solving; and
    1.3 understanding and application of real-world environmental issues.
2. What is the extent of manifestation of usefulness of Project-Based Learning Approach in relation to;
    2.1 attitudes towards environmental issues;
    2.2 environmental behaviors and practices;
    2.3 and environmental responsibility
3. Is there a significant relationship between the assessments on the extent of utilization of Project-Based Learning Approach and on the extent of manifestation of its usefulness?
4. What challenges teachers encounter in the utilization of PBL Approach?
5. Based on the results of the study, what enrichment activities may be proposed?

Methodology

Research Design

It used descriptive correlational research design to assess how the utilization of Project-Based Learning (PBL) approach relate students' environmental awareness. Also, a qualitative data gathering through a key-informant interview is designed to compliment with the initial quantitative research approach.

Participants

The study involved Junior High School Science teachers from Congressional District IV, Batangas Province, using a researcher-made questionnaire for 136 selected respondents out of 209 teachers through stratified proportionate random sampling. To enrich the data, semi-structured interviews were also conducted with selected Science teachers who did not participate in the survey.

Research Instrument

The study utilized a researcher-made questionnaire as the primary instrument, consisting of Likert-scale items to measure the extent of PBL utilization and its usefulness in promoting students' environmental awareness, which underwent expert validation, pilot testing, and statistical analysis. The tool measured:

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

- Extent of utilization of PBL Approach in terms of:
  - engagement in experiential learning
  - development of critical thinking and problem solving
  - understanding and application of real-world environmental issues
- Extent of manifestation of usefulness of PBL Approach in terms of:
  - attitudes towards environmental issues
  - environmental behaviors and practices
  - environmental responsibility

Additionally, semi-structured interviews were conducted with selected teachers to gather in-depth qualitative insights on their experiences, challenges, and perceptions of PBL implementation, with responses analyzed through thematic analysis to identify key patterns and themes.

Data Collection Procedure

The researcher followed a systematic and ethical data gathering procedure by securing approval from the Division of Batangas Province and obtaining permission from school authorities before administering the questionnaires to teacher-respondents through printed or online formats.

In addition, semi-structured interviews were conducted to gather deeper insights into experiences and challenges in implementing Project-Based Learning, complementing and enriching the quantitative data.

Data Analysis

The study utilized statistical tools such as ranking, weighted mean, and Pearson's r to analyze quantitative data, while thematic analysis was employed to interpret patterns from interview responses. Ethical standards were strictly observed through secured permissions, informed consent, confidentiality, and proper data handling to ensure the validity, reliability, and integrity of the research.

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

Results

Section 1: Extent of Utilization of PBL Approach

Table 1.1 Engagement in Experiential Learning

STATEMENTS *I am aware that...*	Weighted Mean Response	Verbal Interpretation	Rank
1. engaging in science projects that involve solving real-life environmental problems helps my students enjoy learning.	3.80	Highly Utilized	2
2. understanding how human activities affect the environment becomes easier for my students through PBL activities in Science.	3.74	Highly Utilized	6.5
3. constructing their own conceptual understanding becomes possible for my students when they explore science topics through hands-on experiments and investigations.	3.70	Highly Utilized	9
4. feeling more connected to environmental issues happens when my students are involved in group projects and fieldwork.	3.76	Highly Utilized	5
5. doing environmental projects in Science makes my students more aware of how they can help protect nature.	3.82	Highly Utilized	1
6. applying what they learned in Science becomes easier for my students when they do real-world tasks like creating and testing eco-friendly solutions.	3.71	Highly Utilized	8
7. working on science projects helps my students develop teamwork and collaboration skills while learning about environmental issues and concerns.	3.74	Highly Utilized	6.5
8. experiencing real environmental challenges becomes possible for my students through PBL activities.	3.68	Highly Utilized	10
9. remembering science lessons better happens when my students engage in practical activities.	3.78	Highly Utilized	4
10. feeling motivated to take care of the environment occurs after my students complete PBL activities in Science.	3.79	Highly Utilized	3
Composite Mean	**3.79**	**Highly Utilized**	-

Legend: 1.00 – 1.49 (Least Utilized); 1.50 – 2.49 (Slightly Utilized); 2.50 – 3.49 (Moderately Utilized) 3.50 – 4.00 (Highly Utilized)

The data show that the extent of utilization of the Project-Based Learning (PBL) approach in terms of engagement in experiential learning is highly utilized (Composite Mean = 3.79). The highest-rated indicator is that doing environmental projects in Science makes students more aware of how they can help protect nature (WM = 3.82), followed by engaging in science projects that involve solving real-life environmental problems (WM = 3.80) and students feeling motivated to take care of the environment after completing PBL activities (WM = 3.79).

Mid-ranked indicators include remembering science lessons better through practical activities (WM = 3.78), feeling more connected to environmental issues through group work and fieldwork (WM = 3.76), and both understanding human impact on the environment and developing teamwork and collaboration skills (WM = 3.74).

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

Lower-ranked indicators include applying learned concepts to real-world eco-friendly solutions (WM = 3.71) and constructing conceptual understanding through hands-on experiments and investigations (WM = 3.70). The lowest-rated indicator is experiencing real environmental challenges through PBL activities (WM = 3.68).

Overall, the findings indicate that PBL effectively enhances students' engagement in experiential learning by promoting awareness, participation, and environmental responsibility.

