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Ethnoscience Integration in Do-It-Yourself (DIY) Laboratories and Creative Thinking Skills of Pre-Service Elementary Teachers

Evidence from Correlation and Regression Analysis

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ABSTRACT

This study examines the relationship between ethnoscience integration in Do-It-Yourself (DIY) Laboratories and the creative thinking skills of pre-service elementary teachers using a quantitative ex post facto correlational and regression design. The participants were 75 students enrolled in an elementary school teacher education program at a private university in Yogyakarta who participated in ethnoscience-based DIY Laboratory activities in an Experimental Elementary School Science course. The results indicate a significant positive correlation between ethnoscience integration and creative thinking skills ($r = 0.715$; $p < 0.001$). The coefficient of determination ($R^2 = 0.512$) shows that the regression model explained 51.2% of the variance in creative thinking skills. For the specific dimensions of creative thinking, the regression models explained 61.1% of the variance in fluency, 60.4% in flexibility, 34.4% in originality, and 26.6% in elaboration. These findings indicate a positive association ethnoscience-based DIY Laboratories and creative thinking among pre-service elementary teachers. The findings highlight the relevance of culturally contextualized DIY Laboratory activities as a context for science learning that connects local knowledge with experimental activities.

Keywords
Creative Thinking Skills
DIY Laboratories
Ethnoscience
Pre-Service Elementary
Science Learning

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Introduction

The 21st-century education requires learners to develop four key competencies, commonly referred to as the 4Cs: Communication, Collaboration, Critical Thinking, and Creativity. These four skills are increasingly important for responding to complex and rapidly changing global challenges in the VUCA (volatile, uncertain, complex, ambiguous) era [1]. In science learning, creativity is not only related to the ability to generate new ideas, but also the ability to apply these ideas innovatively and in a problem-solving manner [2][3]. For pre-service elementary teacher, creative thinking skills are particularly important because they provide a foundation for designing meaningful learning experiences and developing instructional solutions that respond to diverse student needs [4][5].

Previous studies have shown that learners with stronger creative thinking skills are better able to develop ideas, adapt to the learning process, and optimize their academic potential [6]–[8]. In science education, creative thinking is also an important learning objective because inquiry-based activities provide opportunities for learners to explore problems, develop alternative ideas, and construct solutions through scientific processes [9]. For students in elementary teacher education program, these skills are essential not only for academic development but also for preparing them to address diverse instructional challenges as future elementary teachers.

However, the development of creative thinking in science learning can be constrained by limited laboratory facilities and resources [10]. Such limitations may restrict opportunities for experimentation, despite hands-on investigation being an important component of science learning. In the context, ethnoscience offers a relevant approach by incorporating traditional materials, tools, techniques, and cultural practices into science learning. Rather than simply replacing conventional laboratory equipment, ethnoscience can provide culturally contextualized learning experiences that connect scientific concepts with students' everyday environments. This approach can be implemented through Do-It-Yourself (DIY) Laboratory which allow learners to independently design, modify, and construct experimental tools using accessible and locally available resources [11]. Thus, the integration of ethnoscience within DIY Laboratory activities provides an opportunity to address resource limitations while simultaneously connecting science learning with local knowledge.

The concept of DIY Laboratories was introduced in the 1950s and has grown rapidly in the last two decades, especially in the fields of science, technology, biology, and education [12]. Previous research has reported that DIY Laboratories can be a solution to cost, regulatory, and infrastructure barriers, while also increasing student participation and creativity [13][14]. In elementary education, this approach is particularly relevant because they provide pre-service teachers with hands-on experiences in designing and adapting experimental tools to different learning contexts.

DIY Laboratories also provide opportunities for integrating ethnoscience through the use of local materials, simple technologies, and cultural practices of the surrounding community. Ethnoscience refers to knowledge system developed within particular cultural communities that can be connected with scientific concepts and learning processes [15]. The integration of ethnoscience in science education provides a contextual dimension, where students not only develop conceptual understanding but also recognize the relevance of science to everyday life and appreciate local knowledge and wisdom [16]–[18].

Within the Merdeka Curriculum, contextual and inquiry-oriented learning provides opportunities to connect learning with students' environments, experiences, and cultural contexts [19]. In this regard, ethnoscience is pedagogically relevant because it can strengthen students' understanding of local potential while fostering appreciation of cultural knowledge and local wisdom [20]. However, the implementation of ethnoscience in science education remains uneven and prospective teachers may have limited knowledge of ethnoscience [19]. A recent study reported that 88.23% of prospective teachers are in the low category in terms of ethnoscience knowledge [21]. This finding highlights the need to provide pre-service elementary teachers with direct learning experiences that integrate local knowledge into science learning.

