

Place-Based Education in Fostering Environmental Awareness and Engagement of Students in Science

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Abstract—This study investigated the influence of Place-Based Education (PBE) on the environmental awareness and science engagement of students in Science from selected Public Senior High Schools in Laguna during the School Year 2025–2026. Specifically, the study determined the level of place-based education practices in science instruction in terms of grounded in local context, experiential learning, authenticity, collaboration, and reflective practice. It also assessed the level of students' environmental awareness in terms of awareness of environmental issues, concern for nature, eco-friendly habits, and involvement in environmental projects, as well as their level of science engagement in terms of enthusiasm, hands-on involvement, and ability to express scientific thought. Furthermore, the study examined the significant relationship between place-based education and the two learner outcomes. A quantitative research method employing a descriptive-correlational design was utilized in the study. The respondents consisted of 209 Grade 11 students from four selected public senior high schools in Laguna who were chosen through purposive sampling. Data were collected using a researcher-made survey questionnaire based on a five-point Likert scale. The gathered data were analyzed using statistical tools such as mean, standard deviation, Pearson r correlation, and regression analysis. The findings revealed that the level of place-based education practices in science teaching was very high in terms of grounded in local context, experiential learning, authenticity, collaboration, and reflective practice. Moreover, the results indicated that the students demonstrated a high level of environmental awareness and science engagement. Statistical analysis further showed that place-based education has a significant relationship with students' environmental awareness and science engagement, indicating that learning experiences grounded in local contexts and real-world environmental issues enhance students' understanding, responsibility, and participation in scientific learning. The study concludes that place-based education serves as an effective instructional approach in fostering students' environmental consciousness and strengthening their engagement in science learning. It is therefore recommended that science educators integrate more community-based, experiential, and context-driven learning activities to promote meaningful science education that responds to real environmental challenges within the students' local communities. The findings of the study revealed that place-based education has a significant relationship with students' environmental awareness and science engagement. Thus, the null hypothesis is rejected, indicating that integrating local context in teaching contributes positively to learners' outcomes. These results imply that contextualized and localized teaching approaches are effective in enhancing both awareness and active participation of students in science learning.

Keywords— Place-Based Education, Environmental Awareness, Science Engagement, Descriptive-Correlational Design, Senior High School Student.

I. INTRODUCTION

In a world where environmental challenges are becoming more visible, flooded streets after sudden rains, heat that rises earlier each year, and natural spaces slowly disappearing today's learners are growing up at a time when understanding and caring for the environment is no longer optional, but necessary. Schools, therefore, hold an important responsibility not only to teach facts and theories, but also to help young people develop the awareness, skills, and attitudes needed to respond to real issues around them. This is where Place-Based Education (PBE) becomes deeply meaningful.

Place-Based Education is an approach that connects learning to the students' immediate surroundings their community, local environment, culture, and everyday experiences. Yemini, Engel, Simon (2023) further stated that Place based education (PBE) is a pedagogical approach that emphasizes the connection between a learning process and the physical place in which teachers and students are located. It incorporates the meanings and the experiences of place in teaching and learning, which can extend beyond the walls of the school.

The PBE also reconnects education with local places by providing teachers and students with knowledge rooted in local phenomena and a deeper understanding of the processes and outcomes of natural and social systems essential to the health and well-being of all living things. (Vander Ark et al., 2020)

Therefore, PBE encourages students to step outside the classroom and explore the real world that shapes their lives where the student's environmental awareness became more significantly important. This goes beyond simply knowing about pollution, climate change, or conservation. It reflects how students perceive environmental issues, understand their causes and effects, and recognize their personal responsibility in caring for their surroundings. When learners become aware of how environmental problems affect their own community, they develop a stronger sense of connection, empathy, and action.

In addition, science engagement, which captures how involved, curious, and motivated students are in exploring scientific ideas. When students are engaged, they participate actively, think critically, and see science as a tool to understand and improve the world around them.

Bringing these elements together, Place-Based Education offers a meaningful pathway to deepen both environmental awareness and science engagement. This study explores how

Place-Based Education can foster these important qualities among Grade 11 students from selected public senior high schools in Laguna, with the hope of contributing to more responsive, connected, and empowered learners who are ready to take part in caring for both their community and their future. Through learning experiences anchored in local realities, students are encouraged to recognize the relevance of science in addressing everyday environmental concerns.

1.1 Statement of the Problem

Problem/s which were addressed by the research

This study aims to determine the influence of place-based education in the environmental awareness and science engagement of the students.

Specifically, it sought to answer the following questions.

1. What is the level of place-based education in teaching Science terms of;
 - 1.1 Grounded in local context;
 - 1.2 Experiential Learning;
 - 1.3 Authenticity;
 - 1.4 Collaboration; and
 - 1.5 Reflective practice?
2. What is the level of the environmental awareness of the students in terms of;
 - 2.1 Awareness on environmental issue;
 - 2.2 Concern for nature;
 - 2.3 Eco-friendly habits; and
 - 2.4 Involvement in environmental projects?
3. What is the level of engagement of the students in Science in terms of;
 - 3.1 Enthusiasm;
 - 3.2 Hands-on involvement; and
 - 3.3 Express scientific thought?
4. Is there any significance relationship between the Place-Based Education and environmental awareness of the students?
5. Is there any significance relationship between the Place-Based Education and engagement of the students in Science?

