

STUDENTS' ACADEMIC ACHIEVEMENT AND WELL-BEING IN EARTH SCIENCE THROUGH PLACE-BASED LEARNING (PBL)

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ABSTRACT. *Place-based learning (PBL) or pedagogy of place is an exceptional student-centred strategy that uses the available learning spaces in the community to support and build up learning. The study investigated the academic achievement and well-being in Earth Science of Grade 11 students at Stella Matutina Academy of Bukidnon, Inc. It sought to: determine the level of academic achievement in pre-test and post-test; describe the level of well-being in terms of the joy of learning, school connectedness, educational purpose, and academic efficacy; ascertain any difference in academic achievement when exposed to PBL and non PBL and ascertain any significant difference on well-being between pre-test and post-test. The study used a quasi-experimental pre-test and post-test research design. Results showed that students' academic achievement in PBL had increased significantly as well as their well-being after the intervention. Based on the data, the student's level of well-being when exposed to the PBL pre-test and post-test revealed that educational purpose yields the highest post-test mean followed by joy of learning, academic efficacy, and school connectedness has the lowest post-test mean. There is a significant difference in the overall academic achievement before and after the intervention of PBL, thus rejecting the null hypothesis stating that there is no significant difference between the two variables. There is also an important difference between pre-test and post-test in students' well-being. The change in the mean score of both groups especially in the PBL also shows higher than the non-PBL. This indicates that students exposed to PBL have increased academic achievement and well-being as compared to the group that is non-PBL. It is recommended, that educators explore Place-based learning (PBL) to increase not just the academic aspect but also the overall well-being of students.*

Keywords: *academic achievement, students' well-being, place-based learning, earth science*

1. INTRODUCTION

Teaching science is not purely conceptual but also involves the application of theories through hands-on activities. Such activities involve laboratory experiments, field explorations, and other activities that develop students' curiosity, imagination, and soft and hard skills. There is always an idea that science is an application of learned knowledge to improve lives. Many people are interested in science because of its exciting nature, but not everyone can learn it.

By definition, science systematically studies the structure and behavior of the physical and natural worlds through observation and experiment [1]. It involves the disciplines of Biology, Chemistry, Space Sciences, and Sciences that deal with scientific methods, measurements, observations, and research. In education, science is an interactive process that primarily involves classroom talk, field explorations, and laboratory activities.

Science generally influences people's lives, making it an essential part of one's life. Many scientists spent many hours learning new things through science techniques, which are now being used and utilized. However, it has also become a challenge for educators to teach science meaningfully, especially with students bombarded with so many distractions that even getting their attention to learn has become a problem.

Scientific literacy in the Philippines could not be considered better; an international exam conducted in 2018 by the Program for International Student Assessment revealed that the Philippines had flanked in science and mathematics [2]. This result is not shocking because even in recent years, the National Examination Test (NAT) overall passing percentage is not excellent. All these problems in the academic achievement of students were made worse by the advent of the COVID-19 pandemic. This resulted in extensive damage to students' academic achievement [3, 4] and the well-being of

students. Moreover, scientific processes like basic scientific skills such as observing, classifying, communicating, measuring, inferring, and predicting were significantly lower in scientific literacy from all the ASEAN countries participating in 2018 [5].

The low test scores of students in Earth Science are significantly alarming not just in Stella Matutina Academy of Bukidnon, Inc. but in general. The students had a hard time learning Earth Science because they found the concept tough and challenging. Thus, the need for hands-on activities is needed to reinforce learning. Another problem observed aside from academic achievement is the low well-being seen by teachers around the world. As the face-to-face began to start and the new normal emerged, the well-being of students was at risk.

The effects of low well-being have resulted in greater psychological risks like fear, stress, anxiety, and depression for youth age and students [6, 7, 8]

In this new era of education, educators are challenged on how to combat these learning problems so that it can increase academic achievement, and well-being of students and how teachers can become effective curriculum implementers. Many educators are trying out different approaches, like teaching through virtual interactions [9-14], offline modular learning [15], blended learning [16], inquiry-based learning [17, 18], radio-based learning, and place-based learning (PBL).

In a contemporary educational setting, a newer method of teaching is what every educator needs and Place-based learning (PBL) can meet the terms in teaching Earth Science to develop students' academic achievement and well-being. The term PBL refers to contexts like local ecological environments, social problems, and cultural and historical origins in teaching and learning. In a more profound sense, this strategy represents a relatively new field of exploration.

Similarly, in literature, PBL is sometimes called "pedagogy of place," "environmental education," or "outdoor exploration," and is a multi-faceted learning approach that develops students' investigative skills, encourages engagement in the community, and helps them develop and solve a local problem existing in their society [19].

In this research study, the PBL method is included in outdoor activities such as field explorations and involves solving particular problems found in the community. Thus, it can also be a method to improve academic achievement [20] and the well-being of students. According to research, when students are exposed to PBL their learning goals are higher compared to a group that received a regular class discussion. Furthermore, PBL can solve problems of learning loss, because it can unlock many new perspectives for advanced education sustainability and is the perfect approach for training learners to understand scientific principles in many fields of science by offering them the possibility to draw out scientific concepts through investigative research and solve different problems [21].

This research study explored how the Place-based learning (PBL) method is used to improve the academic achievement and well-being of students in Earth Science at the Stella Matutina Academy of Bukidnon, Inc., Kibawe, Bukidnon.