Previous studies have provided evidence of the relevance of ethnoscience-based learning to creative problem solving [22][23], while ethnoscience-based modules have been reported to improve students' creative thinking skills [24]. Creative thinking is commonly reflected through several dimensions, including fluency, flexibility, originality, and elaboration. At the same time, DIY Laboratories have been reported to support participation, independence, and scientific exploration, particularly in contexts with limited laboratory resources [13][14]. The combination of these approaches therefore provides a promising context for developing creative thinking through hands-on and culturally contextualized science learning.

However, research specifically examining the relationship between ethnoscience integration in DIY Laboratory activities and creative thinking skills among pre-service elementary teachers remains limited. Limited evidence is available regarding the statistical contribution of ethnoscience integration to specific dimensions of creative thinking, including

fluency, flexibility, originality, and elaboration. This gap is important because pre-service elementary teachers need opportunities to experience science learning approaches that can later be adapted to diverse elementary school context, including schools with limited laboratory facilities. Through ethnoscience-based DIY Laboratory activities, pre-service teachers can engage in designing, modifying and evaluating experimental tools while connecting scientific concepts with local knowledge and cultural practices [17], [22], [25]. Such experiences may also respond to challenges in the implementation of ethnoscience in schools, including limited instructional materials, learning modules, media, and teacher training [26].

Therefore, this study aims to analyse the relationship between ethnoscience integration in DIY Laboratories and the creative thinking skills of pre-service elementary teachers using correlation and regression analyses. The study also examines the statistical contribution of ethnoscience integration to the dimensions of creative thinking, including fluency, flexibility, originality, and elaboration. The results of this study are expected to provide empirical evidence for strengthening science learning strategies in elementary teacher education and supporting the preparation of pre-service teachers who are able to design contextual and creative learning experiences, including in context with limited laboratory facilities.

Material and Methods

This study employed a quantitative approach using a non-experimental ex post facto correlational and regression design. The design was used to examine the relationship between ethnoscience integration in Do-It-Yourself (DIY) Laboratories and the creative thinking skills of pre-service elementary school teachers. The correlational and regression analyses were conducted to identify the direction, strength, and statistical contribution of the variables. The statistical relationships identified in this study were interpreted as associations and contributions rather than causal effects.

The participants consisted of 75 third-semester Pre-service Elementary Teacher Education students from classes A and B at a private university in Yogyakarta, Indonesia. The sample included 5 male and 70 female students aged 18–29 years. Inclusion criteria comprised active enrolment in the third semester, participation in science learning activities through the Do-It-Yourself (DIY) Laboratory, voluntary participation, and complete questionnaire responses. Exclusion criteria included incomplete questionnaire responses and students who did not participate in the relevant learning activities. The study was conducted in accordance with the applicable research ethical procedures and permission requirements. The study followed the relevant ethical procedures for voluntary participation. Participants were informed about the purpose of the study and were invited to participate voluntarily before completing the questionnaire.

Data were collected using a structured questionnaire with a five-point Likert scale. The questionnaire consisted of two main variables: ethnoscience integration in DIY Laboratories (X) and creative thinking skills (Y). The response categories ranged from 1 to 5, with higher scores indicating a higher level of the measured construct after the appropriate scoring procedure. The instrument contained both favourable (F) and unfavourable (UF) statements. The unfavourable items were negatively worded and were reverse-scored before the calculation of item-total correlations and internal consistency so that higher scores consistently represented higher levels of the respective construct.

The ethnoscience integration variable was operationally defined as students' ability to integrate local cultural knowledge and values into science learning through experimental activities in DIY Laboratories, reflected in their understanding, attitudes and scientific actions based on local culture. The variable consisted of four indicators: (1) integration of cultural values and local wisdom into science concepts, (2) cultural interpretation of scientific phenomena, (3) value-based scientific attitudes, and (4) application of local knowledge in scientific activities or experiments. The indicator structure and distribution of items are presented in Table 1.