Section 1: Extent of Utilization of PBL Approach

Table 1.2 Development of Critical Thinking and Problem Solving

	STATEMENTS *I am aware that...*	Weighted Mean Response	Verbal Interpretation	Rank
1.	helping my students think more deeply about environmental issues, PBL activities in Science strengthen their understanding.	3.74	Highly Utilized	4
2.	identifying problems in their community related to the environment becomes easier for my students through Science projects.	3.65	Highly Utilized	10
3.	using evidence and data from our projects, my students support their ideas and solutions effectively.	3.74	Highly Utilized	4
4.	making it easier for my students to analyze environmental problems from different perspectives, the PBL approach enhances critical thinking.	3.73	Highly Utilized	8
5.	practicing finding realistic solutions to real-life environmental issues, my students benefit greatly from Science projects.	3.76	Highly Utilized	1
6.	improving how my students evaluate the effects of human actions on nature, working on environmental projects strengthens their analytical skills.	3.76	Highly Utilized	1
7.	encouraging my students to ask questions and explore answers about environmental problems, the PBL approach promotes inquiry.	3.74	Highly Utilized	4
8.	connecting scientific concepts to real environmental situations, my students gain deeper understanding through our projects.	3.70	Highly Utilized	9
9.	identifying practical solutions to environmental issues, my students benefited from Science projects.	3.74	Highly Utilized	4
10.	helping my students work better with others in creating solutions to environmental challenges, the PBL approach fosters collaboration.	3.76	Highly Utilized	1
	Composite Mean	**3.73**	**Highly Utilized**	-

Legend: 1.00 – 1.49 (Least Utilized); 1.50 – 2.49 (Slightly Utilized); 2.50 – 3.49 (Moderately Utilized) 3.50 – 4.00 (Highly Utilized)

The data show that the extent of utilization of the Project-Based Learning (PBL) approach in terms of the development of critical thinking and problem-solving skills is highly utilized (Composite Mean = 3.73). The highest-rated indicators are practicing finding realistic solutions to real-life environmental issues, improving how students evaluate the effects of human actions on nature, and helping students work better with others in creating solutions (WM = 3.76), all tied at Rank 1.

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

Mid-ranked indicators include helping students think more deeply about environmental issues, using evidence and data to support ideas, encouraging students to ask questions and explore answers, and identifying practical solutions to environmental issues (WM = 3.74). These are followed by analyzing environmental problems from different perspectives (WM = 3.73).

Lower-ranked indicators include connecting scientific concepts to real environmental situations (WM = 3.70) and identifying problems in the community related to environmental concerns (WM = 3.65), which ranked the lowest.

Overall, the findings indicate that PBL effectively enhances students' critical thinking and problem-solving skills by promoting analysis, collaboration, and application of knowledge to real-world environmental issues.

Section 1: Extent of Utilization of PBL Approach

The data show that the extent of utilization of the Project-Based Learning (PBL) approach in terms of understanding and application of real-world environmental issues is highly utilized (Composite Mean = 3.74). The highest-rated indicator is students' understanding of how human activities contribute to environmental problems such as pollution, deforestation, and climate change (WM = 3.79), followed by students becoming more engaged in environmental news and feeling more responsible for solving environmental problems (WM = 3.78).

Mid-ranked indicators include students' ability to apply Science concepts to propose solutions (WM = 3.74), understanding the interconnection of local and global environmental issues (WM = 3.73), and increased awareness of climate change and the importance of applying scientific knowledge to real-world issues (WM = 3.72). These are followed by students' application of knowledge on waste management (WM = 3.71).

Lower-ranked indicators include connecting classroom lessons to current community environmental issues and understanding the impact of environmental issues on health and livelihoods (WM = 3.69), which are tied as the lowest-ranked indicators.

Overall, the findings indicate that PBL effectively enhances students' understanding and application of real-world environmental issues by promoting awareness, responsibility, and the practical use of scientific knowledge.

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

Table 1.3 Understanding and Application of Real-world Environmental Issues

	STATEMENTS *I am aware that…*	Weighted Mean Response	Verbal Interpretation	Rank
1.	understanding how human activities contribute to environmental problems such as pollution, deforestation, and climate change helps my students become more environmentally aware.	3.79	Highly Utilized	1
2.	connecting classroom lessons to current environmental issues in the community, PBL activities in Science helped my students deepen their learning.	3.69	Highly Utilized	9.5
3.	explaining how waste management affects the environment, my students use what they learned in our PBL projects.	3.71	Highly Utilized	8
4.	becoming more aware of the causes and effects of climate change, my students benefited from the PBL approach.	3.72	Highly Utilized	6.5
5.	applying Science concepts, my students can propose simple solutions for environmental challenges in our community.	3.74	Highly Utilized	4
6.	learning how local and global environmental problems are interconnected, my students gained insight through our project-based activities.	3.73	Highly Utilized	5
7.	paying more attention to environmental news and information, my students became more engaged after doing the PBL approach in Science.	3.78	Highly Utilized	2.5
8.	understanding the impact of environmental issues on people's health and livelihoods became easier for my students through the PBL approach.	3.69	Highly Utilized	9.5
9.	feeling more responsible for helping solve environmental problems, my students became more proactive after participating in our Science projects.	3.78	Highly Utilized	2.5
10.	realizing the importance of applying their scientific understanding to real-world environmental issues, my students benefited from the PBL approach.	3.72	Highly Utilized	6.5
	Composite Mean	**3.74**	**Highly Utilized**	-

Legend: 1.00 – 1.49 (Least Utilized); 1.50 – 2.49 (Slightly Utilized); 2.50 – 3.49 (Moderately Utilized) 3.50 – 4.00 (Highly Utilized)

Section 2: Extent of Manifestation of Usefulness of PBL Approach

The data show that the extent of manifestation of the usefulness of the Project-Based Learning (PBL) approach in terms of attitudes toward environmental issues is highly useful (Composite Mean = 3.79). The highest-rated indicator is developing students' positive attitude toward conserving natural resources (WM = 3.82), followed by developing their sense of environmental protection as a personal responsibility and promoting the habit of reducing, reusing, and recycling (WM = 3.81).

Mid-ranked indicators include making students more aware of current environmental problems, helping them value the importance of solving environmental issues for the community, encouraging proper waste segregation, motivating them to influence others, and making them feel responsible for applying what they learned (WM = 3.79).