2. MATERIALS AND METHODS

The study assessed the academic achievement and well-being of students using Place-based learning (PBL) at Stella Matutina Academy of Bukidnon, Inc. for the SY 2022-2023. The quasi-experimental research design was used to examine the student's academic achievement and well-being in the two groups of grade 11 Earth Science class using Place-based learning (PBL). The experimental group was subjected to Place-based learning (PBL), while the control group experienced non-Place-based learning (non-PBL).

A pre-test on academic achievement and well-being was administered to students before the introduction of PBL. The PBL was conducted in the fourth grading period of the school year 2022-2023. After three weeks of implementation, the students retook the same test, which served as the post-test. The result of these tests determined the difference in the student's academic achievement and well-being in Earth Science of Stella Matutina Academy of Bukidnon, Inc grade 11 students.

There were two (2) instruments used to gather the data namely; the test questionnaire and the well-being questionnaire [22]. The researcher constructed sixty-two (62) multiple-choice test items. The researcher also made a table of specifications (TOS) in creating the test items. The items focused primarily on the topics of (a) Mineral Resources, (b) Water Resources, (c) Soil Resources, and (d) Human Activity and the Environment. All topics are based on the latest Department of Education's (DepEd) curriculum guide for K-12 curriculum Grade 11 Earth Science. A science expert was consulted to determine the questionnaire's appropriateness in testing students' academic achievement. The test questions were pilot tested to the Grade 12 class in Stella Matutina Academy of Bukidnon, Inc. Using the KR-21, the reliability test score of the multiple choice test was 0.760, meaning it is acceptable.

A student well-being questionnaire (SWQ) was adapted to test the non-academic assessment [22]. It is available and downloadable with a permission letter from the website tyrenshaw.org/sswq. Some questions were modified to make them suitable for the participants in the study. The questionnaire is composed of sixteen (16) self-report instrument items with four (4) positive statements in each four (4) subcategory, namely, Joy in Learning (JL), School Connectedness (SC), Educational Purpose (EP) and Academic Efficacy (EA). The students' well-being questionnaire subjected to pilot testing and had a Cronbach alpha of 0.89, indicating its reliability level was good. All items were answerable using a 4-point Likert scale (1 = never to 4 = always), and total scores represent overall school-specific well-being-vitality [22].

The researcher wrote a letter to the school director asking for permission to conduct the study at Stella Matutina Academy of Bukidnon, Inc. The study was participated by grade 11 students in Earth Science subject for the school year 2022-2023. A Learning Activity Sheet (LAS) in the form of laboratory sheets was given to the students to follow.

The respondents of the study were grouped into two according to their section. Both groups were given the same Learning activity sheets (LAS) in the form of laboratory sheets. The first group was given Place-based learning (PBL), and the second group was given non-place-based learning (PBL).

The following rating scale was used to better understand the data:

RAW SCORE	GRADE SCALE	INTERPRETATION
0-29	74% and below	Very Low Performance (VLP)
30-49	75%-79%	Low Performance (LP)
35-41	80-84%	Moderate Performance (MP)
42-49	85%-89%	High Performance (MP)
50-62	90% and above	Very High Performance (VHP)

SCALE	RANGE	DESCRIPTIVE RATING	INTERPRETATION
4	3.50-4.00	Always	Very High (VH)
3	2.50-3.49	Often	High (H)
2	1.50-2.49	Rarely	Low (L)
1	1.00 - 1.49	Never	Very Low (VL)

3. RESULTS AND DISCUSSIONS

This part presents the analysis and interpretation of data gathered from the student's scores relevant for testing the study's hypothesis. The order of presentation follows the arrangement of the problems identified in the study.

3.1 Students' Academic Achievement of the PBL and non-PBL in Earth Science

Table 1 presents the pretest mean scores of students exposed to the place-based learning (PBL) and non-place-based learning (non-PBL) methods. Most pre-test scores of non-PBL and PBL methods are below 75%, indicating very low performance (VLP).

The overall mean percentage score of the students exposed to the non Place-Based Learning method is 24.51, while 27.65, for the Place-Based Learning method indicates very low performance (VLP). The low pre-test scores of the two groups show that they have little or no idea of the topics included in the questions. This result may also indicate they have a little background in some topics since they also got correct answers

Table 1. Comparison of students' academic achievement mean scores in the pretest

	Non-Place Based Learning Method		Place Placed Learning Method		Descriptive Interpretation
	N	%	N	%	
Mean Percentage Score					
90-100	0	0	0	0	VHP
86-89	0	0	2	5.13	HP
80-85	1	2.70	2	5.13	MP
75-79	7	18.92	9	23.08	LP
Below 75	29	78.38	26	66.67	VLP
Total	37	100%	39	100%	
Mean	24.51 (VLP)		27.65 (VLP)		

Legend:

Raw Scores	Percentage Equivalent (%)	Descriptive Interpretation
50-62	90%-100%	Very High Performance (VHP)
42-49	86%-89%	High Performance (HP)
35-41	80%-85%	Moderate Performance (MP)
30-34	75%-79%	Low Performance (LP)
0-29	Below 75%	Very Low Performance (VLP)

This result is similar to a study, where students showed that the pre-test scores were low (L), indicating that it did not meet expectations [23]. Another study confirmed the findings when they stated that before an intervention strategy was made, the MPS of the students indicated very low performance (VLP); they also explained that half of the participants needed background information on the topics. Students need more information on the topics, resulting in very low performance (VLP) [24].

