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Students' Motivation and Academic Performance Via Ethnoscience Learning Instruction

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Abstract: Ethnoscience learning instruction (ELI) translates available learning materials and uses indigenous language in delivering instruction offers a contextualized learning experience. This study examines the effects of ethnoscience learning instruction on the motivation and academic performance of Grade 7 students at Lilingayon National High School. Specifically, it aimed to: determine the level of students' motivation as exposed to ELI and to non-ELI; assess the level of students' academic performance as exposed to ELI and to non-ELI; determine if there is a significant difference in student's level of motivation as exposed to ELI and to non-ELI; and ascertain if there is a significant difference in student's level of academic performance exposed to ethnoscience and non-ethnoscience learning instruction. A quasi-experimental research design was employed in the study. The Student's Motivation Towards Science Learning (SMTSL) questionnaire and a standardized Summative test of the Department of Education 2022 was used to assess the students' motivation and academic performance respectively. ANCOVA was used to test significant differences between two groups. Findings of the study revealed that the student's level of motivation as exposed to ELI and non-ELI as very highly motivated and highly motivated respectively. The level of students' academic performance as exposed to ELI is outstanding and to non-ELI is satisfactory. A significant difference on the levels of motivation in terms of self-efficacy, active learning strategy, performance goal, achievement goal and learning environment stimulation was noted between the ELI and non-ELI, furthermore, there is a significant difference on the levels of academic performance of ELI and non-ELI showing that ELI instruction is effective in improving motivation and academic performance.

Keywords: *Talaandig Ethnoscience Academic performance Motivation Indigenous.*

Introduction

Education is often hailed as the cornerstone of personal and societal development, a force capable of transforming lives and shaping the trajectory of nations. Beyond the confines of classrooms and lecture halls, the importance of education resonates across various facets of human existence, contributing to individual empowerment, economic prosperity, and the cultivation of enlightened societies. Education transcends borders, fostering cultural understanding and tolerance. Exposure to diverse perspectives, histories, and traditions nurtures a global mindset, reducing prejudices and promoting harmony in an interconnected world as stated by MD. Ashkuzzaman. (https://www.lisedunetwork.com/framework-of-education/).In that interconnected world, the role of science education plays an important role.

Science education plays an important role in fostering critical thinking, problem-solving abilities, and a deeper understanding of the natural world. In fact, a lot of effort had been exerted to strengthen students' performance in science focusing on curriculum reforms, specialized schools, teacher capacity building, technology integration, and improving equity and access to quality science education. (Saro et al.2023), Cadiz 2020 emphasized that science education is crucial for achieving success in today's global expectations. In Philippine education, there are both opportunities and barriers within our educational system that impact the success of instruction delivery and the achievement of the mission and vision. More of the barriers are experienced by students who are members of indigenous people (IP).

In the findings of Buenaflor et.al 2023 one of the reason why IP learners were not satisfied with their performance is that they cannot understand some of the lessons due to the language barrier. Another factor for efficient education is the approach to instruction specifically on mountainous region (Villaluz et al., 2023). In this study which focused on the educational journey of Talaandig students, it typically begins with a learner-centered approach in primary school, where instruction is often delivered in their native language and grounded in their cultural context. However, this changes abruptly in Grade 7, where the medium of instruction shifts to English and the curriculum becomes more standardized, following the Department of Education (DepEd) guidelines. Bigalke et al., 2015 cited Martin's findings which showed that using the mother tongue in education significantly improves learning outcomes. This leads to coming up with this study on Ethnoscience Learning Instruction.

Ethnoscience learning instruction is the delivery of Science instruction using the dialect or spoken language of the IP group specifically those from indigenous groups like the Talaandig coming from mountainous regions. It is hoped that by using the spoken language of the Talaandig Tribe in delivering instruction, better science performance and motivation will be observed. As observed in Lilingayon National School, IP students are not very much motivated to go to school as evidenced by the number of absences.