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

Table 2.1 Attitudes towards Environmental Issues

STATEMENTS PBL approach is useful in...	Weighted Mean Response	Verbal Interpretation	Rank
1. making my students more aware of current environmental problems.	3.79	Highly Useful	4
2. helping my students believe that solving environmental problems is important for the future of the community.	3.79	Highly Useful	4
3. developing my students' sense of environmental protection as a personal responsibility.	3.81	Highly Useful	2.5
4. increasing my students' interest in learning science topics related to the environment.	3.76	Highly Useful	10
5. developing my students' positive attitude toward conserving natural resources.	3.82	Highly Useful	1
6. encouraging my students to practice proper waste segregation both at home and in school.	3.79	Highly Useful	4
7. motivating my students to encourage classmates or family members to take care of the environment.	3.79	Highly Useful	4
8. inspiring my students to actively participate in clean-up drives or tree planting activities.	3.77	Highly Useful	9
9. promoting my students' habit of reducing, reusing, and recycling after environmental projects.	3.81	Highly Useful	2.5
10. making my students feel responsible for applying what they learned to real-life environmental situations.	3.79	Highly Useful	4
Composite Mean	**3.79**	**Highly Useful**	-

Legend: 1.00 – 1.49 (Least Useful); 1.50 – 2.49 (Slightly Useful); 2.50 – 3.49 (Moderately Useful) 3.50 – 4.00 (Highly Useful)

Lower-ranked indicators include inspiring students to participate in clean-up drives or tree planting activities (WM = 3.77) and increasing their interest in learning science topics related to the environment (WM = 3.76), which ranked the lowest.

Overall, the findings indicate that the PBL approach is highly effective in shaping positive environmental attitudes by fostering responsibility, awareness, and sustainable practices among students.

Section 2: Extent of Manifestation of Usefulness of PBL Approach

The data show that the extent of manifestation of the usefulness of the Project-Based Learning (PBL) approach in terms of environmental behaviors and practices is highly useful (Composite Mean = 3.78). The highest-rated indicators are making students more conscious of how their actions affect the environment and developing their sense of responsibility in protecting the environment (WM = 3.81), both tied at Rank 1.5.

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

Table 2.2 Environmental Behaviors and Practices

STATEMENTS PBL approach is useful in...	Weighted Mean Response	Verbal Interpretation	Rank
1. making my students more conscious of how their actions affect the environment.	3.81	Highly Useful	1.5
2. encouraging my students to practice proper waste segregation (e.g., biodegradable and non-biodegradable).	3.74	Highly Useful	9.5
3. promoting water and electricity conservation among my students.	3.80	Highly Useful	3
4. motivating my students to actively participate in school or community clean-up drives.	3.78	Highly Useful	7
5. encouraging my students to reuse and recycle materials more often.	3.79	Highly Useful	6
6. motivating my students to educate or influence family and peers to take care of the environment.	3.76	Highly Useful	8
7. developing my students' sense of responsibility in protecting the environment.	3.81	Highly Useful	1.5
8. helping my students reduce the use of plastic products in their daily life.	3.74	Highly Useful	9.5
9. increasing my students' willingness to join environmental campaigns or activities.	3.80	Highly Useful	3
10. making my students more mindful of throwing trash properly and maintaining cleanliness in their surroundings.	3.80	Highly Useful	3
Composite Mean	**3.78**	**Highly Useful**	-

Legend: 1.00 – 1.49 (Least Useful); 1.50 – 2.49 (Slightly Useful); 2.50 – 3.49 (Moderately Useful) 3.50 – 4.00 (Highly Useful)

Mid-ranked indicators include promoting water and electricity conservation, increasing willingness to join environmental campaigns, and encouraging proper waste disposal and cleanliness (WM = 3.80), followed by encouraging reuse and recycling of materials (WM = 3.79) and motivating participation in clean-up drives (WM = 3.78).

Lower-ranked indicators include motivating students to influence others (WM = 3.76) and encouraging proper waste segregation as well as reducing the use of plastic products (WM = 3.74), which are tied as the lowest-ranked indicators.

Overall, the findings indicate that the PBL approach is highly effective in promoting positive environmental behaviors and practices by fostering responsibility, awareness, and active participation in environmental conservation.

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

Section 2: Extent of Manifestation of Usefulness of PBL Approach

Table 2.3. Environmental Responsibility

STATEMENTS PBL approach is useful in...	Weighted Mean Response	Verbal Interpretation	Rank
1. helping my students understand the importance of protecting the environment.	3.87	Highly Useful	1
2. raising my students' awareness of environmental issues.	3.85	Highly Useful	2
3. encouraging my students to practice proper waste segregation at home or in school.	3.8	Highly Useful	6
4. developing my students' sense of responsibility in contributing to environmental protection.	3.79	Highly Useful	9.5
5. increasing my students' willingness to join environmental programs or campaigns.	3.81	Highly Useful	4.5
6. helping my students understand how human actions affect the environment.	3.8	Highly Useful	6
7. making my students more mindful of conserving energy and water.	3.82	Highly Useful	3
8. encouraging my students to avoid harmful practices such as littering or burning trash.	3.79	Highly Useful	9.5
9. inspiring my students to educate others about caring for the environment.	3.8	Highly Useful	6
10. developing my students' belief that small actions can make a positive impact on the environment.	3.81	Highly Useful	4.5
Composite Mean	**3.81**	**Highly Useful**	-

Legend: 1.00 – 1.49 (Least Useful); 1.50 – 2.49 (Slightly Useful); 2.50 – 3.49 (Moderately Useful) 3.50 – 4.00 (Highly Useful)

The data show that the extent of manifestation of the usefulness of the Project-Based Learning (PBL) approach in terms of environmental responsibility is highly useful (Composite Mean = 3.81). The highest-rated indicator is helping students understand the importance of protecting the environment (WM = 3.87), followed by raising their awareness of environmental issues (WM = 3.85) and making them more mindful of conserving energy and water (WM = 3.82).

Mid-ranked indicators include increasing students' willingness to join environmental programs or campaigns and developing their belief that small actions can create a positive impact (WM = 3.81), as well as encouraging proper waste segregation, helping them understand the effects of human actions, and inspiring them to educate others (WM = 3.80).