II. METHODOLOGY

A quantitative research method employing a descriptive-correlational design was utilized in the study. The respondents consisted of 209 Grade 11 students from four selected public senior high schools in Laguna who were chosen through purposive sampling. Data were collected using a researcher-made survey questionnaire based on a five-point Likert scale. The gathered data were analyzed using statistical tools such as mean, standard deviation, Pearson r correlation, and regression analysis.

III. RESULTS AND DISCUSSION

This chapter presents the different results and discusses the results from treating the data gathered in this study. All specific questions in Chapter 1 under the statement of the problem were answered in this chapter supported by tables. It presents the data gathered about the significant relationship between place-based education and students' environmental

awareness and science engagement. In particular, the study sought to address the following:

Level of Place-Based Education in Teaching Science.

In this study, the level of place-based education in teaching Science refers to Grounded in Local Context, Experiential Learning, Authenticity, Collaboration, and Reflective Practice.

These dimensions were used to determine the extent to which place-based education practices were integrated into science instruction in selected public senior high schools. Each indicator reflects essential strategies that connect learning to students' immediate environment, encourage active participation, and promote meaningful understanding of scientific concepts.

Table 1. Level of Place-Based Education in Teaching Science in terms of Grounded in the Local Context

Statements	Mean	SD	Remarks
In Place-Based Education, I do activities that			
...utilize the local environment and community resources to support my understanding of scientific concepts.	4.83	0.37	Strongly Agree
...recognize the relevance of local issues in shaping my learning experiences in science.	4.74	0.44	Strongly Agree
...apply classroom lessons to real situations observed within my own community.	4.80	0.40	Strongly Agree
...engage in learning activities that involve exploring local ecological or cultural features.	4.74	0.44	Strongly Agree
...connect scientific theories to examples found in the immediate surroundings of local area.	4.81	0.39	Strongly Agree
Weighted Mean	4.79		
SD	0.20		
Verbal Interpretation	Very High		

Table 1 shows the level of place-based education in teaching Science in terms of being grounded in local context. Respondents strongly agree that place-based learning activities utilize the local environment and community resources to support their understanding of scientific concepts, recognize the relevance of local issues in shaping their science learning experiences, apply classroom lessons to real situations observed within their own community, engage in learning activities that involve exploring local ecological or cultural features, and connect scientific theories to examples found in the immediate surroundings of their local area.

The level of place-based education in terms of grounded in local context attained an overall weighted mean of 4.79 with a standard deviation of 0.20, verbally interpreted as Very High. This indicates that science instruction demonstrates a very high level of integration of local context in the teaching and learning process. This further implies that students frequently experience science lessons that relate scientific ideas to real-life situations within their communities, making learning more meaningful and relevant.

In summary, the findings indicate that grounding science instruction in the local context is an essential component of effective place-based education. By incorporating local environments, community resources, and real-life issues into classroom learning, students are able to develop a deeper understanding of scientific concepts while strengthening their

awareness of the relationship between science and their immediate surroundings.

Table 2. Level of Place-based Education in Teaching Science in terms of Experiential Learning

Statements	Mean	SD	Remarks
In Place-Based Education, I involve in the learning process that...			
...integrate hands-on activities that immerse us in real-life environmental and community situations.	4.75	0.43	Strongly Agree
...facilitate learning experiences that allow us to directly interact with local ecological or cultural resources.	4.66	0.48	Strongly Agree
...design lessons that require us to explore the community to deepen their understanding of scientific concepts.	4.78	0.41	Strongly Agree
...provide opportunities for us to apply classroom learning to authentic, place-specific challenges.	4.70	0.46	Strongly Agree
...engage learners in field-based investigations that highlight the relevance of science within the local context.	4.81	0.39	Strongly Agree
Weighted Mean	4.74		
SD	0.23		
Verbal Interpretation	Very High		

Table 2 shows the level of place-based education in teaching Science in terms of experiential learning. Respondents strongly agree that place-based learning integrates hands-on activities that immerse them in real-life environmental and community situations, facilitates learning experiences that allow direct interaction with local ecological or cultural resources, designs lessons that require exploration of the community to deepen understanding of scientific concepts, provides opportunities to apply classroom learning to authentic place-specific challenges, and engages learners in field-based investigations that highlight the relevance of science within the local context.

The level of place-based education in terms of experiential learning attained an overall weighted mean of 4.74 with a standard deviation of 0.23, verbally interpreted as Very High. This indicates that science instruction demonstrates a very high level of experiential learning practices that allow students to actively participate in meaningful learning activities connected to their local environment. This further implies that learners are frequently exposed to hands-on and field-based experiences that strengthen their understanding of scientific concepts through direct engagement with real-world situations.

In summary, the findings demonstrate that experiential learning is a vital component of place-based education in science teaching. Through hands-on exploration, community engagement, and field-based investigations, students are able to connect theoretical knowledge with practical experiences, thereby enhancing their understanding and appreciation of science within their local context.

Table 3 shows the level of place-based education in teaching Science in terms of authenticity. Respondents strongly agree that learning experiences integrate local culture, traditions, and practices into lesson plans to make learning relevant to their lives, incorporate real-world community

problems into classroom activities to enhance meaningful learning, use local resources such as natural sites, community centers, and historical landmarks as teaching tools, design tasks and projects that reflect authentic situations encountered outside the classroom, and encourage learners to explore and investigate issues that have direct significance in their local context.