Table 1. Indicators of Ethnoscience Integration in DIY Laboratories

Indicator	Sub-indicators	Item Number
The application of local cultural values in scientific concepts	Linking science concepts with traditional community practices	1, 2, 3
	Explaining scientific phenomena through local cultural terms, symbols, or experiences	4
	identifying the relevance of science and local wisdom in learning	5, 6
The interpretation of local culture in scientific phenomena	Explaining the relationship between cultural perspectives and scientific phenomena	7
	Interpreting natural phenomena based on contextual cultural meanings	8
	Appreciating local community perspectives	9, 10
Value-based scientific attitudes	Demonstrating cooperation, responsibility, and scientific honesty	11, 12, 13
	Respecting group opinions and deliberation	14, 15
	Applying scientific ethics based on cultural values	16
The application of local knowledge in experiments	Using materials and tools from the surrounding environment	17, 18
	Modifying experiments according to local conditions	19
	Applying local cultural principles to improve experimental activities	20
	Item Total	**20**

The creative thinking variable was operationally defined as students' ability to generate diverse and original ideas, apply flexible thinking, and develop ideas in detail in the context of science experiments using DIY Laboratories. The variable consisted of four indicators: fluency, flexibility, originality, and elaboration. The indicator structure and distribution of items are presented in Table 2.

Table 2. Indicators of Creative Thinking Skills

Indicator	Sub-indicators	Item Number
Fluency	Generating various ideas for experiments	1, 2
	Proposing alternative solutions to experimental problems	3, 4
	Explaining experimental results from different perspectives	5
Flexibility	Changing from one strategy to another	6, 7
	Being open to changes in experimental design	8, 9
	Adapting ideas to available resources and conditions	10, 11
Originality	Creating unique experimental ideas or designs	12, 13
	Demonstrating personal innovation in experimental activities	14, 15
Elaboration	Developing and refining experimental designs	16
	Adding details or variations	17, 18
	Developing simple ideas into more meaningful and attractive experimental designs	19, 20
	Item Total	**20**

The five-point Likert scale was used to record participants' responses. The response categories were always (5), often (4), sometimes (3), rarely (2), and never (1). Both favourable and unfavourable statements were included in the questionnaire. The use of unfavourable items was intended to represent the constructs from different directions and reduce uniform response tendencies.

Instrument validity was examined through content and empirical item-level procedures. First, content validity was established through expert judgment. The experts reviewed the relevance, clarity, and alignment of the questionnaire items with the operational definitions and theoretical indicators of each construct. The item development followed the predefined indicators of ethnoscience integration and creative thinking skills presented in Tables 1 and 2.

Second, empirical item validity was examined using the item-total correlation procedure. The empirical examination was conducted on the available questionnaire responses and each item's correlation with the total score of its respective scale was calculated after the appropriate reverse-scoring procedure. An item was considered valid when its corrected item-total correlation exceeds the critical correlation value at the 5% significance level.

The pilot data were used to examine the empirical validity and reliability of the instrument. For the available 80 responses, the critical correlation value was $r = 0.220$ at $\alpha = 0.05$. The empirical item analysis showed that most items demonstrated correlations above the critical value. Two items, namely X12 ($r = -0.212$) and Y20 ($r = 0.189$), did not meet the criteria and were therefore excluded from the final scoring of the respective constructs. The remaining items demonstrated acceptable item-total correlation.

Table 3. Empirical Validity of the Research Instruments

Variable	Item	R count	R table	Decision
Ethnoscience Integration in DIY Laboratories	X1–X11	0.319–0.712	0.220	Valid
	X12	0.212	0.220	Invalid
	X13–X20	0.266–0.673	0.220	Valid
Creative Thinking	Y1–Y19	0.267–0.589	0.220	Valid
	Y20	0.189	0.220	Invalid

Following the item analysis and scoring procedure, internal consistency was assessed using Cronbach's alpha coefficient. The reliability analysis was conducted after reverse-coded items had been recoded so that all items had a consistent scoring direction. Items that did not meet empirical validity criteria were not included in the final scale score.

Table 4. Reliability of Research Instruments

Variable	Cronbach's α	Interpretation
Ethnoscience Integration in DIY Laboratories	0.853	Good internal consistency
Creative Thinking Skills	0.867	Good internal consistency

Data analysis was performed using JASP 0.18.3, including: (1) Shapiro–Wilk normality test, (2) Pearson correlation test, (3) simple linear regression analysis to test the effect of variable X on Y, and (4) multiple linear regression to analyse the contribution of each ethnoscience indicator to the creative thinking skills indicator. The significance level was set at $p < 0.05$. The purpose of the analysis was to ensure data normality, measure the direction and strength of the relationship between variables, and determine the magnitude of the influence of ethnoscience integration, both overall and per indicator, on students' creative thinking ability.