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

Lower-ranked indicators include developing students' sense of responsibility in contributing to environmental protection and encouraging them to avoid harmful practices such as littering or burning trash (WM = 3.79), which are tied as the lowest-ranked indicators.

Overall, the findings indicate that the PBL approach is highly effective in strengthening students' environmental responsibility by enhancing awareness, fostering positive values, and encouraging proactive participation in environmental protection.

Section 3. Relationship between the Assessment on the Extent of Utilization of Project-Based Learning Approach and the Extent of Manifestation of its Usefulness

Table 3.1 Relationship between the Assessment on the Extent of Utilization of Project-Based Learning Approach (Engagement in Experiential Learning) and the Extent of Manifestation of its Usefulness

PBL Usefulness	Engagement in Experiential Learning			
	Pearson r	*Strength of Relationship*	*p-value*	*Significance*
Attitudes towards Environmental Issues	*0.802*	*Very Strong*	*0.000****	*Significant*
Environmental Behaviors and Practices	*0.809*	*Very Strong*	*0.000****	*Significant*
Environmental Responsibility	*0.786*	*Strong*	*0.000****	*Significant*

*Legend: Legend: p < 0.05 – *Significant, p < 0.01 – **Significant, p < 0.001 – ***Significant. Relationship Level (+/-): 0.00 – 0.19 (Very Weak); 0.20 – 0.39 (Weak); 0.40 – 0.59 (Moderate); 0.60 – 0.79 (Strong); 0.80 – 1.00 (Very Strong)*

The data show that the extent of utilization of the Project-Based Learning (PBL) approach in terms of engagement in experiential learning has a significant positive relationship with the extent of manifestation of its usefulness. There is a very strong and significant correlation with attitudes toward environmental issues (r = 0.802, p = 0.000), indicating that higher engagement in experiential learning is strongly associated with more positive environmental attitudes. Similarly, a very strong and significant correlation is observed with environmental behaviors and practices (r = 0.809, p = 0.000), suggesting that increased engagement in PBL activities greatly enhances students' actual environmental actions. A strong and significant correlation is also found with environmental responsibility (r = 0.786, p = 0.000), showing that experiential learning contributes substantially to students' sense of responsibility toward the environment.

Overall, the findings indicate that PBL engagement significantly supports the development of environmental awareness and action, with the strongest effects observed in environmental behaviors and attitudes, followed closely by environmental responsibility.

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

Section 3. Relationship between the Assessment on the Extent of Utilization of Project-Based Learning Approach and the Extent of Manifestation of its Usefulness

Table 3.2 Relationship between the Assessment on the Extent of Utilization of Project-Based Learning Approach (Development of Critical Thinking and Problem Solving) and the Extent of Manifestation of its Usefulness

PBL Usefulness	Development of Critical Thinking and Problem Solving			
	Pearson r	Strength of Relationship	p-value	Significance
Attitudes towards Environmental Issues	0.719	Strong	0.000***	Significant
Environmental Behaviors and Practices	0.707	Strong	0.000***	Significant
Environmental Responsibility	0.701	Strong	0.000***	Significant

*Legend: Legend: p < 0.05 – *Significant, p < 0.01 – **Significant, p < 0.001 – ***Significant. Relationship Level (+/-): 0.00 – 0.19 (Very Weak); 0.20 – 0.39 (Weak); 0.40 – 0.59 (Moderate); 0.60 – 0.79 (Strong); 0.80 – 1.00 (Very Strong)*

The data show that the extent of utilization of the Project-Based Learning (PBL) approach in terms of the development of critical thinking and problem-solving skills has a significant positive relationship with the extent of manifestation of its usefulness. There is a strong and significant correlation with attitudes toward environmental issues ($r = 0.719$, $p = 0.000$), indicating that improved critical thinking and problem-solving skills are associated with more positive environmental attitudes.

Similarly, a strong and significant correlation is observed with environmental behaviors and practices ($r = 0.707$, $p = 0.000$), suggesting that enhanced higher-order thinking skills contribute to better environmental actions among students. A strong and significant correlation is also found with environmental responsibility ($r = 0.701$, $p = 0.000$), showing that these skills support the development of students' sense of responsibility toward the environment.

Overall, the findings indicate that the development of critical thinking and problem-solving skills through PBL significantly supports environmental awareness, behaviors, and responsibility, with consistently strong effects across all areas.

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Volume 2 Issue 6 (2026)

Section 3. Relationship between the Assessment on the Extent of Utilization of Project-Based Learning Approach and the Extent of Manifestation of its Usefulness

Table 3.3 Relationship between the Assessment on the Extent of Utilization of Project-Based Learning Approach (Application of Real-world Environmental Issues) and the Extent of Manifestation of its Usefulness

PBL Usefulness	Application of Real-world Environmental Issues			
	Pearson r	Strength of Relationship	p-value	Significance
Attitudes towards Environmental Issues	0.770	Strong	0.000***	Significant
Environmental Behaviors and Practices	0.792	Strong	0.000***	Significant
Environmental Responsibility	0.741	Strong	0.000***	Significant

*Legend: Legend: p < 0.05 – *Significant, p < 0.01 – **Significant, p < 0.001 – ***Significant. Relationship Level (+/-): 0.00 – 0.19 (Very Weak); 0.20 – 0.39 (Weak); 0.40 – 0.59 (Moderate); 0.60 – 0.79 (Strong); 0.80 – 1.00 (Very Strong)*

The data show that the extent of utilization of the Project-Based Learning (PBL) approach in terms of the application of real-world environmental issues has a significant positive relationship with the extent of manifestation of its usefulness. There is a strong and significant correlation with attitudes toward environmental issues ($r = 0.770$, $p = 0.000$), indicating that applying real-world contexts in learning enhances students' environmental attitudes.

Similarly, a strong and significant correlation is observed with environmental behaviors and practices ($r = 0.792$, $p = 0.000$), suggesting that real-world application of knowledge greatly supports students' environmental actions. A strong and significant correlation is also found with environmental responsibility ($r = 0.741$, $p = 0.000$), showing that connecting lessons to real-life environmental issues strengthens students' sense of responsibility.