Table 3. Level of Place-Based Education in Teaching Science in terms of Authenticity

Statements	Mean	SD	Remarks
In Place-Based Education, I engage in the learning experience that ...			
...integrate local culture, traditions, and practices into lesson plans to make learning relevant to us lives.	4.88	0.32	Strongly Agree
...incorporate real-world problems from the community into classroom activities to enhance meaningful learning.	4.65	0.48	Strongly Agree
...use local resources, such as natural sites, community centers, and historical landmarks, as teaching tools.	4.81	0.39	Strongly Agree
...design tasks and projects that reflect authentic situations that may encounter outside the classroom.	4.67	0.47	Strongly Agree
...encourage us to explore and investigate issues that have direct significance in their local context.	4.78	0.42	Strongly Agree
Weighted Mean	4.76		
SD	0.22		
Verbal Interpretation	Very High		

The level of place-based education in terms of authenticity attained an overall weighted mean of 4.76 with a standard deviation of 0.22, verbally interpreted as Very High. This indicates that science instruction demonstrates a very high level of authenticity in learning experiences by integrating real-life community situations and resources into classroom instruction. This further implies that students perceive their learning activities as meaningful, relevant, and closely connected to real-world issues within their community.

In summary, the findings confirm that authenticity plays a crucial role in strengthening place-based education. By incorporating real-life problems, community resources, and cultural contexts into science lessons, learners are able to see the practical value of scientific knowledge and develop a deeper understanding of how science applies to everyday life.

Authenticity in education plays a crucial role in how students engage with their learning. When educators create authentic learning experiences, students find it easier to connect what they learn in school to real-world situations.

Table 4 shows the level of place-based education in teaching Science in terms of collaboration. Respondents strongly agree that collaborative tasks encourage them to work together in exploring local environmental or community-based projects, facilitate group activities that require shared decision-making and collective problem-solving, promote cooperation when conducting experiments or field investigations in the local context, design tasks that require learners to leverage each other's strengths and knowledge of the community, and foster partnerships between students and community members to enhance learning experiences.

Table 4. Level of Place-Based Education in Teaching Science in terms of Collaboration

Statements	Mean	SD	Remarks
In Place-Based Education, I Participate in a collaborative tasks that ...			
...encourage us to work together in exploring local environmental or community-based projects.	4.84	0.37	Strongly Agree
...facilitate group activities that require shared decision-making and collective problem-solving.	4.74	0.44	Strongly Agree
...promote cooperation among us when conducting experiments or field investigations in the local context.	4.70	0.46	Strongly Agree
...design tasks that require us to leverage each other's strengths and knowledge of the community.	4.70	0.46	Strongly Agree
...foster partnerships between us and community members to enhance learning experiences.	4.74	0.44	Strongly Agree
Weighted Mean	4.75		
SD	0.24		
Verbal Interpretation	Very High		

The level of place-based education in terms of collaboration attained an overall weighted mean of 4.75 with a standard deviation of 0.24, verbally interpreted as Very High. This indicates that science instruction demonstrates a very high level of collaborative learning practices that encourage teamwork, cooperation, and shared responsibility among students. This further implies that learners frequently engage in group-based activities and community partnerships that enhance their learning experiences and promote collective problem-solving skills.

In summary, the findings demonstrate that collaboration is an essential element of place-based education. By engaging students in cooperative learning and community-based projects, science instruction fosters teamwork, communication, and collective inquiry, which are important in addressing real-world environmental and scientific challenges. One of the main benefits of student collaboration is the increase in motivation. When students collaborate, they can share ideas and support one another, which creates a lively learning environment.

Table 5. Level of Place-Based Education in Teaching Science in terms of Reflective Practice

Statements	Mean	SD	Remarks
In Place-Based Education, I manifest practices that ...			
...encourage us to evaluate our own learning experiences during community- or environment-based activities.	4.87	0.33	Strongly Agree
...promote critical thinking by answering question reflecting the outcomes of local field investigations.	4.80	0.40	Strongly Agree
... guide us to connect classroom concepts with their observations and experiences in the local context.	4.73	0.44	Strongly Agree
...facilitate discussions where we analyze the challenges and successes of our projects.	4.76	0.43	Strongly Agree
...incorporate reflective journals or reports that help us articulate insights gained from real-world learning.	4.77	0.42	Strongly Agree
Weighted Mean	4.79		
SD	0.21		
Verbal Interpretation	Very High		

Table 5 shows the level of place-based education in teaching Science in terms of reflective practice. Respondents strongly agree that reflective practices encourage them to evaluate their own learning experiences during community- or environment-based activities, promote critical thinking by answering reflective questions related to the outcomes of local field investigations, guide learners in connecting classroom concepts with their observations and experiences in the local context, facilitate discussions that analyze the challenges and successes of their projects, and incorporate reflective journals or reports that help articulate insights gained from real-world learning.

The level of place-based education in terms of reflective practice attained an overall weighted mean of 4.79 with a standard deviation of 0.21, verbally interpreted as Very High. This indicates that science instruction demonstrates a very high level of reflective learning practices that encourage students to think critically about their experiences and learning outcomes. This further implies that learners are guided to analyze their observations, evaluate their learning processes, and connect theoretical knowledge with practical experiences. In summary, the findings indicate that reflective practice is an important component of place-based education. Through reflection and critical analysis of their experiences, students develop deeper insights into scientific concepts and gain a more meaningful understanding of the relationship between science and their local environment.