Results

Based on the results of data analysis, a series of findings related to the integration of ethnoscience in DIY Laboratories and students' creative thinking skills were obtained, as follows:

A. Pearson Correlation Test Results

A correlation test was conducted to determine the relationship between the integration of ethnoscience in DIY Laboratories (variable X) and students' creative thinking skills (variable Y). The results of the Pearson correlation test are presented in Table 5.

Table 5. Pearson's Correlations

	n	Pearson's r	p	Effect size (Fisher's z)	SE Effect size
Ethnoscience -Creative thinking skills	75	0.715***	< .001	0.898	0.118

* p < .05, ** p < .01, *** p < .001

Based on the results of the analysis in Table 5, a Pearson correlation coefficient of $r = 0.715$ with $p < 0.001$ was obtained, indicating statistically significant positive relationship between the integration of ethnoscience in DIY Laboratories and the creative thinking skills of pre-

service Elementary School Teacher Students. The Fisher's effect size of 0.898 with SE = 0.118 shows that a substantial relationship between the two variables. The scatter plot in Figure 1 shows a positive linear pattern, indicating that students with higher levels of ethnoscience integration tended to have higher levels of creative thinking skills.

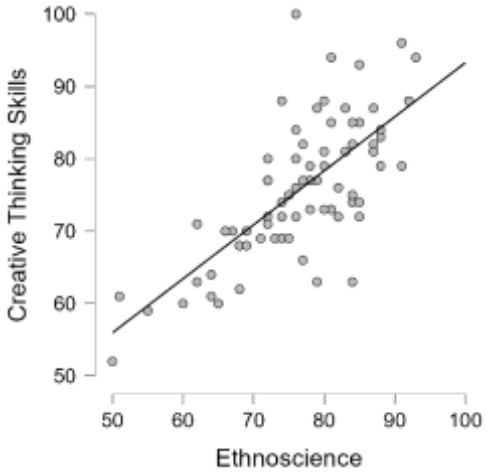


Fig. 1. Scatter plot ethnoscience vs creative thinking skill

B. Simple Regression Test Results

Simple linear regression analysis was used to examine the statistical contribution of ethnoscience integration in DIY Laboratories (X) to students' creative thinking skills (Y). The test results are presented in Table 6:

Table 6. Model Summary – Creative thinking skill

Model	R	R^2	Adjusted R^2	RMSE	R^2 Change	F Change	df1	df2	p	Durbin-Watson		
										Autocorrelation	Statistic	p
H_0	0.000	0.000	0.000	9.620	0.000		0	74		0.034	1.930	0.760
H_1	0.715	0.512	0.505	6.767	0.512	76.563	1	73	< 0.001	-0.121	2.224	0.274

Regression analysis shows that the regression model is statistically significant (F = 76.563; $p < 0.001$), with R = 0.715 and R^2 = 0.512. The model explained 51.2% of the variance in creative thinking skills, while the remaining 48.8% was associated with other factors not included. The regression coefficient X → Y of 0.746 ($p < 0.001$) indicates a positive statistical association between ethnoscience integration and creative thinking skills.

C. Multiple Regression Test Results per Indicator

Multiple linear regression analysis was used to examine the statistical contribution of the four indicators of ethnoscience integration in DIY Laboratories (X), namely the application of local cultural values in scientific concepts (X1), the interpretation of local culture in scientific phenomena (X2), value-based scientific attitudes (X3), and the application of local knowledge in experiments (X4), to the four indicators of students' creative thinking skills (Y), namely fluency (Y1), flexibility (Y2), originality (Y3), and elaboration (Y4). The test results are presented in Table 7.

Table 7. Model Summary - Fluency

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	10.605
H_1	0.782	0.611	0.589	6.799

Table 8. Coefficients of fluency

Model		Unstandardized	Standard Error	Standardized	t	p	Collinearity Statistics	
							Tolerance	VIF
H_0	(Intercept)	78.987	1.225		64.500	< 0.001		
H_1	(Intercept)	12.269	6.741		1.820	0.073		
	X1	0.298	0.112	0.273	2.671	0.009	0.533	1.875
	X2	0.238	0.147	0.235	1.620	0.110	0.263	3.805
	X3	-0.057	0.115	-0.064	-0.494	0.623	0.326	3.064
	X4	0.397	0.094	0.443	4.204	< .001	0.500	1.999

The results of the analysis in Table 7 & Table 8 show that the four ethnoscience integration indicators jointly accounted for 61.1% of the variance in fluency ($R = 0.782$; $R^2 = 0.611$; $p < 0.001$). The application of local knowledge in experiments (X4) had the largest standardized coefficient ($\beta = 0.443$; $p < 0.001$), followed by the integration of cultural values in science concepts (X1) ($\beta = 0.273$; $p = 0.009$). The interpretation of local culture in scientific phenomena (X2) was not statistically significant ($\beta = 0.235$; $p = 0.110$), and value-based scientific attitudes (X3) were also not statistically significant ($\beta = -0.064$; $p = 0.623$).