Overall, the findings indicate that the application of real-world environmental issues through PBL significantly enhances students' attitudes, behaviors, and responsibility, with the strongest effect observed in environmental behaviors and practices.

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Section 4. Challenges Encountered by Teachers in the Utilization of PBL Approach

Table 4.1 Challenges Encountered by the Teachers

	STATEMENTS	Weighted Mean Response	Verbal Interpretation	Rank
1.	Managing time becomes difficult as students lack time management in completing PBL assignments.	3.40	Agree	4.5
2.	Facing difficulties in accessing necessary resources makes it challenging to complete PBL projects effectively.	3.30	Agree	9
3.	Struggling with the complexity of PBL projects makes it hard for students to understand how to approach and finish tasks.	3.40	Agree	4.5
4.	Encountering difficulties in collaborating with group members due to conflicting priorities and unclear expectations creates challenges in project completion.	3.39	Agree	7
5.	Balancing academic rigor with student autonomy in the PBL process affects the quality of students' final outputs.	3.39	Agree	7
6.	Managing time ineffectively becomes a challenge as PBL projects often take longer to complete than expected.	3.41	Agree	3
7.	Lacking performance skills necessary for collaborative work makes it hard for students to contribute effectively to group projects.	3.39	Agree	7
8.	Showing reluctance or insufficient confidence in using PBL approaches affects effective implementation in class.	3.42	Agree	2
9.	Getting distracted by the noisy classroom environment makes it difficult for students to focus and complete PBL assignments.	3.58	Strongly Agree	1
10.	Receiving insufficient support and resources from the school makes it challenging to carry out PBL projects on environmental awareness.	3.21	Agree	10
	Composite Mean	**3.39**	**Agree**	-

Legend: 1.00 – 1.49 (Strongly Disagree); 1.50 – 2.49 (Disagree); 2.50 – 3.49 (Agree) 3.50 – 4.00 (Strongly Agree)

The findings revealed that the most significant challenge in implementing Project-Based Learning (PBL) was classroom distraction caused by a noisy environment, indicating that managing student behavior is a major concern during collaborative activities. Teachers also reported low confidence in using PBL and difficulties in managing time, showing the need for stronger training, support, and better lesson planning strategies.

Moderate challenges included issues in group collaboration, balancing academic rigor with student autonomy, and students' limited teamwork skills, suggesting the need for clearer guidance and improved scaffolding. Meanwhile, resource-related problems such as lack of materials and insufficient school support were less severe but still affected implementation quality.

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Volume 2 Issue 6 (2026)

Overall, the study shows that while PBL is valued for promoting engagement and learning, its effective implementation requires improved classroom management, teacher training, resource support, and structured planning.

Section 4. Thematic Analysis on Teachers' Challenges in Implementing PBL Projects on Environmental Issues

Table 4.2 Thematic Analysis on Teachers' Challenges in Implementing PBL Projects on Environmental Issues

Themes	Subthemes	Key Ideas / Codes	Sample Responses
Time Constraints	Limited instructional time, difficulty balancing curriculum pacing	PBL requires extensive time for planning, guiding, and assessment	*"One challenge is the lack of time to complete all the tasks."*
Lack of Resources and Materials	Limited access to project tools, technology, or environmental materials	Environmental projects need specific resources that are not always available	*"Sometimes, not all students have the materials they need for the project."*
Student Readiness and Independence	Varying skill levels, need for closer guidance	Some students struggle with independent or self-directed tasks	*"Some students need more guidance to finish their tasks."*
Logistical and Organizational Difficulties	Coordination of groups, scheduling, and classroom management	Managing multiple groups and maintaining focus can be difficult	*"The noise during group work can distract other classes."*
Assessment Challenges	Difficulty in measuring group and individual performance	Evaluating projects fairly and consistently can be subjective	*"Assessing collaborative projects can be challenging."*
Limited Community and Environmental Access	Difficulty connecting with real-world environmental contexts	Partnering with local organizations or conducting fieldwork can be hard	*"Community involvement is valuable but sometimes difficult to organize."*

Teachers identified several key challenges in implementing PBL projects on environmental issues, mainly time constraints, lack of materials, and low student readiness for independent and collaborative work. These issues made it difficult to align PBL with the curriculum, manage classroom activities, and ensure equal participation among students.

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Volume 2 Issue 6 (2026)

Teachers also found assessment challenging due to the complexity and subjectivity of evaluating both the process and output of group work.

Additionally, logistical problems and limited training further hindered effective implementation, highlighting the need for stronger professional development, clear assessment tools, and better institutional support. Despite these difficulties, teachers remained positive about PBL, recognizing its potential to enhance learning and environmental awareness when properly supported with time, resources, and structured guidance.

Section 5: Proposed Project-Based Learning Modules to Enhance student's Environmental Awareness

The proposed Project-Based Learning (PBL) modules were developed to address gaps identified in the study, particularly the lack of structured materials, limited resources, and challenges faced by teachers in implementing PBL for environmental education. These modules provide clear, step-by-step, and curriculum-aligned activities that guide both teachers and students in conducting real-world environmental projects.

They emphasize hands-on, collaborative, and interdisciplinary learning where students investigate local environmental issues such as waste management, conservation, and sustainability initiatives. Each module includes objectives, activities, assessments, and reflection tasks to ensure meaningful and organized learning experiences.

Overall, the modules aim to improve student engagement, reduce classroom management issues, and strengthen environmental awareness by connecting lessons to real-life situations. Ultimately, they are designed to develop environmentally responsible learners who demonstrate critical thinking, collaboration, and active participation in solving ecological problems in their communities.

Discussion

The study revealed the extent of utilization and usefulness of the Project-Based Learning (PBL) approach in enhancing students' environmental awareness, along with the challenges encountered by teachers and proposed enrichment activities. Overall, the findings show that PBL is highly utilized and highly effective in promoting environmental learning when properly implemented, although several challenges still need to be addressed to maximize its impact.