One way reflective practice enhances teaching effectiveness is by allowing educators to assess their teaching strategies. When teachers reflect on their lessons, they can identify what worked well and what did not. This ongoing evaluation helps them become more effective in delivering content.

Level of Environmental Awareness of the Students.

In this study, the level of Environmental Awareness by the students refers to Awareness of environmental issues, Concern for nature, Eco-friendly habits, and Involvement in environmental projects. The following tables show the statements, mean, standard deviation, remarks, and verbal interpretation from the perspectives of the respondents.

Table 6. Level of Environmental Awareness of the students in terms of Awareness on Environmental Issue

Statements	Mean	SD	Remarks
In the Place-Based Education, I understand environmental issues through...			
...recognizing the impact of human activities on the local environment.	4.73	0.44	Strongly Agree
...identifying common environmental problems in my community, such as pollution or deforestation.	4.68	0.47	Strongly Agree
...observing changes in the natural surroundings and understand their causes.	4.76	0.43	Strongly Agree
...explaining the importance of conserving local natural resources.	4.74	0.44	Strongly Agree
...discussing environmental issues with peers, family, or teachers.	4.77	0.42	Strongly Agree
Weighted Mean	4.74		
SD	0.23		
Verbal Interpretation	Very High		

Table 6 shows the level of Environmental Awareness by the students in terms of Awareness of Environmental Issues. Respondents strongly agree that they recognize the impact of human activities on the local environment, identify common environmental problems in their community such as pollution or deforestation, observe changes in natural surroundings and understand their causes, explain the importance of conserving local natural resources, and discuss environmental issues with peers, family members, or teachers.

The level of Environmental Awareness in terms of awareness of environmental issues attained an overall weighted mean of 4.74 with a standard deviation of 0.23, verbally interpreted as Very High. This indicates that students demonstrate a very high level of awareness regarding environmental problems and their causes within their local community. This further implies that learners are knowledgeable about environmental concerns and understand the importance of protecting natural resources.

In summary, the findings demonstrate that students possess strong awareness of environmental issues affecting their surroundings. Through exposure to place-based learning experiences, students are able to recognize environmental challenges and develop a greater sense of responsibility toward environmental protection.

In today's world, environmental issues are becoming increasingly important. Many students are aware of these issues, but the level of awareness varies. Some students understand the causes and effects of climate change, pollution, and biodiversity loss, while others may have limited knowledge. Education plays a crucial role in shaping students' awareness of environmental issues.

Moreover, increasing students' environmental awareness encourages them to adopt responsible behaviors such as proper waste disposal, energy conservation, and participation in community clean-up activities. When learners are exposed to real-world environmental challenges, they become more conscious of the impact of human actions on nature. This awareness can inspire students to become advocates for environmental protection and active contributors to sustainable development within their communities.

Table 7. Level of Environmental Awareness of the students in terms of Concern for Nature

Statements	Mean	SD	Remarks
In a Place-Based Education, I show concerns for nature through....			
...appreciating the beauty and value of the natural environment in my community.	4.77	0.42	Strongly Agree
...participating in activities that preserve or restore the environment, such as tree planting or clean-up drives.	4.78	0.42	Strongly Agree
...reducing personal actions that may harm the environment, such as littering or wasting resources.	4.82	0.38	Strongly Agree
...supporting initiatives or programs that aim to conserve nature in the local area.	4.86	0.35	Strongly Agree
...respecting the balance of ecosystems by avoiding activities that disrupt them.	4.70	0.46	Strongly Agree
Weighted Mean	4.79		
SD	0.21		
Verbal Interpretation			Very High

Table 8 shows the level of Environmental Awareness by students in terms of concern for nature. Respondents strongly agree that they appreciate the beauty and value of the natural environment in their community, participate in activities that preserve or restore the environment such as tree planting or clean-up drives, reduce personal actions that may harm the environment, support initiatives that aim to conserve nature in the local area, and respect the balance of ecosystems by avoiding activities that disrupt them.

The level of Environmental Awareness in terms of concern for nature attained an overall weighted mean of 4.79 with a standard deviation of 0.21, verbally interpreted as Very High. This indicates that students demonstrate a very high level of concern and appreciation for the natural environment. This further implies that learners value environmental protection and actively support efforts that promote sustainability and ecological balance.

In summary, the findings indicate that students develop a strong sense of responsibility toward nature. Their appreciation and concern for the environment encourage them to participate in conservation activities and support initiatives that aim to protect natural resources.

Table 8. Level of Environmental Awareness of the Students in terms of Eco-friendly Habits

Statements	Mean	SD	Remarks
In a Place-Based Education, I do practice eco-friendly habits through....			
...using reusable materials, such as water bottles or shopping bags, instead of disposable ones.	4.82	0.39	Strongly Agree
...participating in school or community programs that promote sustainability.	4.72	0.45	Strongly Agree
...adopting habits that reduce pollution, such as walking, biking, or using public transportation.	4.80	0.40	Strongly Agree
...avoiding actions that harm the environment, such as littering or cutting trees unnecessarily.	4.68	0.47	Strongly Agree
...supporting initiatives that promote green living and environmental protection.	4.76	0.43	Strongly Agree
Weighted Mean	4.76		
SD	0.23		
Verbal Interpretation			Very High

Table 9 shows the level of Environmental Awareness of students in terms of Eco-friendly Habits. Respondents strongly agree that they practice eco-friendly habits such as using reusable materials instead of disposable ones, participating in sustainability programs in school or community, adopting habits that reduce pollution such as walking or using public transportation, avoiding actions that harm the environment, and supporting initiatives that promote green living and environmental protection.