Furthermore, it was noticeable that there were students who got high scores, especially in the PBL before intervention. These differences in in pre-test scores in PBL could be attributed because of the variation of multiple intelligences, learning styles the students received before instructions, and other variables such as factors related to personality [25].

Table 2. Comparison of students' academic achievement mean scores in post-test

	Non-Place-Based Learning Method		Place-Placed Learning Method		Descriptive Interpretation
	N	%	N	%	
Mean Percentage Score					
90-100	1	2.70	2	5.13	VHP
85-89	5	13.51	11	28.21	HP
80-84	6	16.22	9	23.08	MP
75-79	8	21.62	13	33.33	LP
Below 75	17	45.95	4	10.26	VLP
Total	37	100%	39	100%	
Mean	31.78 (LP)		37.23 (MP)		

Legend:

Raw Scores	Percentage Equivalent (%)	Descriptive Interpretation
50-62	90%-100%	Very High Performance (VHP)
42-49	86%-89%	High Performance (HP)
35-41	80%-85%	Moderate Performance (MP)
30-34	75%-79%	Low Performance (LP)
0-29	Below 75%	Very Low Performance (VLP)

Table 2 presents the results of the post-test scores of students in both groups. It shows that there is an increase in the mean percentage scores in both groups. The students under the non PBL method had a mean percentage score of 31.78, which shows they have low performance (LP) compared to the pretest, which also shows very low performance (VLP).

The class exposed to the PBL method had a mean percentage score of 37.23, indicating moderate performance (MP).

Thirteen (13) students in the PBL method had low performance (LP) scores however two (2) got very high performance (VHP) followed by eleven (11) high performance (HP) and nine (9) moderate performance (MP). This information proves that students in the PBL method performed better than the non-PBL method group. These findings also showed that exposure to PBL could increase academic performance and is more effective than the indoor classroom strategy in Earth Science.

Similarly, since the PBL method showed an increase in their mean scores, the student's critical thinking is also developed. This result is in congruence with another study, which stated that the ability of students to make scientific investigations is an important part of learning science [26]. Similarly, the learners in social sciences who took outdoor education activities scored higher than those who performed courses that were inside the classroom environment [27]. Several research types also proved that exposure of students to real-life experiences could boost academic learning, personal development, and environmental stewardship. It was reported that learners learn to persevere and develop problem-solving, critical thinking, leadership, teamwork, and resilience [28] as they are exposed to the PBL method.

The increase in the test scores in the post-test of PBL signifies the importance of incorporating the Place-based learning (PBL) method in teaching. In doing such, the students can develop many skills, such as critical thinking, and increase academic achievement. Results also in Table 2 showed that the group exposed to non-PBL had increased MPS. However, it is not similar to the PBL method, wherein most students got higher scores. The traditional teacher-centered instructions were unsuccessful in delivering the topics since many of the students still got very low scores indicating very low performance. Although there are some instances that the topics in Earth Science should be taught by the teacher with direct instructions the teacher should incorporate activities that can develop students' academic achievement.

3.2 Students' Well-Being of the PBL and non-PBL in Earth Science

Table 3 presents the students' well-being on the pretest and posttest regarding the perceived joy of learning. The mean pretest score for PBL is 3.02, indicating high (H) well-being, while the post-test mean score is 3.21, still indicating high (H) well-being. While students' joy of learning pretest exposed to non-PBL had a mean of 3.29, meaning high (H), and the post-test with an average mean of 3.09, indicating high (H) also. It can be seen in Table 3 that the difference between the mean scores of the pretest and posttest under the PBL signifies that there is a change in feeling from 3.02 to 3.21, but there is just a slight increase for the non-PBL.

Table 3. Students' well-being in terms of the joy of learning

Indicators	Pretest				Posttest			
	PBL		Non-PBL		PBL		Non-PBL	
	Mean	QI	Mean	QI	Mean	QI	Mean	QI
JOY IN LEARNING								
I get excited about learning new things in class.	3.51	VH	3.64	VH	3.38	H	3.22	H
I am interested in the things I am doing at school.	2.92	L	3.32	H	3.31	H	3.16	H
I feel happy when I am working and learning at school.	3.10	H	3.35	H	3.26	H	3.11	H
I enjoy working on class projects and assignments.	2.56	H	2.86	H	2.90	H	2.86	H
Mean	3.02	H	3.29	H	3.21	H	3.09	H

Legend:		
Scale	Description	Qualitative Interpretation
3.50-4.00	Always	Very High (VH)
2.50-3.49	Often	High (H)
1.5-2.49	Rarely	Low (L)
1.00-1.49	Never	Very Low (VL)

It is clear that during the pre-test under the PBL, the indicator "I get excited about learning new things in class" yields 3.51 (VH), however, it slightly decreased in the post-test, to 3.38 (H). The same is true with the non PBL where they got a mean of 3.64 (VH) in the pre-test and 3.22 (H) in the post-test. The statement "I am interested in the things I am doing at school" in PBL increased from 2.29 (L) to 3.31 (H). However, it decreased in non-PBL from 3.32 to 3.16, but still high (H) well-being. The slight differences could be attributed to the difficulties they may experience in accomplishing the given task in the future. In the statement, "I am interested in the things I am doing in school," it is evident that there is an increase in pre-test scores from low to high post-test scores. A study stated that interest in the topic is one of the most important factors in every lesson because students get excited and show interest when their curiosity about the subject takes place when they are learning new things, feeling challenged, and having fun [29].