In terms of utilization, PBL was highly applied in three main areas: experiential learning, critical thinking and problem-solving, and understanding real-world environmental issues. Teachers reported that students were actively engaged in hands-on activities such as waste audits, clean-up drives, and environmental investigations. These experiences helped students connect classroom lessons to real environmental concerns, develop teamwork, and strengthen problem-solving skills. However, sustaining student motivation over long-term projects and improving identification of local environmental issues were noted as areas needing improvement.

Regarding usefulness, PBL was found to be highly effective in shaping students' environmental attitudes, behaviors, and sense of responsibility. Students developed stronger

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https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

appreciation for environmental protection, showed increased awareness of their personal impact, and participated in environmentally responsible actions such as waste segregation, conservation practices, and community clean-up activities. Among the three, environmental responsibility received the highest rating, indicating that PBL strongly influenced students' sense of accountability toward the environment. Nevertheless, consistent practice of some behaviors, such as proper waste segregation and reduced plastic use, still requires reinforcement.

The correlation analysis showed a significant and strong positive relationship between the extent of PBL utilization and its usefulness. This means that the more effectively PBL is implemented in classrooms, the greater its impact on students' environmental awareness, attitudes, and responsible behaviors.

Despite these positive outcomes, teachers encountered several challenges in implementing PBL. The most prominent issue was classroom management, particularly dealing with noisy and distracting environments during group activities. Other challenges included limited time for project completion, insufficient resources and school support, varying student readiness, and difficulties in balancing student autonomy with academic requirements. These findings suggest the need for stronger institutional support, improved training, and more effective classroom management strategies to ensure successful implementation of PBL.

Finally, the study proposed enrichment activities to strengthen PBL implementation. These include the development of structured and context-based PBL modules, stronger community engagement through partnerships with local organizations and NGOs, and continuous professional development for teachers. These interventions aim to improve instructional support, sustain student engagement, address resource limitations, and enhance the overall effectiveness of PBL in promoting environmental awareness and responsibility among learners.

Conclusion

Based on the findings of the study, it can be concluded that the Project-Based Learning (PBL) approach plays a significant role in enhancing students' environmental awareness and their overall learning experience in Science education. The following conclusions were drawn:

1. The PBL approach was assessed as highly utilized by the science teachers.
2. Similarly, the PBL approach was assessed by the teachers as highly useful.
3. The assessments on the extent of utilization and on the extent of manifestation of usefulness were found significantly related.
4. Teachers faced challenges such as getting distracted by the classroom noise, reluctant or insufficient confidence in using PBL approach and time management, however, PBL remained a valuable and engaging instructional strategy.
5. Enrichment activities such as teacher training and resource support are recommended to strengthen the implementation and sustainability of the PBL approach in Science education.

References

A. Books

Abante M. et al., (2024). Advanced Research Methods. Mindshapers Co., Inc.

Fernando M. et al., (2024). The Teaching Profession. Books Atbp. Publishing Corp.

Larioque R. & Jugo R., (2024). Facilitating Student-Centered Teaching & Learning. Books Atbp. Publishing Corp.

Moore B. & Parker R., (2005). Critical Thinking, Seventh Edition. McGraw-Hill Companies, Inc.

Sergote J., (2024). Introduction to Research. Unlimited Books Library Services & Publishing, Inc.

Yazon A., (2020). Statistics, A Guide for Researchers and Thesis Writers. Wiseman's Books Trading, Inc.

B. Unpublished Materials

Bartz, S. (2023). How can project-based learning improve environmental science education? LinkedIn. https://www.linkedin.com/advice/0/how-can-project-based- learning improve-environmental-7uijc

Calore, D. (2018). The effect of project-based learning on student engagement and attitude in the science classroom (Master's thesis, Montana State University). ScholarWorks. https://scholarworks.montana.edu/items/f83c156a-b227- 4289b5ee-7aeec9ccec9c

City Schools Division Office of Dasmariñas. (2020, February 19). Division Memorandum No. 40, s. 2020: Reiteration of Youth for Environment in Schools Organization (YES-O) guidelines on composition, election, term of office and submission of annual accomplishment report (AAR). City Schools Division Office of Dasmariñas. Retrieved from https://www.depeddasma.edu.ph/dm-no-40-s-2020-reiteration-of-youth-for-environment-in-schools-organization-yes-o-guidelines-on-composition-election-term-of-office-and-submission-of-annual-accomplishment-report-aar/

Cloke H., (2024). Experiential Learning: Your 'Hands-On' Guide to Learning by Experience. https://www.growthengineering.co.uk/what-is- experiential- learning/

Dabbous A. et al., (2023). Measuring environmental awareness: An analysis using google search data. https://www.sciencedirect.com/science/article/abs/pii/S030147972 3017723

Department of Education. (2003, September 1). Establishment of the Youth for Environment in Schools (YES) Organization (DepEd Order No. 72, s. 2003). Department of Education. https://www.deped.gov.ph/2003/09/01/do-72-s-2003-establishment-of-the-youth-for-environment-in-schools-yes-organization/

Eoghan R., (2025). What Is Critical Thinking?. Revised on February 19, 2025. https://www.scribbr.com/working-with-sources/critical- thinking/

Evenddy S. et al., (2023). Exploring the Benefits and Challenges of Project- Based Learning in Higher Education. https://www.researchgate.net/publication/376198430_Exploring_t he_Benefits_and_Challenges_of_ProjectBased_Learning_in_Higher_E ducation

Funa, A. A. (2023). *ISTEM-PBL: Framework on biology education for sustainable development* [Doctoral dissertation, De La Salle University]. Animo Repository.https://animorepository.dlsu.edu.ph/etdd_scied/21/

Gabuardi VM., (2021). Project-Based Learning: boosting 21st century skills https://revistas.ucr.ac.cr/index.php/estudios/article/view/49335

Hamidani et al., (2022). A Conceptual Framework Using Experiential Learning To Encourage Student Engagement.https://library.iated.org/view/HAMIDANI2022ACO

Hussein B., (2021). Addressing Collaboration Challenges in Project- Based Learning: The Student's Perspective. https://www.mdpi.com/2227-7102/11/8/434