Ethnoscience learning instruction has the potential to boost intrinsic motivation by making science education more meaningful and relevant to students' lives (Munadnar et al., 2023). As cited by Buenaflor et.al 2023 that some ongoing initiatives for IP learners to experience culture- responsive education include the contextualization of lesson plans, the use of the local language for instruction, and providing more instruction. Students' motivation is a crucial determinant of academic success (Wigfield et al., 2016). Moreover, Arcipe L., Vinci C., and Balones J., 2023 found that Motivation to Learn and Student Engagement is positively and significantly correlated and Motivation to learn has partially interceded the relationship between Language Learning Problems and Student Engagement.

Since studies have shown that the use of spoken language affects motivation and performance this study is birthed. It study aims to investigate the impact of ethnoscience learning instruction on students' motivation and academic performance in sciesnce of Talaandig students.

METHOD

A quasi-experimental research design was employed to determined the effect of ethno-science learning instruction to students' motivation and academic performance. Two intact classes were selected in Grade 7 Science. Random sampling with tossing a coin was used to assign ELI and non-ELI and pre-test was used as covariate.

The study was conducted at Lilingayon National High School, a DepEd educational institution that offers secondary education, located in Barangay Lilingayon, Valencia City, Bukidnon (Figure 2). It is approximately 31.6 kilometers away from Poblacion, Valencia City, Bukidnon. This school located in mountainous region with a total number of 630 enrollees for the S.Y 2023-2024. A high enrollment rate of Indigenous learners comprising a 78 percent of the total enrollees. There were 491 of IP Learners, but the school employs English as their primary mode of instruction to meet the national educational standards.

There were 25 teachers and 2 staff. It offers both Junior high school and senior high school curriculum specifically the General Academic and technical Vocational strand. There were 345 enrollees in the JHS and 285 enrollees in the SHS. The students came from the surrounding community whose main source of living is farming. The highest educational attainment of the people in the community is mostly elementary level and the spoken language is Talaandig and only very few can speak and understand English.

To measure the students' academic performance, the researcher utilized 40 items standardized assessment from the Department of Education, which focused on the concepts about The Philippine Environment; Interactions in the Atmosphere; Seasons in the Philippines; and Eclipses.

For academic performance, zero-based grading system was employed. The following was used for the interpretation of data, which was adapted from the standards set criteria of DepEd order no.8 series of 2015.

The research adopted SMTSL (Student's Motivation Towards Science Learning) questionnaire, from Valdez et al. (2021), for determining the level of motivation towards science education, with thirty-five 35 indicators subdivided into six sub components namely: Self-Efficacy, Active Learning Strategies, Science Learning Value, Performance Goal, Achievement Goal, Learning Environment Stimulations. A 5-point Liker scale was used where students rate themselves range from 1-5 – point scale: 1-strongly disagree, 2-disagree, 3- No Opinion, 4-agree, and 5-strongly agree.

The student's level of motivation was classified according to their scores in SMTSL questionnaire. This classification, as shown below, was presented by Arisandi et al. (2021) on their study on vocational students' motivation towards learning chemistry.

Descriptive statistics was used to measure the level of motivation and the academic performance of the learners.

Analysis of covariance (ANCOVA) was used to determine the significant differences of the students' level of motivation and academic performance before and after the implementation of the ethno-science and context-based approach learning model. Significance was defined with a p-value less than 0.05. All tests was be bilateral.

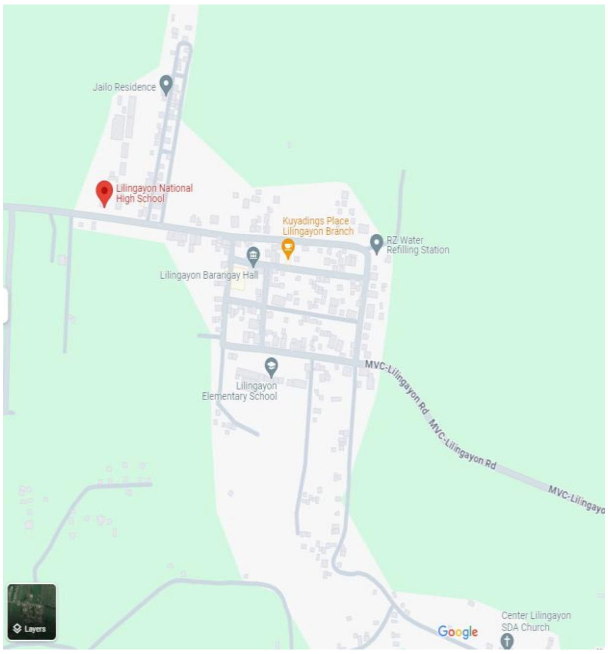

Figure 1. *Map of Lilingayon National High School, Lilingayon, Valencia City, Bukidnon. Philippines*