There is also an increase in the mean scores of the statement "I enjoy working on class projects" from 2.56 to 2.90. However, it remained the same in non-PBL, with 2.86 interpreted as high (H). This result conforms to the research's other findings, which examined the interactions between the teacher and student, which showed that the teacher's behavior indicates values and perceptions, which in turn facilitated the classroom interaction between emotion, cognition, and motivation [30, 31]. At the same time, the statement "I feel happy when I am working and learning at school" also showed an increase in pre-test scores from 3.10 to 3.26, while it slightly decreased in non-PBL from 3.35 to 3.11. Moreover, this result is highly supported, that joy in learning is an important aspect of successful classroom instruction. Positive emotions such as joy, pleasure, and desire are well thought of to motivate learning [31].

The joy of learning or joy in learning stimulates learning and emerges when children understand and "own" their learning process. It is further defined as "experiencing positive emotions and cognitions when engaged in academic tasks" [10]. The differences in pre-test and post-test mean scores indicate that there are changes in behavior. If the student feels joyful during class, they are more likely to engage in different tasks given by the teacher. This also shows that incorporating Place-based learning (PBL) is an effective method to increase the feeling of joyfulness and decrease negative feelings.

There is a big difference in the non-PBL method from 3.29 to 3.09 in their pre-test and post-test. These differences can be caused by several factors such as exams, homework and projects, indifference, courses, syllabi and teachers, scolding and insult, pressure-violence-punishment. All of these unhappiness factors are associated with the teacher [20]. In a traditional classroom, the teacher is the sole giver of knowledge, and the classroom is their only environment. Since this is already in the fourth quarter, students are engaged in different activities, performance tasks, and exams in different subject areas.

Table 4 presents the students' well-being on the pre-test and post-test regarding school connectedness. The average pre-test score for PBL is 3.02 with "High", while the post-test mean score slightly increased to 3.07 with "High". The pre-test exposed to non-PBL had a mean of 3.09, meaning "High," and the post-test with an average mean of 2.90, indicating "High."

Table 4. Students' well-being in terms of school connectedness

Indicators	Pretest				Posttest			
	PBL		Non-PBL		PBL		Non-PBL	
	Mean	QI	Mean	QI	Mean	QI	Mean	QI
SCHOOL CONNECTEDNESS								
I feel like I belong at this school.	3.08	H	3.46	H	3.31	H	3.03	H
I can really be myself at this school.	3.08	H	3.05	H	3.03	H	2.97	H
I am treated with respect at this school	3.00	H	3.27	H	3.03	H	3.11	H
I feel like people at this school care about me.	2.90	H	2.59	H	2.90	H	2.49	H
Mean	3.02	H	3.09	H	3.07	H	2.90	H

Legend:		
Scale	Description	Qualitative Interpretation
3.50-4.00	Always	Very High (VH)
2.50-3.49	Often	High (H)
1.5-2.49	Rarely	Low (L)
1.00-1.49	Never	Very Low (VL)

The students exposed to PBL showed an increase in their pre-test to post-test. In PBL, school connectedness is important because students believe that adults and peers in the school care about their learning and them as individuals [22]. Accordingly, it is an indicator of instructive and societal results when students feel assured that they have a place in the school or scholarly work [33]. It also refers to the learner's feelings that they are being cared about for their academic success and themselves as learners [34].

Results also showed that incorporating the PBL method can help make students feel that they belong to the school. The increase in PBL mean scores indicates that the method is effective because students feel that they belong to the school, they can be themselves in school, they feel respected and they think that the school cares about them. These positive results foster healthy behaviors and are found to have an effect on succeeding academically, including higher grades and test scores and have better school attendance, and stay in school better. Research findings strongly stated that when students feel supported by adults at school, they feel more motivated to learn and engage in class, do homework, and are more likely to value school [35]. Similarly, it was also found that students with higher school connectedness prefer to pursue higher education beyond high school [36].

In the PBL method, there is an increase in the mean scores in statements "I feel like I belong at this school" from 3.08 to

3.31, and" I am treated with respect at this school" from 3.00 to 3.03, both with high (H) interpretations. However, the statement "I can be myself at this school" decreased from 3.08 to 3.03 but still has High interpretation. Moreover, the statement that people at this school care for me remained the same at 2.90 in both the pre-test and post-test.

The result reveals that school connectedness changes over time. In the pre-test and post-test, it signifies that several variables are constantly at play. The way adults treat students in school can affect several aspects of their lives, especially in their academics. Accordingly, Place-Based Education fosters connection to place and makes good partnerships between schools and communities. A good relationship between adults and students can improve student achievement and environmental, social, and economic vitality [37]. It was also found that positive association between school belongingness or connectedness and achievement, students with a higher sense of belongingness also showed better school grades [38]. The data also reflected the decrease in the school connectedness of students exposed to non-PBL method compared to the PBL group which moved slightly higher. It was observed during the conduct of the study that the non-PBL group has so many things to accomplish since it is already in the fourth quarter. Their projects, examinations, and hectic schedules contributed to their low mean scores. During this time the adviser and the students have slight misunderstandings with each other, which is a contributory factor for the decrease in their overall mean scores. Students in the PBL group showed that they were harmoniously working with the adults.