Laurienti B., (2025). How Project-Based Learning Enhances Environmental Science Education. https://www.smartlablearning.com/environmental- science-through-project-based-learning/

Masdiana R. et al., (2020). Project-based learning to enhance student's awareness towards the environment. https://www.researchgate.net/publication/341594152_Proj ect-based_learning_to_enhance_student's_awareness_towards_the_ environment

McGrath A., & Jonker A., (2023). What are environmental issues?. https://www.ibm.com/think/topics/environmental-issues

Mijatovic I. et al., (2019). The Factors Affecting the Environmental Practices of Companies: The Case of Serbia. https://www.mdpi.com/2071- 1050/11/21/5960

Mutanga M., (2024). Students' Perspectives and Experiences in Project- Based Learning: A Qualitative Study. https://www.mdpi.com/2813- 4346/3/4/52

Nugraha S. & Ridwan I., (2019). Improving students' environmental awareness through Project-Based Learning (PBL) https://doi.org/10.35706/eltinfc.v2i2.3055

Pacificar, C. J. (2024). *Filipino learners' environmental awareness and practices.* West Visayas State University Repository. https://repository.wvsu.edu.ph/handle/20.500.14353/695

Perrault E. & Albert C., (2018). Utilizing project-based learning to increase sustainability attitudes among students. https://www.researchgate.net/publication/320219823_Utilizing_project-based_learning_to_increase_sustainability_attitudes_among_students

Priya R., (2021). Hands On Activities: Role Of Methods Of Teaching As Means Of Interdisciplinary Education Https://Www.Researchgate.Net/Publication/354335210_Hands_ON_Activities_Role_Of_Methods_Of_Teaching_As_Me Ans_Of_Interdisciplinary_Education

Rahman M., (2021). 21st Century Skill "Problem Solving": Defining the Concept.https://www.researchgate.net/publication/332413873_21_st_Cent ury_Skill_Problem_Solving_Defining_the_Concept

Sweet H., (2024). Student Achievement Through Project-Based Learning. https://digitalcommons.csp.edu/cgi/viewcontent.cgi?article=1101&context=teacher-education_masters

Syahdia R. et al., (2024). Challenges of Implementing Project-Based Learning Models in Secondary Schools in Various Countries. https://www.researchgate.net/publication/382518016_Challenges_of_Implementing_Project-Based_Learning_Models_in_Secondary_Schools_in_Various_Countries

Yolcu H., (2023). Using project-based learning in an environmental education course and revealing students' experiences: A case study.https://www.researchgate.net/publication/370693802_Using_project-based_learning_in_an_environmental_education_course_and_revealing_students'_experiences_A_case_study

Zhong Q. & Shi G., (2020). Environmental Behavior. https://www.sciencedirect.com/topics/social-sciences/environmental-behavior

Zhou C., (2023). The Impact of the Project-Based Learning Method on Students. https://www.researchgate.net/publication/369628184_The_Impact_of_the_Project-Based_Learning_Method_on_Students

Zulhaimi N., et al., (2019). Implementation of Project-Based Learning in Environmental Education.https://doi.org/10.31871/WJRR.9.6.24

C. Journals/Magazines/Periodicals

Abrenilla, B. (2025). Project-based learning: Junior high school teacher's perspective in Digos City Division. International Journal of Progressive Research in Engineering Management and Science (IJPREMS), 5(5), 2386–2393.

Aldabbus S., (2018). Project-Based Learning: Implementation & Challenges. Https://Www.Researchgate.Net/Profile/ShabanAldabbus/Publication/328368222_Project-Based_Learning_Implementation_Challenges/Links/5Bc8cd20a6fdcc03c79095e0/Project-Based-Learning- Implementation-Challenges.Pdf

Almula MA., (2020). The Effectiveness of the Project-Based Learning (PBL) Approach as a Way to Engage Students in Learning. First published online July 5, 2020. https://journals.sagepub.com/doi/full/10.1177/2158244020938702

Alrajeh T., (2021). Project-based Learning to Enhance Pre-service Teachers' Teaching Skills in Science Education. Received October 16, 2020; Revised December 31, 2020; Accepted January 20, 2021.10.13189/ujer.2021.090202.https://www.hrpub.org/journals/article_info.php?aid=10574

Borhan MT., (2018). Promoting Environmental Stewardship through Project-Based Learning (PBL). Vol._1_No._4;_April_2018/23.pdf. https://www.ijhssnet.com/journals/

Cadiz, A. P., & Cortez, L. A. S. (2024). Exploring the Best Practices of the Youth for Environment in Schools--Organization (YES-O). Journal of Biological Education Indonesia (Jurnal Pendidikan Biologi Indonesia), 10(1), 348-365.

Carlina E., (2019). Science Project-based Learning Integrated with Local Potential to Promote Student's Environmental Literacy Skills. VOL. 4 NO. 1 (2019). https://journals.aijr.org/index.php/ajss/article/view/675

Chavez, R. (2023). Place-Based Outdoor Learning with PBL strategies: Enhancing ecological understanding in high school students. *Philippine Journal of Environmental Education*, 11(1), 59–74.

Chenyue Zhou. (2023). Project-Based Learning benefits compared to traditional teaching methods. *International Journal of Educational Research.*

Corbano-Reyes, R. (2023). Project-Based Learning in Science: Effects on Students' Science Process and 21st - Century Skills. Psychology and Education: A Multidisciplinary Journal, 10(9), 1010-1019. https://10.5281/zenodo.8166219

De Los Reyes, J., & Orongan, M. (2023). Digital PBL for environmental learning in Grade 10 Science. *Asian Journal of Science and Technology Education.*

Diaz, L. (2025). Integrating Sustainable Development Goals into plant biology lessons through Project-Based Learning. *Asian Journal of Science Education, 18*(1), 77–91.