RESULTS AND DISCUSSION

- **Summary of Findings**

Table 1 presents the summary of the students' level of motivations via ELI and non-ELI. The students' motivation in the Non-ELI is highly motivated with an overall mean of 3.53. However, in ELI, the students' level of motivation is very highly motivated with an overall mean of 4.29. This increase suggests that when the curriculum includes culturally relevant materials, students feel more confident in their abilities. This implies that integrating cultural elements into the curriculum can greatly enhance students' self-belief and motivation, potentially leading to better academic performance and a more positive learning experience.

INDICATOR	NON-ETHNOSCIENCE POSTTEST		ETHNOSCEINCE POSTTEST	
Indicator	Mean	Q1	Mean	Q2
Science Learning Value	3.99	HM	4.41	VHM
Learning Environment Stimulation	3.76	HM	4.72	VHM
Achievement Goal	3.78	HM	4.58	VHM
Active Learning Strategy	3.68	HM	4.27	VHM
Self-Efficacy	3.33	M	4.29	VHM
Performance Goal	2.63	HM	3.48	HM
OVERALL MEAN	3.53	HM	4.29	VHM

Table 2 presents the level of students' academic performance. The table shows the pretest results of the students from two groups. As presented in the table, both groups Ethnoscience and non-ethnoscience learning instruction got 74 and below in their pretest results.

RANGE	NON-ETHNOSCIENCE				ETHNOSCIENCE				QI
	PRETEST		POSTTEST		PRETEST		POSTTES T		
	N	%	N	%	N	%	N	%	
90-100	0	0	0	0	0	0	11	42	O
85-89	0	0	1	4	0	0	4	15	VS
80-84	0	0	2	7	0	0	6	24	S
75-79	0	0	5	18	0	0	4	15	FS
74 and below	28	100	20	71	26	100	1	4	DNME
Total	28	100	28	100	26	100	26	100	
OVERALL MPS	29.02 (69)		53.66 (79)		43.56 (73)		80.19 (99)		
Descriptive Rating	DNME		FS		DNME		S		

Legend:

SCALE	QUALITATIVE INTERPRETATION
90-100	Outstanding (O)
85-89	Very Satisfactory (VS)
80-84	Satisfactory (S)
75-79	Fairly Satisfactory (FS)
74-Below	Did Not Meet Expectation (DNME)

The ELI has a percentage mean score from 43.56 whose transmuted grade is equivalent to 73 with a qualitative interpretation "Did Not Meet Expectation" to 80.19 mean percentage score transmuted is 99 with outstanding interpretation. For the non-ELI, the posttest mean score was 53.66, categorized as "Fairly Satisfactory." Although there was an improvement, it was less pronounced compared to the ELI.

This means that both groups have less prior knowledge about the topic and reflects the notion that science classes are usually perceived by the students to be the most difficult subject compared to the other subjects (Elmas & Gevan 2016). This is in agreement with the with the studies of Migalang (2018), Yder (2017), and Hinampas (2017) that pretest results are generally concentrated at the lowest academic performance range because concepts are still new and unfamiliar to them.

Wati et al. (2021) supported the findings that such culturally relevant teaching methods could significantly improve students' engagement and performance. Their study suggests that when students see their cultural heritage reflected in their learning materials, they are more likely to appreciate and understand scientific concepts deeply. Similarly, the pretest mean score for students in the non-ethnoscience instruction group was 29.02, also categorized as "Did Not Meet Expectation" (DNME). This uniform underperformance highlights a broader issue in the instructional methods used, regardless of whether they include ethnoscience elements.

