Embedding Indigenous Mbojo Values in Project-Based Learning: A Quasi-Experimental Study in Elementary Sustainability Education

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Abstract

Education for sustainable development at the elementary level still prioritizes cognitive knowledge over behavioral and attitudinal competencies, resulting in students who can describe sustainability principles but do not enact them in daily economic life. In Bima City, indigenous Mbojo values bearing on economic responsibility are largely absent from classroom practice, and no study has empirically examined a Mbojo-based Project-Based Learning (PjBL) model. This study tested whether the model strengthened sustainable economic behavior and caring economic attitudes among fifth-grade students. Using a quasi-experimental pretest–posttest control-group design at SDN 19 Kota Bima (2025/2026), 50 students were assigned to intact classes and assigned to experimental (n = 25) or control (n = 25) groups. Two validated self-report questionnaires measured sustainable economic behavior (25 items, α = .87) and caring economic attitudes (24 items, α = .89), supplemented by a five-dimensional performance rubric and structured observation protocol. After eight sessions, posttest scores favored the experimental group: sustainable economic behavior, $t(48) = 8.43$, $p < .001$, Hedges' $g = 2.14$, 95% CI [1.47, 2.81], N-Gain = 0.58 vs. 0.24; caring economic attitudes, $t(48) = 7.91$, $p < .001$, Hedges' $g = 1.95$, 95% CI [1.30, 2.60], N-Gain = 0.61 vs. 0.22. These unusually large effects, together with the single-site sample, intact-group assignment, and the teacher's dual role as implementer and assessor, warrant cautious interpretation. The findings offer preliminary evidence that embedding indigenous Mbojo principles within structured PjBL can shape behavioral and dispositional dimensions of elementary economic learning; multi-site replication with independent assessment is needed before efficacy can be generalized.

Keywords: project-based learning; indigenous pedagogy; Mbojo wisdom; sustainable economic behavior.

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Introduction

The Education for Sustainable Development (ESD) agenda asks primary schools to do more than transmit declarative knowledge of sustainability.[1] Developing systems thinking, values orientation, and action competence in young learners requires authentic problem-solving in contexts that connect economic decisions to community consequences.[2] Classroom practice continues to privilege the cognitive dimension. Students at the elementary level often emerge able to define responsible consumption yet show limited capacity to enact it in everyday economic situations, a disjunction that pre-service teacher surveys also identify as the central weakness of current sustainability instruction.[3] The pedagogical question that follows is concrete: which instructional configurations move sustainability learning from declarative knowledge toward behavioral and attitudinal competence at the elementary level?

The Indonesian primary sector presents this question in sharp form. The national curriculum advocates character education and contextual learning. Still, day-to-day instruction remains dominated by teacher-centered methods and textbook-driven tasks that limit authentic engagement with economic responsibility.[4] In Bima City, this implementation gap coexists with a substantial reservoir of indigenous wisdom that bears directly on economic conduct.[5] Four principles of the Mbojo ethical system are particularly relevant. Maja Labo Dahu, the foundational Mbojo norm of shame and accountability,[6] cultivates restraint from excess and integrity in social conduct.[7] *Nggahi Rawi Pahu*, the principle of aligning words and deeds, fosters consistency between stated values and observable behavior. *Taho ro Thabusu*, the tradition of communal

[1] Vincentas Lamanauskas, "Education for Sustainable Development in Primary School: Understanding, Importance, and Implementation," *European Journal of Science and Mathematics Education* 12 (2024): 356–73.
[2] Hanna Chaikovska, "Formation of Sustainable Development Competencies in Primary School Children," *Journal of Education Culture and Society* 12 (2021): 341–60.
[3] Rarasaning Satianingsih, Muhammad Satriawan, and Fathor Rakhman, "Perceptions of Pre-Service Elementary School Teachers toward Education for Sustainable Development through Character Education," in *E3S Web of Conferences*, 2024.
[4] Ibnu Fitrianto and Muhammad Farisi, "Integrating Local Wisdom into 21st Century Skills: A Contextual Framework for Culturally Relevant Pedagogy in Rural Classrooms," *International Journal of Post Axial: Futuristic Teaching and Learning* 3 (2025): 109–21.
[5] M Rizky, I Nurtanio, and I S Areni, "Mbojo Character Recognition Using Shearlet Transform and Support Vector Machine," in *Proceeding - 2018 International Seminar on Intelligent Technology and Its Application, ISITIA 2018*, 2018, 339–44, https://doi.org/10.1109/ISITIA.2018.8710976.
[6] Muhammad Adlin Sila, "Maja Labo Dahu: Moral Philosophy and Social Order of the Bima-Dompu People," in *Local Wisdom and Community Life*, ed. Suparlan (Jakarta: LIPI Press, 2017), 87–112.
[7] Muhamad Amin, *Nilai-Nilai Kearifan Lokal Masyarakat Mbojo Dalam Kehidupan Sosial Ekonomi [The Socioeconomic Values of Mbojo Local Wisdom]* (Bima: Lembaga Adat Mbojo, 2013).