The level of Environmental Awareness in terms of Eco-friendly Habits attained an overall weighted mean of 4.76 with a standard deviation of 0.23, verbally interpreted as Very High. This indicates that students demonstrate a very high level of environmentally responsible behaviors in their daily lives. This further implies that learners actively practice habits that support environmental sustainability and contribute to reducing environmental harm.

In summary, the findings demonstrate that students consistently practice eco-friendly behaviors that promote environmental sustainability. These habits reflect their growing awareness and commitment to protecting the environment through responsible daily actions.

Table 9. Level of Environmental Awareness of the students in terms of Involvement in Environmental Projects

Statements	Mean	SD	Remarks
In a Place-Based Education, I participate in environmental projects and initiatives through...			
...participating actively in school or community environmental projects.	4.75	0.43	Strongly Agree
...collaborating with peers during tree planting, clean-up drives, or similar activities.	4.71	0.46	Strongly Agree
...volunteering time and effort for environmental awareness campaigns.	4.73	0.44	Strongly Agree
...planning initiatives that address local environmental issues.	4.75	0.43	Strongly Agree
...taking responsibility for assigned tasks in environmental projects.	4.79	0.41	Strongly Agree
Weighted Mean	4.75		
SD	0.26		
Verbal Interpretation			Very High

Table 10 shows the level of Environmental Awareness by the Students in terms of involvement in Environmental Projects. Respondents strongly agree that they participate actively in school or community environmental projects, collaborate with peers during activities such as tree planting or clean-up drives, volunteer time and effort for environmental awareness campaigns, plan initiatives that address local environmental issues, and take responsibility for assigned tasks in environmental projects.

The level of Environmental Awareness in terms of involvement in Environmental Projects attained an overall weighted mean of 4.75 with a standard deviation of 0.26, verbally interpreted as Very High. This indicates that students demonstrate a very high level of participation in environmental initiatives and community-based activities. This further implies that learners are actively engaged in environmental projects that promote sustainability and community responsibility.

In summary, the findings demonstrate that students are highly involved in environmental initiatives that address local ecological concerns. Their participation in environmental projects strengthens their sense of responsibility and commitment toward protecting and preserving the environment.

Level of Science Engagement of the Learners.

In this study, the Level of Science Engagement by the students refers to Enthusiasm, Hands-on involvement, and Expressing Scientific thought. The following tables show the statements, mean, standard deviation, remarks, and verbal interpretation from the perspectives of the respondents.

Table 10 shows the level of Science Engagement of the learners in terms of Enthusiasm. Respondents strongly agree that they demonstrate enthusiasm toward science learning by showing eagerness to participate in science lessons and activities, demonstrating curiosity when learning new

scientific concepts, asking questions to deepen their understanding during science classes, expressing interest in exploring scientific phenomena in the local environment, and engaging actively in experiments, demonstrations, and hands-on activities.

Table 10. Level of Science Engagement of the learners in terms of Enthusiasm

Statements	Mean	SD	Remarks
In a Place-Based Education, I demonstrate enthusiasm toward science learning through...			
...showing eagerness to participate in science lessons and activities.	4.86	0.35	Strongly Agree
...demonstrating curiosity when learning new scientific concepts.	4.80	0.40	Strongly Agree
...asking questions to deepen understanding during science classes.	4.70	0.46	Strongly Agree
...expressing interest in exploring scientific phenomena in the local environment.	4.78	0.41	Strongly Agree
...engaging actively in experiments, demonstrations, and hands-on activities.	4.77	0.42	Strongly Agree
Weighted Mean	4.78		
SD	0.22		
Verbal Interpretation			Very High

The level of science engagement in terms of enthusiasm attained an overall weighted mean of 4.78 with a standard deviation of 0.22, verbally interpreted as Very High. This indicates that students demonstrate a very high level of enthusiasm toward science learning. This further implies that learners are highly motivated and actively interested in participating in science-related activities, which strengthens their engagement and curiosity in understanding scientific concepts.

In summary, the findings demonstrate that enthusiasm plays an important role in fostering science engagement among students. Through active participation, curiosity, and interest in exploring scientific ideas and phenomena, students develop a positive attitude toward science learning, particularly when lessons are connected to meaningful and place-based experiences.

Moreover, varied teaching strategies help address the different learning styles and needs of students, allowing more learners to participate meaningfully in class activities. Inquiry-based experiments, collaborative tasks, and technology-integrated lessons can stimulate curiosity and encourage deeper exploration of scientific ideas. When students experience success and enjoyment in learning science, their confidence increases, motivating them to engage further in future lessons. As a result, effective teaching methods not only improve academic performance but also nurture long-term interest in science.

Table 11 shows the level of Science Engagement of the learners in terms of Hands-on involvement. Respondents strongly agree that they engage in Hands-on science learning experiences by participating actively in laboratory experiments and practical science activities, manipulating materials and tools to explore scientific concepts, conducting experiments while following proper procedures and safety guidelines, engaging in hands-on projects that relate science to real-life situations, and carefully observing and recording outcomes during practical activities.