Moreover, Gopal et al. (2021) emphasized the importance of instructional design in influencing student performance. Their research found that active learning strategies, which engage students more directly in the learning process, can lead to significant improvements in academic outcomes. These strategies can be incorporated into both ethnoscience and non-ethnoscience contexts to enhance student engagement and performance. Blended learning approaches, which combine online and face-to-face interactions, have been shown to significantly enhance student performance and engagement. Budur et al. (2019) conducted a meta-analysis that confirmed the positive effects of blended learning on student outcomes. This approach could be particularly beneficial in ethnoscience instruction by providing students with flexible learning opportunities that integrate cultural context with interactive and engaging teaching methods.

Table 3 presents the comparison of the level of students' learning motivations after exposure to non-ELI and ELI.

The following are the motivation indicators and their means in the pretest: Self Efficacy; Active Learning Strategy, Science Learning Value, Performance Goal, Achievement Goal, Learning Environment Stimulation. While in the Posttest scores Self Efficacy; Active Learning Strategy; Science Learning Value; Performance Goal; Achievement Goal; Learning Environment Stimulation.

MOTIVATIONAL FACTORS	NON-ETHNOSCIENCE	t-value	p-value	ETHNOSCIENCE	t-value	p-value
	POSTTEST			POSTTEST		
	Mean			Mean		
Self-Efficacy	3.33	-2.03	.048*	4.29	-4.43	.000*
Active Learning Strategy	3.68	-1.69	.097	4.27	-2.83	.007*
Science Learning Value	3.99	-2.67	.010*	4.41	-1.83	.073
Performance Goal	2.63	0.41	.686	3.48	-4.08	.000*
Achievement Goal	3.78	-3.25	.002*	4.58	-8.84	.000*
Learning Environment Stimulation	3.76	-2. 13	.038*	4.72	-10.00	.000*
OVERALL	3.53	-1.85	.147	4.29	-11.15	.000*

As shown on the table, an overall mean score of ELI was 4.29 with a t-value of -11.15 this means that there is a greater evidence of significant difference and probability value of 0.000.

The pretest mean for self-efficacy was 3.65, which significantly increased to 4.29 post-intervention, as indicated by a t-value of -4.43 and a p-value of 0.000. This substantial rise suggests that the intervention effectively boosted students' confidence in their academic abilities. According to Meng and Zhang (2023), academic self-efficacy is strongly correlated with academic performance, acting both as a direct and an indirect predictor through increased academic engagement. Their research underlines the critical role of self-efficacy in academic settings, confirming our findings. The mean score for active learning strategies improved from 3.82 to 4.27 post-intervention, with a t-value of -2.83 and a p-value of 0.007, indicating a statistically significant enhancement. This finding suggests that students adopted more effective learning techniques following the intervention. Gill et al. (2024) emphasize the impact of digital pedagogy in fostering active learning and improving academic outcomes, which supports our observation of enhanced active learning strategies among students. While the mean score for the value placed on science learning increased from 4.19 to 4.41, the t-value of -1.83 and a p-value of 0.073 suggest that this change was not statistically significant. However, there is a positive trend worth noting. Kristensen et al. (2023) indicate that academic self-efficacy and a supportive learning environment significantly contribute to the perceived value of subjects like science. Their findings align with the observed trend, even if the statistical significance was not achieved in this instance. Performance goals saw a notable increase from a mean of 2.82 to 3.48, supported by a t-value of -4.08 and a p-value of 0.000, reflecting a significant rise in students' motivation to achieve academic standards. Meng and Zhang (2023) found that higher academic self-efficacy leads to better performance and goal achievement through enhanced engagement, corroborating our results. The mean score for achievement goals increased significantly from 3.92 to 4.58, with a t-value of -8.84 and a p-value of 0.000. This suggests a greater focus on mastery and competence among students. Green et al. (2022) support this by highlighting that achievement goals are essential for long-term academic success. Their research confirms the importance of setting challenging yet attainable goals to boost student motivation and performance. The most dramatic change was observed in the learning environment stimulation, which increased from a mean of 3.90 to 4.72, with a t-value of -10.00 and a p-value of 0.000. This indicates that the intervention made the classroom significantly more engaging and motivating. Ghadampour et al. (2016) discuss how technology-based education creates a stimulating learning environment that enhances student engagement and motivation, supporting the effectiveness of our intervention in this aspect. Overall, the mean motivation score increased from 3.72 to 4.29 post-intervention, reflected by a t-value of -11.15 and a p-value of 0.000. This significant increase demonstrates the overall effectiveness of the intervention in enhancing students' motivation to learn. Harper, McCormick, and Marron (2024) explore the impact of blended learning environments on student outcomes, finding that comprehensive interventions significantly enhance overall student motivation, which aligns with our overall findings.