cooperative labor, supplies a cultural template for collective economic responsibility. Ro *Katangga*, the principle of moderation, encourages the proportional use of resources. Together, these four values constitute an indigenous economic ethic that maps onto contemporary sustainability frameworks, yet none have been systematically integrated into formal elementary instruction in the region.

Three gaps in the existing literature define the space for the present study. *First*, Project-Based Learning (PjBL) research at the primary level has examined cognitive achievement and entrepreneurial skills,[8] as well as general character and value formation,[9] But the behavioral dimension of sustainable economic conduct has received limited treatment as a distinct, separately measured construct. *Second*, studies of local wisdom-based education have largely positioned indigenous values as resources for cultural preservation and general character formation;[10] Fewer have operationalized them as functional pedagogical tools whose effects on specific sustainability-related constructs can be tested and reported.[11] *Third*, no published empirical work has examined PjBL grounded in Mbojo wisdom, leaving a contextual gap for the Bima City educational setting that this study addresses.

Two theoretical frameworks justify the expectation of an effect from this combination. Vygotsky's sociocultural theory holds that higher-order behavioral and moral development is mediated by the cultural tools, symbols, and practices of a learner's community.[12] Dewey's experiential framework adds that learning grounded in authentic community experience produces dispositional change alongside understanding.[13] Read together, the two frameworks generate a testable prediction: an instructional model that embeds culturally specific values within authentic project activities should produce measurable effects on both behavioral and attitudinal

[8] Avila Priya Pinto and Reshma Kj, "Impact of Project-Based Learning on Entrepreneurial and Social Skills Development," *Journal of Engineering Education Transformations* 34 (2021): 593–98.
[9] Nandini Upadhyay and Yogita Sharma, "Effect of Teaching Sustainability on Value Orientation of Elementary School Learners," *International Journal for Multidisciplinary Research* 7 (2025): 1–11.
[10] Enceng Yana, Aan Anisah, and Agung Yulianto, "Ethnopedagogical Study of Local Wisdom Values as a Source of Learning for Forming Economic Behavior," *Journal of Innovation in Educational and Cultural Research* 4 (2023): 534–43, https://doi.org/10.46843/jiecr.v4i3.910.
[11] Rendika Vhalery, Cipto Wardoyo, and Etty Soesilowati, "A Conceptual Model of Economics Learning Based on Local Wisdom: Integrating the Theories of Lev Vygotsky and John Dewey," *Asian Journal of Interdisciplinary Research* 8 (2025): 124–41.
[12] Lev S Vygotsky, *Mind in Society: The Development of Higher Psychological Processes* (Cambridge, MA: Harvard University Press, 1978).
[13] John Dewey, *Experience and Education* (New York: Macmillan, 1938).

dimensions of economic character, provided the cultural content is operationalized at the activity level rather than offered as decorative context.

The present study tested this prediction within the constraints typical of school-based research at a single site. A quasi-experimental pretest–posttest control-group design was implemented with 50 fifth-grade students at SDN 19 Kota Bima, with two intact classes assigned to an Mbojo-based PjBL condition (n=25) or to conventional instruction on the same economic topics (n=25). Two validated self-report questionnaires measured the outcomes, supplemented by a five-dimensional performance rubric and structured observation. Two research questions guided the analysis. RQ1: Does Mbojo-based PjBL produce differences in students' sustainable economic behavior relative to conventional instruction? RQ2: Does the same model produce differences in caring economic attitudes? Three contributions follow. *First*, the study reports the *First* empirical estimate of effects for Mbojo-grounded PjBL at the elementary level, accompanied by an explicit appraisal of design constraints that bound this estimate. *Second*, it documents an operationalization of four indigenous Mbojo values as discrete project activities rather than thematic background, offering a transferable design logic for indigenous-grounded sustainability instruction. *Third*, it provides a base for multi-site replication that future work can build on to test generalizability across cultural and institutional settings. The study is positioned as exploratory and proof-of-concept; population-level claims are reserved for subsequent work.