Dhage, P., et al. (2024). PBL in environmental science: Local water quality investigations. *International Environmental Journal of Education.*

Diquito, T. (2024). Basic education curriculum under the newly implemented K to 10 (MATATAG) curriculum in the philippines: the case of science education. American Journal of Education and Technology (AJET), 3(3), 123-132.

Eleazar, M., Felipe, A. L., Aragoncillo, A., & Nguyen, M. (2020). Bringing PBL to Philippines's higher education: How much are teachers geared for the transition from traditional to PBL approach?. In Proceedings of the 5th International Conference on Active Learning in Engineering Education (PAEE/ALE 2020) (pp. 88-96). Department of Production and Systems-PAEE association.

Estrellado, C. J. P. (2023). MATATAG curriculum: Why curriculum [must] change? Journal of Interdisciplinary Perspectives, 2(1), 6–10. https://doi.org/10.69569/jip.2024.0001

Indriyatno, H., Purwianingsih, A., Solihat, R., Nurazizah, S., & Levhan, F. (2024). PBL integrated with SDGs for metacognitive awareness. *Journal of Educational Sustainability,* 12(3). https://journal.uinjkt.ac.id

Firdausih F., & Aslan A., (2024). Literature Review: The Effect Of Project-Based Learning On Student Motivation And Achievement In Science. Vol. 4 No. 3 (2024): December. https://www.injoe.org/index.php/INJOE/article/view/176

Guo P., Saab N., & Admiraal, (2020). A review of project-based learning in higher education: Student outcomes and measures. Volume 102, 2020, 101586. https://www.sciencedirect.com/science/article/pii/S08830355 19325704

Kldiashvili, E., Abiatari, I., & Zarnadze, M. (2025). Project-Based Approach as Methodology to Improve Academic Performance of Medical School Students Within the Research Line Teaching

Course: A Quasi-Experimental Study. Health science reports, 8(3), e70562. https://doi.org/10.1002/hsr2.70562

Kwon, H., & Lee, Y. (2025). A meta-analysis of STEM project-based learning on creativity. STEM Education, 5(2), 275-290.

Lalor et al., (2020.) Project-based Learning for Environmental Sustainability Action. https://www.ajol.info/index.php/sajee/article/view/192233

Lopez J. and Palacios FJ., (2024). Effects of a Project-Based Learning Methodology on Environmental Awareness of Secondary School Students. Vol.17, No.1 e-ISSN: 1308-1470, www.e-iji.net p-ISSN: 1694-609X pp. 1-22, https://www.e-iji.net/dosyalar/iji_2024_1_1.pdf

Nugraha, I., & Ridwan, A. (2019). Student reactions to PBL and environmental awareness. *International Journal of Environmental Education.*

Ou J., & Lin D., (2023). Evaluation of Project-based Teaching Quality Based on SBM-DEA. VOL. 18 NO. 14 (2023) . https://doi.org/10.3991/ijet.v18i14.40395

Perez Jr., M., Salic-Hairulla, M., Magsayo, M., Nabua, R., & Malayao, A. (2025). Integrating inquiry-based STEAM teaching packets for ecoliteracy. *Journal of Environmental Education Research.*

Perez Jr., J., Salic-Hairulla, A., Magsayo, R., Nabua, A., & Malayao, P. (2025). Enhancing ecoliteracy through inquiry-based STEAM teaching packets in Project-Based Learning. *Philippine Journal of Science Education, 14*(1), 33–50.

Punzalan, C. H., & Balanac, M. L. M. (2020). Students' participation in tree planting activity: Promoting the 21st century environmental education. The Journal of Sustainability Education.

Resaba, M. L., & Gayeta, N. E. (2021). Utilization of project-based learning (PBL) resources in senior high school. International Multidisciplinary Research Journal, 3(2), 252–259. https://doi.org/10.54476/iimrj307

Rianti, R., Utaya, S., & Purwanto, W. (2023). PBL and ecological intelligence in senior high geography. *Indonesian Journal of Geography Education.*

Sánchez Milara, I., & Cortés Orduña, M. (2024). Possibilities and challenges of STEAM pedagogies. arXiv e-prints, arXiv-2408.

Sánchez-García, R., & Reyes-de-Cózar, S. (2025). Enhancing Project-Based Learning: A Framework for Optimizing Structural Design and Implementation—A Systematic Review with a Sustainable Focus. Sustainability (2071-1050), 17(11).

Sancho Avalos, F., Villacorta Castro, G., & Santa-Cruz Terán, E. (2023). Systematic review on PBL and environmental awareness. *ejer.com.tr.*

Tadena, M. T. G., & Salic-Hairulla, M. A. (2021, March). Raising environmental awareness through local-based environmental education in STEM lessons. In Journal of Physics: Conference Series (Vol. 1835, No. 1, p. 012092). IOP Publishing.

Zamora, M. B. (2023). Enhancing environmental education through community service learning: a qualitative exploration of curriculum integration. Science and Education, 4(4), 736-747.

Zhang L., & Ma Y., (2023). A study of the impact of project-based learning on student learning effects: a meta-analysis study. 17 July 2023 /Volume 14 - 2023. https://www.frontiersin.org/journals/psychology/articles/10.3389/fp syg.2023.1202728/full

Zulhaimi et al., (2019).Implementation of Project-Based Learning in Environmental Education.Volume-9, Issue-6, December 2019. https://doi.org/10.31871/WJRR.9.6.24

Online ISSN: 3082-5121
Aloysian Interdisciplinary Journal of Social Sciences, Education, and Allied Fields
https://journals.aloysianpublications.com
Volume 2 Issue 6 (2026)

D. Electronic Sources - Ebook

Valenzuela J. & Fester J., (2021). Environmental Science for Grades 6-12 : a Project-Based Approach to Solving the Earth's Most Urgent Problems. https://search.worldcat.org/title/1276861893

Tan, D. A., & Percales, J. P. C. (2024). *Place-based PBL in Earth Science Eucation.*

ResearchGate.https://Www.Researchgate.Net/Publication/383864899_Students%27_Academic_Achievement_And_Well-Being_In_Earth_Science_Through_Place-Based_Learning_Pbl