Table 9. Model Summary - Flexibility

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	12.642
H_1	0.777	0.604	0.581	8.183

Table 10. Coefficients of Flexibility

Model		Unstandardized	Standard Error	Standardized	t	p	Collinearity Statistics	
							Tolerance	VIF
H_0	(Intercept)	74.747	1.460		51.205	<0 .001		
H_1	(Intercept)	-4.523	8.114		-0.557	0.579		
	X1	0.398	0.134	0.305	2.961	0.004	0.533	1.875
	X2	-0.150	0.177	-0.125	-0.849	0.399	0.263	3.805
	X3	0.358	0.138	0.342	2.596	0.011	0.326	3.064
	X4	0.425	0.114	0.398	3.742	< 0.001	0.500	1.999

The results of the analysis in Table 9 & Table 10 show that the four ethnoscience integration indicators jointly accounted for 60.4% of the variance in flexibility ($R = 0.777$; $R^2 = 0.604$; $p < 0.001$). The application of local knowledge in experiments (X4) had the largest standardized coefficient ($\beta = 0.398$; $p < 0.001$), followed by value-based scientific attitudes (X3) ($\beta = 0.342$; $p = 0.011$) and the integration of cultural values in science concepts (X1) ($\beta = 0.305$; $p = 0.004$). The interpretation of local culture in scientific phenomena (X2) was not statistically significant ($\beta = -0.125$; $p = 0.399$).

Table 11. Model Summary - Originality

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	11.246
H_1	0.586	0.344	0.306	9.368

Table 12. Coefficients of Originality

Model		Unstandardized	Standard Error	Standardized	t	p	Collinearity Statistics	
							Tolerance	VIF
H_0	(Intercept)	74.533	1.299		57.397	< 0.001		
H_1	(Intercept)	38.349	9.289		4.129	< 0.001		
	X1	0.014	0.154	0.012	0.090	0.928	0.533	1.875
	X2	0.303	0.203	0.282	1.494	0.140	0.263	3.805
	X3	-0.418	0.158	-0.448	-2.645	0.010	0.326	3.064
	X4	0.572	0.130	0.602	4.400	< 0.001	0.500	1.999

The results of the analysis in Table 11 & Table 12 show that the four ethnoscience integration indicators jointly accounted for 34.4% of the variance in originality (R = 0.586; R^2 = 0.344; p < 0.001). The application of local knowledge in experiments (X4) had the largest positive standardized coefficient (β = 0.602; p < 0.001). Value-based scientific attitudes (X3) showed a statistically significant negative coefficient (β = −0.448; p = 0.010). Meanwhile, the integration of cultural values in science concepts (X1) and the interpretation of local culture in scientific phenomena (X2) were not statistically significant predictors of originality.

Table 13. Model Summary - Elaboration

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	11.551
H_1	0.516	0.266	0.224	10.176

Table 14. Coefficients of Elaboration

Model		Unstandardized	Standard Error	Standardized	t	p	Collinearity Statistics	
							Tolerance	VIF
H_0	(Intercept)	74.880	1.334		56.139	<0.001		
H_1	(Intercept)	28.486	10.090		2.823	0.006		
	X1	0.371	0.167	0.311	2.220	0.030	0.533	1.875
	X2	0.200	0.220	0.182	0.909	0.366	0.263	3.805
	X3	-0.157	0.172	-0.164	-0.913	0.364	0.326	3.064
	X4	0.209	0.141	0.214	1.476	0.144	0.500	1.999

The results of the analysis in Table 13 & Table 14 show that the four ethnoscience integration indicators jointly accounted for 26.6% of the variance in elaboration (R = 0.516; R^2 = 0.266; p < 0.001). The integration of cultural values in science concepts (X1) was the strongest statistically significant positive predictor of elaboration (β = 0.311; p = 0.030). Value-based scientific attitudes (X3) showed a negative but statistically non-significant coefficient (β = −0.164; p = 0.364). Meanwhile, the interpretation of local culture in scientific phenomena (X2) and the application of local knowledge in experiments (X4) were not statistically significant predictors of elaboration.