The data indicates significant improvements in multiple motivational factors following the intervention, corroborated by recent studies. These improvements are consistent with findings in educational psychology that emphasize the importance of self-efficacy, active learning strategies, and stimulating learning environments in enhancing student motivation and performance. The intervention proved effective in significantly enhancing students' academic motivation across various dimensions, setting a precedent for future educational strategies.

As shown from Table 4, the computed F-value between the two groups was 40.9, with a probability (p) value of 0.001*, indicating high significance. Thus the null hypothesis is rejected that there is no significant difference between the academic performance of students as exposed to ELI and non-ELI.

The study results implied that when students were exposed to ELI, performed better than those in the non-ELI. The ANCOVA results indicate that both the pretest scores (a measure of initial motivation and ability) and the ELI method significantly affect students' posttest academic performance. By adjusting for the pretest scores, the analysis provides a clearer understanding of the true impact of the ELI. Including pretest scores as a covariate helps control for the initial differences in student abilities, ensuring that the observed differences in posttest scores are more likely due to the instructional method rather than pre-existing differences. Gopal et al. (2021) supported the result that active learning and blended instructional designs can significantly enhance student performance. The principles of active engagement and blended learning can be effectively integrated into ELI education to further boost student outcomes.

GROUP	N	Mean Percentage	SD
ETHNOSCIENCE	26	32.1	4.94
NON-ETHNOSCIENCE	28	21.5	4.85
TOTAL	54	26.8	4.89

SOURCE	SS	df	Mean Square	F-value	Sig.
Overall Model	1154	2	576.99	128.9	0.001*
Pretest (Covariate)	788	1	788.31	88.1	0.001*
Group	366	1	365.68	40.9	0.001*
Residuals	457	51	8.95		

CONCLUSION

The student's level of motivation as exposed to ELI as very highly motivated and non-ELI as highly motivated .In terms of Self-efficacy, the non-ELI is (M) and ELI is (VHM), for active learning strategies the non-ELI is (HM) and ELI is (VHM), for science learning value the non-ELI is (HM) and ELI is (VHM), for performance goal the non-ELI is (M) and ELI is (HM), for achievement goal the non-ELI is (HM) and ELI is (VHM) and lastly for learning environment simulation the non-ELI is (HM) and ELI is (VHM). The level of students' academic performance as exposed to ELI is outstanding and to non-ELI is fairly satisfactory. A significant difference on the levels of motivation in terms of self-efficacy, active learning strategy, performance goal, achievement goal and learning environment stimulation was noted, furthermore, there is a significant difference on the students' level of academic performance as exposed to ELI.

LIMITATIONS OF THE STUDY

This study focuses on the impact of ELI and non-ELI on the students' level of motivation and academic performance towards science education. Two (2) intact sections, from grade 7 of Lilingayon National High School, Lilingayon, Valencia City, Bukidnon are the participants of this research. The study covers four (4) topics in Science 7 in the 4th quarter of S.Y 2023-2024: The Philippine Environment; Interactions in the Atmosphere; Seasons in the Philippines; and Eclipses, which are part of the curriculum guide prescribed by the Department of Education (DepEd). Data on Motivation is limited to the participant's responses on the Student's Motivation Towards Science Learning (SMTSL) questionnaire, and academic performance is the data gathered from the standardized DepEd summative test.

RECOMMENDATIONS

Teachers may look further into the motivation of the students within the science class especially when placed under ethnoscience learning instruction for students' success and meaningful learning and see if a highly motivated learner is translated into an academically performing one. Curriculum designers may look into the possibility of formulating an IP curriculum which promotes the use of native language as medium of instruction. Further research may be conducted using native language as medium of instruction in teaching IPs across all disciplines. A qualitative approach may also be conducted to substantiate the quantitative findings. A separate track intended for IP students may also be ventured into paving the way for them to see the future direction of undergoing formal education and preserving the cultural heritage of the group.

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