The low post-test results of the nonp-PBL group can be attributed to different factors such as such as educational policies, management practices, discipline strategies [39], and individual, social, and environmental factors [40]. Further, the absence of school connectedness would result in failure, low scholarly performance, high-risk practices, and weak psychological well-being [41, 42]

and meaningful [22]. As shown, the average pre-test score for PBL is 3.51 and increased to 3.66, both with the same interpretation of very high (VH). While students' educational purpose pre-test exposed to non-PBL had a mean of 3.70 and slightly decreased to 3.52, both still meant very high. Students consider that what they are doing in school is relevant to their future endeavors. This also means that students care about their learning in school. When students believe what they are learning is important and that having a good education gives them a good career, good status in the community, and self-confidence they will be more likely to persevere and continue doing the tasks given to them [42].

Results also showed that in PBL, all indicators increased from pre-test to post-test mean scores. The statement "I feel like the things I do at school are important" from 3.41 high (H) to 3.64 very high (VH). The statement, "I think school matters and should be taken seriously" has increased from 3.64 to 3.72 both indicated were very high (VH). The indicator "I feel it is important to do well in my classes" increased from 3.36, high (H) to 3.51 very high (VH). The statement, "I believe the things I learn at school will help me in my life" increased from 3.64 to 3.74, both having very high (VH) interpretation. It has been found that setting educational goals helps students to stay away from antisocial behaviors [43, 44]. Having an education could contribute to how people think, feel, and behave. It also improves not only their personal satisfaction or sues but also their community. Moreover, education also develops human personality, thoughts, and dealings with others and prepares them for future experiences [42].

All indicators in the education purpose have revealed an increase in the post-test means this reveals that incorporating the PBL method in a class can make students realize that their education will make them successful in the future. In doing so, they can also strive hard and do their best to achieve their goal. Since PBL is an outdoor activity, the educational environment helps facilitate learning. Performing outdoor PBL activities can also be good external factors that may trigger learning; internalization of discipline rules regulates strictness and maintains mental hygiene, leading to in-depth learning [45].

The result also showed a decrease in the mean score of non PBL method (3.70 to 3.52), although it still indicates a very high (VH). The differences are quite big. One of the statements "I feel it is important to do well in my class" decreased from 3.70 to 3.35. These differences were attributed to several factors during the implementation of the study why they do not feel it is important to perform well in class includes, shyness, embarrassment to talk, and fear of getting wrong answers. These results were well supported stating that getting tensed and nervous to speaking in front of the whole class and having faulty pronunciations are the top three reasons for students' reluctance to participate in class [46].

Since the overall mean results in the PBL group are 3.51 to 3.66 it indicates very high (VH). This reveals that the PBL method can give meaning to what they need to learn in school and not just consider this as a route activity for the sake of completing the set competencies rather, the PBL method has shown the students that there is more to learn outside than being confined in the four corners of the classroom. This result is also supported by claiming the importance of

Table 5. Students' well-being in terms of educational purpose

Indicators	Pretest				Posttest			
	PBL		Non-PBL		PBL		Non-PBL	
	Mean	QI	Mean	QI	Mean	QI	Mean	QI
EDUCATIONAL PURPOSE								
I believe the things I learn at school will help me in my life.	3.64	VH	3.76	VH	3.74	VH	3.81	VH
I think school matters and should be taken seriously.	3.64	VH	3.76	VH	3.72	VH	3.41	H
I feel like the things I do at school are important.	3.41	H	3.57	VH	3.64	VH	3.49	H
I feel it is important to do well in my classes	3.36	H	3.70	VH	3.51	VH	3.35	H
Mean	3.51	VH	3.70	VH	3.66	VH	3.52	VH
Legend:								
Scale	Description		Qualitative Interpretation					
3.50-4.00	Always		Very High (VH)					
2.50-3.49	Often		High (H)					
1.5-2.49	Rarely		Low (L)					
1.00-1.49	Never		Very Low (VL)					

Table 5 presents the students' well-being on the pre-test and post-test in terms of educational purposes. Educational purpose is appraising school and academic tasks as important

educational purpose among students because it can broaden people's horizons, prepare people to contribute to society, prepare for a successful career, stimulate a more well-rounded society, learn, and be prepared for the real world [47].

Table 6. Students' well-being in terms of Academic Efficacy

Indicators	Pre-test				Post-test			
	PBL		Non-PBL		PBL		Non-PBL	
	Mean	QI	Mean	QI	Mean	QI	Mean	QI
ACADEMIC EFFICACY								
I get good grades in my classes.	3.31	H	3.27	H	3.38	H	3.14	H
I do good work at school.	2.87	H	3.16	H	3.13	H	2.95	H
I do well on my class assignments.	3.00	H	3.14	H	3.13	H	3.03	H
I am an academically successful student.	2.64	H	3.08	H	2.90	H	3.14	H
Mean	2.96	H	3.16	H	3.14	H	3.07	H

Legend:

Scale	Description	Qualitative Interpretation
3.50-4.00	Always	Very High (VH)
2.50-3.49	Often	High (H)
1.5-2.49	Rarely	Low (L)
1.00-1.49	Never	Very Low (VL)

Table 6 shows students' well-being in terms of academic efficacy, which refers to the student's beliefs and attitudes toward their capabilities to achieve academic success and their belief in their abilities to fulfil academic tasks and the successful learning of materials [48]. In education, self-efficacy generally refers to academic self-efficacy, which can also be defined as one's academic behaviors effectively meeting environmental demands. Academic efficacy also showed strong, supported predictive links among academic self-efficacy, positive emotions, metacognitive learning strategies, and academic performance [22].