Table 11. Level of Science Engagement of the learners in terms of Hands-on involvement

Statements	Mean	SD	Remarks
In a Place-Based Education, I engage in hands-on science learning experiences through...			
...participating actively in laboratory experiments and practical science activities.	4.79	0.41	Strongly Agree
...manipulating materials and tools to explore scientific concepts.	4.65	0.48	Strongly Agree
...conducting experiments following proper procedures and safety guidelines.	4.79	0.41	Strongly Agree
...engaging in hands-on projects that relate science to real-life situations.	4.73	0.45	Strongly Agree
...observing and record outcomes during practical activities carefully.	4.80	0.40	Strongly Agree
Weighted Mean	4.75		
SD	0.23		
Verbal Interpretation	Very High		

The level of science engagement in terms of hands-on involvement attained an overall weighted mean of 4.75 with a standard deviation of 0.23, verbally interpreted as Very High. This indicates that students demonstrate a very high level of participation in practical and experiential science learning activities. This further implies that learners are actively involved in experiments, investigations, and projects that allow them to explore scientific concepts through direct experience and practical application.

In summary, the findings indicate that hands-on involvement plays a crucial role in strengthening students' engagement in science learning. Through active participation in laboratory work, practical investigations, and real-life science projects, students are able to deepen their understanding of scientific principles and develop essential inquiry and problem-solving skills.

Table 12. Level of Science Engagement of the learners in terms of Express Scientific thought

Statements	Mean	SD	Remarks
In a Place-Based Education, I express scientific thinking and understanding through...			
...discussing scientific ideas confidently with classmates and teachers.	4.75	0.43	Strongly Agree
...interpreting data and information from experiments or investigations.	4.73	0.44	Strongly Agree
...formulating hypotheses or predictions based on scientific understanding.	4.81	0.39	Strongly Agree
...communicating scientific findings effectively through writing or presentations.	4.72	0.45	Strongly Agree
...comparing results from different experiments to draw conclusions.	4.80	0.40	Strongly Agree
Weighted Mean	4.76		
SD	0.23		
Verbal Interpretation	Very High		

Table 12 shows the Level of Science Engagement of the learners in terms of expressing Scientific thought. Respondents strongly agree that they express scientific thinking and understanding by discussing scientific ideas confidently with classmates and teachers, interpreting data and information from experiments or investigations, formulating hypotheses or predictions based on scientific understanding, communicating scientific findings effectively through writing

or presentations, and comparing results from different experiments to draw conclusions.

The level of Science Engagement in terms of expressing Scientific thought attained an overall weighted mean of 4.76 with a standard deviation of 0.23, verbally interpreted as Very High. This indicates that students demonstrate a very high level of ability in expressing and communicating scientific ideas and understanding. This further implies that learners are capable of analyzing information, explaining scientific concepts, and sharing their findings through discussions, written outputs, and presentations.

In summary, the findings demonstrate that expressing scientific thought is an important aspect of science engagement. By communicating ideas, interpreting data, and drawing conclusions from investigations, students strengthen their scientific reasoning and develop confidence in articulating their understanding of scientific concepts.

Test of Association between the Place-Based Education and Environmental Awareness of the Learners.

To test the significant relationship between the Place-Based Education and Students' Environmental Awareness in terms of Awareness on Environmental issue, Concern for nature, Eco-friendly habits, and Involvement in environmental projects they were treated statistically using Real Statistics Data Analysis Tools using the Pearson Product Moment Correlation Coefficient.

Table 13. Significant Relationship between the Place-Based Education and Environmental Awareness of the students

Place-Based Education		Awareness on Environmental Issue	Concern for Nature	Eco-friendly Habits	Involvement in environmental Projects
Grounded in local context	Pearson Correlation	0.262**	0.167**	0.304**	0.343**
	Sig. (2-tailed)	(2-0.000)	0.018	0.000	0.000
	N	209	209	209	209
Experiential Learning	Pearson Correlation	0.324**	0.136	0.336**	0.171**
	Sig. (2-tailed)	(2-0.000)	0.055	0.000	0.016
	N	209	209	209	209
Authenticity	Pearson Correlation	0.225**	0.219**	0.273**	0.157*
	Sig. (2-tailed)	(2-0.001)	0.002	0.000	0.028
	N	209	209	209	209
Collaboration	Pearson Correlation	0.134	0.319**	0.245**	0.225**
	Sig. (2-tailed)	(2-0.059)	0.000	0.000	0.001
	N	209	209	209	209
Reflective Practice	Pearson Correlation	0.216**	0.287**	0.289**	0.183**
	Sig. (2-tailed)	(2-0.002)	0.000	0.000	0.010
	N	209	209	209	209

Table 13 presents the significant relationship between Place-Based Education and students' Environmental

Awareness in terms of awareness of environmental issues, concern for nature, eco-friendly habits, and involvement in environmental projects.

The results show that grounded in local context has a significant positive relationship with awareness of environmental issues ($r = 0.262$, $p = 0.000$), eco-friendly habits ($r = 0.304$, $p = 0.000$), and involvement in environmental projects ($r = 0.343$, $p = 0.000$). However, its relationship with concern for nature ($r = 0.167$, $p = 0.018$), although positive, is relatively weaker but still significant. This indicates that connecting science lessons with the local environment helps students better recognize environmental problems and encourages them to practice environmentally responsible behaviors and participate in environmental initiatives.

In terms of experiential learning, a significant relationship was found with awareness of environmental issues ($r = 0.324$, $p = 0.000$), eco-friendly habits ($r = 0.336$, $p = 0.000$), and involvement in environmental projects ($r = 0.171$, $p = 0.016$). However, its relationship with concern for nature ($r = 0.136$, $p = 0.055$) was not significant. This suggests that hands-on and field-based learning experiences help students develop awareness of environmental concerns and encourage environmentally responsible behaviors, although they may not always directly influence emotional concern toward nature.