Overall, the multiple regression analyses indicated that the four ethnoscience integration indicators jointly accounted for varying proportions of variance across the four dimensions of creative thinking. The explained variance was highest for fluency (R^2 = 61.1%) and flexibility (R^2 = 60.4%), followed by originality (R^2 = 34.4%) and elaboration (R^2 = 26.6%). The application of local knowledge in experiments (X4) had the largest positive standardized coefficient for fluency, flexibility, and originality, whereas the integration of cultural values in science concepts (X1) had the largest statistically significant positive coefficient for elaboration.

Discussion

The results show a strong and statistically significant positive association between the integration of ethnoscience in DIY Laboratories and students' creative thinking skills, with r = 0.715 ($p < 0.001$). The regression model accounted for 51.2% of the variance in creative thinking skills (R^2 = 0.512), while the remaining 48.8% was not explained by the model. This finding indicates that ethnoscience integration is statistically associated with substantial variation in students' creative thinking skills within the study sample.

This finding is in line with the view that ethnoscience bridges scientific and cultural knowledge, making learning more contextual and meaningful [24]. Previous studies have also confirmed that the integration of ethnoscience, whether through direct or digital learning, can support critical and creative thinking skills [27]–[29]. In the context of DIY Laboratories, the use of simple materials and local knowledge provides opportunities for students to explore different alternatives when solving experimental problems. This is consistent with the finding that local potential can be used as a concrete learning resource to encourage student exploration [30]. Other studies have also reported that ethnoscience-based inquiry supports higher-order thinking skills, including analysis, creativity, and synthesis [28][31][32].

However, the implementation of ethnoscience in Indonesia is still not systematic, particularly in connecting local cultural knowledge with scientific learning activities. Therefore, the findings of this study provide additional evidence regarding the statistical association between ethnoscience integration and creative thinking in the context of simple laboratory activities. The four ethnoscience indicators jointly accounted for different proportions of variance across the four dimensions of creative thinking. The contribution was highest for fluency (R^2 = 61.1%) and flexibility (R^2 = 60.4%), followed by originality (R^2 = 34.4%) and elaboration (R^2 = 26.6%). At the indicator level, the application of local knowledge in experiments (X4) had the largest positive standardized coefficient among fluency, flexibility, and originality, whereas the integration of cultural values into science concepts (X1) was the largest positive standardized coefficient of elaboration. These findings are consistent with

previous research reporting differences in the development of fluency, flexibility, elaboration, and originality in ethnoscience-based learning [33].

The different patterns across the four dimensions of creative thinking suggest that ethnoscience integration may be associated with different aspects of creativity to different degrees. This finding can be compared with the results of a collaborative ethno-STEAM project-based learning study, which reported creativity achievement distributed across highly creative (29%), creative (48%), and moderately creative (23%) categories [34]. This difference confirms that the ethnoscience approach places different emphases on each dimension of creativity. Thus, the integration of ethnoscience in DIY Laboratories has proven to be an effective strategy for developing the creativity of prospective elementary school teachers, while also strengthening culture-based science learning that supports the mastery of 21st-century skills.

Conclusion

Based on the results of data analysis and discussion, it can be concluded that the integration of ethnoscience in Do-It-Yourself (DIY) Laboratories is significantly associated with the creative thinking skills of prospective elementary school teachers. Local wisdom-based experimental activities provide a learning context in which students can engage with diverse, flexible, and original ideas during science experiments. Statistical analysis showed a strong and statistically significant positive relationship between ethnoscience integration and creative thinking skills ($r = 0.715$; $p < 0.001$), with a Fisher's z value of 0.898. The coefficient of determination ($R^2 = 0.512$) indicates that ethnoscience integration statistically accounted for 51.2% of the variance in students' creative thinking skills, while the remaining variance was not explained by the model.

The contribution of the four ethnoscience indicators varied across the dimensions of creative thinking, with R^2 values of 61.1% for fluency, 60.4% for flexibility, 34.4% for originality, and 26.6% for elaboration. The application of local knowledge in experiments showed the strongest significant contribution to fluency, flexibility, and originality, while the integration of cultural values into science concepts was the strongest significant predictor of elaboration. These findings indicate that ethnoscience integration in DIY Laboratories is statistically associated with different dimensions of creative thinking and provides a contextual setting for culture-based science learning. This study recommends the development of more systematic and adaptive DIY Laboratory designs that incorporate local wisdom to support the implementation of contextual science learning in elementary education.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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