The data also presents the students' well-being on the pre-test and post-test regarding academic efficacy. The average pretest score for PBL is 2.96, indicating high (H) well-being, while the post-test mean score increased to 3.14 which is also high (H). Academic efficacy of students pretest exposed to non PBL had a mean of 3.16 which is high(H), and the post-test with average mean decreased to 3.07 still indicating high (H). High results in academic efficacy revealed that the students who believed in their abilities and had more positive emotions used more metacognitive learning strategies, resulting in better academic performance [49, 50].

The students exposed to PBL showed an increase in all indicators. In the statement, "I am an academically successful student" from 2.64 to 2.90 (High), "I do good work at school" from 2.87 to 3.13 (High), "I do well on my class assignments" from 3.00 to 3.13 (High), "I get good grades in my classes" from 3.31 to 3.38 (High). All indicators showed an increase in academic efficacy. During the carrying out of the study, the students were exposed to different learning areas, as such they were more engaged and had a better grip on the concept. It was also observed that their behavior and attitudes are quite different compared to those who are not exposed to PBL. They were also observed to be more confident to answer in the post-test than in the pre-test. This result in attitudes and the feeling that they are more accomplished to finish the task is supported by research, that attitude has a great contribution to academic achievement and good study patterns. Successful students do not waste time or energy [51]. Furthermore, results in incorporating PBL in class is found to be effective

driving force to help students study and concretize the topic discussed [52], where participants responded favorably in all areas of self-efficacy by incorporating place-based learning students.

However, in the non-PBL, all indicators showed a decrease in all statements, as shown in the data above. The decrease in the non-PBL method can be attributed to many academic workload of the students, during the carrying out of the study, the students are also having a research project in one of their subjects. Aside from research, projects, assessments, and presentations are given since it is already in the last quarter of the school year. Too academic overload can lead to lower academic adjustments. If the students were to manifest high self-efficacy it would mean that it leads to higher academic scores [53].

Self-efficacy development is intertwined with a person's experiences, competencies, and developmental tasks in different domains at different stages in life, so it is important for understanding educational outcomes because it leads to specific behaviors and motivations [54]. Incorporating student-centred activities as out-of-door activities like place-based learning could enhance students' academic efficacy and self-efficacy. Additionally, the utilization of community learning space as instructional material can improve student performance and strengthen positive attitudes and firm self-efficacy beliefs [55].

Table 7. Summary of Students' Well-being Pre-test and Post-test per subcategory

Subcategory	Pretest				Posttest			
	PBL		Non-PBL		PBL		Non-PBL	
	Mean	QI	Mean	QI	Mean	QI	Mean	QI
Educational Purpose	3.51	VH	3.70	VH	3.66	VH	3.52	VH
Joy of Learning	3.02	H	3.29	H	3.21	H	3.09	H
Academic Efficacy	2.96	H	3.16	H	3.14	H	3.07	H
School Connectedness	3.02	H	3.09	H	3.07	H	2.90	H
Mean	3.13	H	3.31	H	3.27	H	3.14	H

Legend:

Scale	Description	Qualitative Interpretation
3.50-4.00	Always	Very High (VH)
2.50-3.49	Often	High (H)
1.5-2.49	Rarely	Low (L)
1.00-1.49	Never	Very Low (VL)

Table 7 presents the students' well-being on the pre-test and life [56]. On the other hand, low well-being is related to multiple factors that harm professional development, such as unhealthy lifestyles, mental health problems, and post-test. As shown, the overall mean pretest score for PBL is 3.13 (High), which increased to 3.27 (High). The overall mean of the pretest exposed to non-PBL was 3.31 (High), which decreased to 3.14, but was still high (H). These results indicate that there is a change in behavior in all subcategories in their attitudes toward teaching science throughout the intervention especially in the PBL group.

Greater well-being supports higher academic performance, indicating that it is a significant portion of a student's academic academic failure [57].

These results revealed that incorporating PBL in teaching and learning effectively improves students' overall academic functioning and well-being. Student well-being is essential for improving youth academic and psychological health. Furthermore, students' well-being can also be associated with

various psychological adjustments and challenges, thus becoming a substantive predictor if the student is an alcohol consumer, and has antisocial behaviors, suicidal tendencies, nutrition habits, and tobacco use [58]. Similarly, the high well-being of students can be used as a high predictive effect on different variables such as prosocial behavior, followed by academic satisfaction, psychological health problems, and school achievement. School connectedness and joy of learning significantly project student academic satisfaction, prosocial behavior, and psychological adjustment problems. On the other hand, Educational purpose and academic efficacy were important predictors of all adolescent outcomes [58].