For authenticity, significant positive relationships were found across all indicators of environmental awareness: awareness of environmental issues ($r = 0.225$, $p = 0.001$), concern for nature ($r = 0.219$, $p = 0.002$), eco-friendly habits ($r = 0.273$, $p = 0.000$), and involvement in environmental projects ($r = 0.157$, $p = 0.028$). These results indicate that when science lessons are connected to real-life situations and local community contexts, students are more likely to develop stronger environmental awareness and responsible behaviors.

Meanwhile, collaboration showed significant relationships with concern for nature ($r = 0.319$, $p = 0.000$), eco-friendly habits ($r = 0.245$, $p = 0.000$), and involvement in environmental projects ($r = 0.225$, $p = 0.001$), but no significant relationship with awareness of environmental issues ($r = 0.134$, $p = 0.059$). This implies that collaborative learning activities and community participation may strengthen students' appreciation of nature and encourage active involvement in environmental protection initiatives.

Lastly, reflective practice demonstrated significant positive relationships with all dimensions of environmental awareness, including awareness of environmental issues ($r = 0.216$, $p = 0.002$), concern for nature ($r = 0.287$, $p = 0.000$), eco-friendly habits ($r = 0.289$, $p = 0.000$), and involvement in environmental projects ($r = 0.183$, $p = 0.010$). This suggests that reflective learning activities help students analyze environmental issues more deeply and encourage responsible environmental actions.

Overall, the findings reveal that several components of place-based education have significant positive relationships with students' environmental awareness. This indicates that integrating local context, experiential learning, authentic tasks, collaboration, and reflective practices in science instruction

contributes to the development of students' understanding, attitudes, and behaviors toward environmental protection.

In summary, the results indicate that Place-Based Education plays an important role in strengthening students' environmental awareness. By connecting science learning with real-life community experiences and environmental issues, students become more aware of ecological challenges and are more likely to adopt environmentally responsible behaviors and participate in environmental initiatives.

Place-Based Education (PBE) fosters a sense of connection to the ecological issues that directly impact students' lives. A study by Hamilton and Marckini-Polk (2023) demonstrated that middle school students participating in place-based education programs exhibited notable advancements in their environmental literacy and stewardship behaviors. This highlights the potential of PBE to not only educate students about the environment but also to inspire actionable commitments towards its conservation. This demonstrates that schools, districts, and policymakers should consider expanding PBE initiatives as a strategic approach to developing future citizens who are both knowledgeable about and actively committed to addressing local and global environmental challenges.

Test of Association between the Place-Based Education and Science Engagement of the students.

To test the significant relationship between the Place-Based Education and students' science engagement in terms of Enthusiasm, Hands-on involvement, and Express scientific thought in environmental projects they were treated statistically using Real Statistics Data Analysis Tools using the Pearson Product Moment Correlation Coefficient.

Moreover, the Pearson r correlation was used to determine both the strength and direction of the relationship between the variables, specifically whether place-based education practices are positively or negatively associated with students' science engagement. This statistical treatment allows for an objective interpretation of how changes in place-based education practices may influence students' level of participation and interest in science learning activities. Furthermore, the level of significance was set to determine whether the computed relationship is statistically significant or not, providing a basis for accepting or rejecting the null hypothesis.

Table 14 presents the significant relationship between Place-Based Education and students' Science engagement in terms of enthusiasm, hands-on involvement, and expressing scientific thought.

The results show that grounded in local context has a significant positive relationship with enthusiasm ($r = 0.317$, $p = 0.000$), hands-on involvement ($r = 0.312$, $p = 0.000$), and expressing scientific thought ($r = 0.273$, $p = 0.000$). This indicates that connecting science lessons with students' local environment and community experiences helps increase their interest, active participation, and ability to communicate scientific ideas.

In terms of experiential learning, significant positive relationships were observed with enthusiasm ($r = 0.258$, $p = 0.000$), hands-on involvement ($r = 0.287$, $p = 0.000$), and

expressing scientific thought ($r = 0.317, p = 0.000$). These findings suggest that hands-on activities, field investigations, and real-life learning experiences enhance students' motivation, participation in practical activities, and ability to express scientific understanding.

Table 14. Significant Relationship between the Place-Based Education and Engagement of the students in Science

Place-Based Education		Enthusiasm	Hands-on involvement	Express scientific thought
Grounded in Local Context	Pearson Correlation	0.317**	0.312**	0.273**
	Sig. (2-tailed)	0.000	0.000	0.000
	N	209	209	209
Experiential Learning	Pearson Correlation	0.258**	0.287**	0.317**
	Sig. (2-tailed)	0.000	0.000	0.000
	N	209	209	209
Authenticity	Pearson Correlation	0.240**	0.050	0.369**
	Sig. (2-tailed)	0.000	0.483	0.000
	N	209	209	209
Collaboration	Pearson Correlation	0.272**	0.276**	0.157*
	Sig. (2-tailed)	0.000	0.000	0.027
	N	209	209	209
Reflective Practice	Pearson Correlation	0.247**	0.272**	0.212**
	Sig. (2-tailed)	0.000	0.000	0.003
	N	209	209	209

For authenticity, significant relationships were found with enthusiasm ($r = 0.240, p = 0.000$) and expressing scientific thought ($r = 0.369, p = 0.000$). However, its relationship with hands-on involvement ($r = 0.050, p = 0.483$) was not significant. This implies that while authentic learning experiences connected to real-world contexts increase students' interest and ability to communicate scientific ideas, they may not always directly influence students' participation in practical science activities.