The students exposed to PBL showed an increase in pretest to posttest in all subcategories. The joy of learning increased from 3.02 to 3.21, meaning high (H). On the other hand, the non-PBL showed a decrease in their mean from 3.29 to 3.09. It was found out also that the joy of learning has also been seen as an effective way to improve student's attitudes toward teaching science [59].

School connectedness also increased in PBL from 3.02 to 3.07, meaning high (H), which decreased in the non-PBL method. Research has demonstrated a strong relationship between school connectedness and educational outcomes, including school attendance, staying in school longer, and higher grades and classroom test scores. Furthermore, students with higher school connectedness do well academically and are less likely to engage in risky behaviors than students with lower school connectedness [60].

The educational purpose from 3.51 to 3.66 is very high (VH) compared to non-PBL from 3.70 to 3.52, but still, it is very high (VH). Knowing the educational purpose of teaching the subject would give the students a hint of what is to be accomplished by the teacher and students at the end of the lesson. Recognizing that in the end, they would learn something that can be applied in the future, that is why they wanted to learn. It is also important for the students that there will be better opportunities in the future when they would perform similar tasks. Accordingly, highly educated ones have better job chances. Moreover, he emphasized that education polishes the mind, reinforces thoughts, and strengthens our character and behaviors [42].

Academic efficacy in PBL increased from 2.96 to 3.14 high (H). The increase in academic efficacy is said to significant predictor of all adolescent outcomes, such as school achievement, academic motivation, prosocial behaviors, and psychological health problems [58]. A parallel result showed that students with higher self-efficacy preferred mastery goals which entail challenges and new knowledge as well as performance that encompass good grades and surpassing others [61].

Findings also imply that academic self-efficacy can directly predict academic achievement [62]. Additionally, academic self-efficacy can be a good sign of students' psychological well-being. The data showed that the students revealed high academic efficacy indicating that they are more likely to engage and complete tasks given ample time. They also showed perseverance and high academic achievement.

The overall well-being of students in teaching Earth Science showed that it was significantly associated with youth functioning and adjustment outcomes. The overall results of

the PBL method showed that students have high well-being, especially in incorporating the PBL method in the lessons. This indicates that there is high mental health and physical health, resulting in a more holistic approach. Likewise, high well-being is linked to numerous good outcomes such as physical health and longevity, better individual performance, and higher life satisfaction [63].

In the non-PBL group the overall well-being is also considered high (H), but looking closely at the overall mean in the pre-test against the post-test there was a decrease. Using direct instructions in the lesson can have different effects on students, particularly on their well-being. It is necessary that the teacher not stick to direct instructions only but rather explore the curriculum because it is the work of the teacher to make the students learn not the other way around. Every educator should also make an effort to make the students feel motivated, keep interest in the subject area, and increase well-being and academic achievement.

The importance of carrying out a well-being analysis on students is a helpful way of analyzing the overall health of the students in schools, as it plays a crucial role in youth school functioning and outcomes. When students report higher well-being, it can indicate a good interplay of different variables in the school, like the treatment of teachers, parents, the environment, and their peers. Well-being is difficult to interpret as it entails much psychology. However, despite these hindrances, a school where a student stays for many hours a week should seek to find out what is happening to their students aside from monitoring their academic progress.

3.3 Analysis of Covariance (ANCOVA) Between Students' Academic Achievements

Table 8 shows the comparison of the academic performance of the students in non-Place-Based learning (non-PBL) and Place-based learning (PBL)

Table 8. Analysis of Covariance (ANCOVA) between group and pre-test in Academic Achievement

Group	N	Mean	Standard Deviation
Non-Place-Based Learning Method	37	31.78	8.21
Place-Based Learning Method	39	37.23	7.33
Total	76	34.5921	8.19297

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Group	502.072	1	502.072	8.219	.005*
Pretest (Covariate)	6.140	1	6.140	.101	.752
Error	4459.566	73	61.090		
Total	4967.778	75			

Legend: *Sig at 0.05 levels (p=0.05)

Students exposed to PBL had a mean score of 37.23 (SD=7.33), while students exposed to non-PBL had a mean score of 31.78 (SD=8.21). These results showed that students exposed to Place-Based Learning performed better than non Place-Based Learning. These findings, therefore, reject the null hypothesis that there is no significant difference in student academic achievement of students when exposed to

Place-based learning (PBL) from those in non Place-Based Learning (non-PBL).

Table 8 also shows the Analysis of Covariance (ANCOVA) between the group and pre-test in academic achievement. The F-value equals 8.219 ($p < 0.005$) between groups signifying significant differences between groups. There was a significant increase in the student's academic achievement based on their post-test scores.

The results revealed that employing PBL in a discussion led to higher passing rates with the topics discussed than the non-PBL. These results showed that participants exposed to a Place-based learning community had a stronger sense of belonging, improved academic performance, and increased persistence relative to the reference group [20]. Similarly, it also explained that students exposed to Place-based education showed higher post-test scores [19]. During the implementation of the study, it was also observed that the students tended to interact more with their classmates to finish the task.

In the study, it was also observed that the students tended to respect the opinions of their group members to finish the given task. They also showed cooperation by dividing the tasks into smaller units. The study revealed that using a Place-based learning (PBL) strategy can increase the pre and post-assessments of student attitudes and engagement in learning science [64]. Place-based learning (PBL) is an excellent method of instruction and learning because it incorporates interdisciplinary learning, problem-solving, immersive experiential learning, student-centered learning, and a constructivist learning model. Furthermore, it was found that PBL has positive effects on cognitive skill development and knowledge retention [65]

The application of PBL in education improves students' academic achievement because it has a very promising, simple methodology and thorough procedure. Students exposed to PBL can grasp the topic the teacher wants to impart to the students. Since it is a hands-on activity, it can facilitate learning and not just rote learning. Because of this, PBL is not only used in the educational sector but also even in different aspects of work.

3.4 Analysis of Covariance (ANCOVA) Between Students' Well-being

Table 9 shows the Analysis of Covariance (ANCOVA) between groups of students' well-being. The results clearly showed the impact of PBL on the well-being of the students and that there was a significant difference. This can be attributed to the fact that well-being cannot be processed overnight; it takes time and cannot be changed immediately. However, there is a slight difference in the mean of both groups, non PBL had 3.1419, while the PBL had a high mean of 3.2674.

This slight difference in the mean can be pointed out during the implementation of the outdoor activity. The participants are very eager to carry out the different tasks given to them. The participants also showed the importance of being involved in the community, and how they can affect the area, they lived in. An increase in well-being from pre to post-test demonstrates how the participants feel when conducting the activity.

Table 9. Analysis of Covariance (ANCOVA) Between Group of Students' Well-being

Group	N	Mean	Standard Deviation
Non-Place-Based Learning Method	37	3.1419	.37977
Place-Based Learning Method	39	3.2674	.24925
Total	76	3.2063	.32357

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Group	.425	1	4.215	4.215	.044*
Pretest (Covariate)	.194	1	.194	1.922	.170
Error	7.359	73	.101		
Total	7.978	75			

Legend: *Sig at 0.05 levels ($p=0.05$)

Table 9 also shows the Analysis of Covariance (ANCOVA) between the group and pretest in well-being. Based on the data, the F-value of 4.215 ($p=0.044$) between two groups of students is significant; thus, the null hypothesis that there is no significant difference in the well-being of students before and after exposure to PBL and non-PBL is rejected.

It was also observed when the students carried out the activity that their curiosity arose because they kept asking what the results meant during their observations. One participant also said that she would advocate being an earth warrior. This result is comparable to the effects of regular outdoor classes and shows that it can promote students in social, academic, physical, and psychological dimensions [66].

Although there is only a slight difference in mean, the result was strongly supported by research, that exposing students to outdoor activity has an impact on learners' general well-being and health in the school context and ultimately on their overall well-being, mental and social health [67].

It was observed that when the students are out of the classroom, they begin to be curious, and there is noticeable engagement between them. In another study, it is believed that the positive effects of outdoor activities suggest that it also depends on the child's developmental stages and the types of environment they are exposed to. It also suggests that outdoor activities have a productive potential to combine health and well-being outcomes with educational aims supported [68, 69].

Furthermore, schools or institutions need to promote not just good grades but also the well-being of students. Students with low well-being also showed poor academic achievement. They are often aloof, withdrawn from social interactions, and sometimes easily leave off in a group. Several works of literature exposed how institutions can lift the well-being of students without sacrificing academics.

Psychological well-being and academic performance are significantly related. Most students exhibit a positive attitude toward themselves and their environment, are self-autonomous, capable of maintaining positive relationships, have a clearer sense of purpose and direction in life, and engage in continuous personal growth [70].

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of the study, the following conclusions were drawn:

Applying the PBL method in teaching is an effective learning strategy to increase academic achievement as well as the well-being of students. The academic achievement of students exposed to the Place-based learning (PBL) pretest obtained very low performance (VLP), while in the post-test, increased to moderate performance (MP). The non-place-based learning (control) during the pre-test got very low performance and moved a little shift to low performance.

Applying the PBL method to teaching the lesson can enhance the students' overall well-being compared to non-PBL classes. If the well-being of the students is taken into consideration, there will be no students left behind and they will continue what they have started in school. The four subcategories of well-being educational purpose, joy of learning, academic efficacy, and school connectedness are clear indicators to look at to what is happening to the students.

There is a significant difference in academic achievement between the two groups. Thus, the null hypothesis there is no significant difference between the two groups was rejected. A significant difference was observed in students' well-being between the two groups; thus, the stated null hypothesis that there is no significant difference between the two groups is rejected. Students exposed to the PBL method have higher well-being compared to the non-PBL method.

Based on the findings of the study, the following are the recommendations:

Administrators and curriculum designers may start applying Place-based learning (PBL) in the curriculum, as it would increase students' academic achievement in science. It also strengthens concept mastery because they can relate it to real-world settings. They can also become independent learners and take charge of their learning.

Educators may also consider using other variables affecting the lessons' interest in engagement, motivation, and others. Other forms of teaching pedagogy, like cooperative activities, may also be used to improve performance in classroom achievement.

Teachers may also reflect on the type of assessment being formulated process after the pedagogy was applied. Other forms of evaluation may also be used to countercheck other variables aside from performance.

Community leaders may start protecting the different learning areas found within the community as it can foster the learning of the students and increase interaction among students at the maximum level. Science teachers may start an activity involving outdoor learning to develop cognitive, affective, and psychomotor skills and help the students build up well-being and self-reliance through conducting science investigations.

Future researchers are encouraged to make a similar study, but the time may be extended up to several more weeks.

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