Meanwhile, collaboration demonstrated significant positive relationships with enthusiasm ($r = 0.272, p = 0.000$), hands-on involvement ($r = 0.276, p = 0.000$), and expressing scientific thought ($r = 0.157, p = 0.027$). This indicates that collaborative learning activities such as group investigations, teamwork, and shared problem-solving enhance students' interest in science, participation in activities, and ability to share scientific ideas.

Lastly, reflective practice showed significant positive relationships with enthusiasm ($r = 0.247, p = 0.000$), hands-on involvement ($r = 0.272, p = 0.000$), and expressing scientific thought ($r = 0.212, p = 0.003$). This confirms that reflective activities encourage students to think critically about their learning experiences and strengthen their engagement and participation in science learning.

Overall, the findings reveal that Place-Based Education has significant positive relationships with students' science engagement. This indicates that integrating local context, experiential learning, authentic activities, collaboration, and

reflective practices in science teaching can enhance students' enthusiasm, active participation, and ability to express scientific understanding.

In summary, the results demonstrate that Place-Based Education plays a vital role in promoting Science Engagement among students. By connecting science lessons with real-world community contexts and meaningful learning experiences, students become more interested, actively involved, and confident in expressing scientific ideas and understanding.

This aligns with findings from Yemini, Engel, and Simon (2025), who conducted a systematic review of literature and noted that place-based education consistently enhances environmental awareness across various educational settings. Their review emphasized that the contextual relevance of local environments serves to deepen students' understanding and engagement with environmental challenges.

IV. CONCLUSION AND RECOMMENDATIONS

The null hypothesis stating that there is no significant relationship between place-based education and students' environmental awareness was rejected. Place-based education significantly improves students' awareness, concern, and participation in environmental activities.

The null hypothesis stating that there is no significant relationship between place-based education and students' science engagement was likewise rejected. Place-based education significantly enhances students' enthusiasm, participation, and scientific communication skills.

Students exposed to contextualized and experiential science teaching develop stronger environmental responsibility and deeper appreciation of scientific concepts.

Place-based education is an effective instructional approach that makes science learning more meaningful, relevant, and engaging for students.

Integrating local community issues, hands-on experiences, and reflective activities in science lessons contributes to better learner outcomes.

Based on the drawn conclusions resulted to the following recommendations:

Science Teachers may regularly integrate place-based education strategies such as fieldwork, local investigations, environmental projects, and collaborative learning activities in science instruction. This means teachers should design lessons that go beyond classroom lectures by bringing students to actual learning sites such as rivers, school gardens, coastal areas, or community waste facilities where applicable. Teachers may also assign tasks such as identifying local environmental problems, collecting data from their surroundings, and analyzing real situations related to topics like ecosystems, pollution, and climate change. Through these activities, students are able to directly observe scientific concepts in action, making abstract ideas easier to understand and more meaningful.

School Administrators may provide training programs, seminars, and instructional support to strengthen teachers' skills in implementing place-based education. Specifically, administrators may organize regular in-service trainings

focused on experiential learning strategies, curriculum contextualization, and the use of community resources in teaching science. They may also allocate budget for field trips, laboratory materials, and environmental projects to support hands-on learning activities. In addition, administrators may build partnerships with local government units, environmental agencies, and nearby institutions to support learning opportunities outside the school, ensuring that teachers have the necessary support to effectively implement place-based education.

Students may actively participate in environmental programs, science fairs, and community-based activities to further improve their awareness and engagement. This includes joining activities such as tree planting, coastal or river clean-up drives, waste segregation campaigns, and school-based environmental monitoring projects. Students may also conduct simple research projects within their communities, such as surveying environmental issues or studying local biodiversity. Through these activities, learners are able to apply scientific concepts in real-life contexts, develop responsibility toward the environment, and strengthen their engagement in science learning.

Curriculum Developers may include more contextualized, community-based, and experiential learning competencies in the science curriculum. This involves revising curriculum guides to incorporate learning outcomes that require students to investigate local environmental issues, perform community-based research, and propose science-based solutions to real-world problems. Curriculum developers may also design performance tasks that encourage fieldwork, experimentation, and reflection based on students' local experiences. By doing so, the curriculum becomes more relevant and responsive to the needs of learners and their communities, making science education more practical and meaningful.

Parents and Community Stakeholders may support environmental and science programs by encouraging eco-friendly practices at home and collaborating with schools through participation in activities, sharing local knowledge, and assisting in community-based projects. Their involvement strengthens the connection between classroom learning and real-life application.

Future researchers may conduct similar studies in different settings and explore other factors such as motivation, teacher readiness, school support, and school type differences. They may also use mixed-method approaches and examine long-term effects on students' academic performance, environmental behavior, decision-making, and the role of technology in place-based learning to further strengthen and expand the findings.

Continuous use of place-based education is recommended to develop environmentally aware, scientifically engaged, and socially responsible learners through consistent contextualized and experiential teaching. This approach extends learning beyond the classroom, enhances application of scientific knowledge to real-life environmental issues, and promotes lifelong learning and sustainable community involvement.

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