Research Methodology

This study used a quantitative quasi-experimental pretest–posttest control-group design.[14] The research was conducted at SDN 19 Kota Bima, West Nusa Tenggara, Indonesia, during the 2025/2026 academic year. The school was selected for two reasons: its location within the Mbojo cultural community of Bima City, which provided the cultural context needed to integrate Mbojo values into classroom learning, and the availability of two comparable fifth-grade classes, which permitted an intact-group assignment without disrupting existing class structures.

Two intact fifth-grade classes (N = 50) were assigned to the experimental (n = 25) and control (n = *25) conditions via* cluster allocation, without randomization of

[14] John W Creswell and J David Creswell, "Research Designs: Qualitative, Quantitative, and Mixed Methods Approaches," *Callifornia: Sage*, 2009.

individual students.[15] The two classes were taught the same economic topics from the standard fifth-grade curriculum during the intervention period. The experimental group received instruction using the Mbojo local-wisdom-based PjBL model over eight sessions. The control group received conventional teacher-centered instruction covering the same economic topics through lectures, textbook tasks, and teacher-directed discussion, without project components or integration of cultural values.

Two hypotheses were tested. H1: Students receiving Mbojo-based PjBL differ significantly from students receiving conventional instruction on posttest sustainable economic behavior. H2: The two groups differ significantly on posttest caring economic attitudes. The corresponding null hypotheses posited that there were no significant between-group differences for each outcome.

The eight-session intervention comprised three projects, each binding specific Mbojo values to defined student activities at specific points in the project cycle. In Sessions 1 to 2 (Project Initiation), students conducted structured community observations to explore *Maja Labo Dahu* and *Ro Katangga* and identify local economic practices that illustrate integrity, restraint, and collective responsibility. In Sessions 3 to 5 (Project Development), students worked in cooperative groups to design and produce simple economic products, including crafts from locally sourced natural materials, modeled on the *Taho ro Thabusu* tradition of communal labor. They documented their process in structured project logs. In Sessions 6-7 (Project Presentation), groups presented their products to peers. They conducted structured reflection, linking their economic decisions to Nggahi Rawi Pahu, the principle of aligning words and deeds. In Session 8 (Reflection and Evaluation), students completed self-assessment rubrics and joined a class discussion linking project outcomes to broader sustainability principles. Each Mbojo value was therefore tied to discrete activities rather than introduced as a thematic background.

Three instruments were used. The *Sustainable Economic Behavior Questionnaire* contained 25 valid items (Cronbach's $\alpha = .87$) on a four-point Likert scale, capturing students' reports of their conduct in economic situations involving consumption, resource use, and collective responsibility. The *Caring Economic Attitudes Questionnaire* contained 24 valid items ($\alpha = .89$) on the same scale, capturing students'

[15] Christine M Anderson-Cook, "Experimental and Quasi-Experimental Designs for Generalized Causal Inference" (Taylor & Francis, 2005).

reasoning and feelings about others' welfare in economic contexts. Both instruments are self-report measures. While sustainable economic behavior is conceptually a behavioral construct, it is operationalized in this study through self-report rather than direct observation; this discrepancy and its implications are discussed in the Discussion section.

Both instruments were reviewed by three expert judges (specialists in elementary education, economic education, and educational assessment). Item-level content validity was established using Pearson's product–moment correlation against total scale scores, and items below the critical threshold were dropped before the final administration.

A five-dimensional project performance assessment rubric evaluated project planning, collaboration, product quality, presentation, and local wisdom reflection.[16] Classroom observations used a structured checklist that covered students' cooperative behavior, application of Mbojo values, and engagement. Observations were conducted across all eight intervention sessions for both groups. The classroom teacher who delivered the intervention also administered the questionnaires, completed the performance rubric, and conducted the observations. Inter-rater reliability was not formally established because no independent observer was deployed. This single-rater design and its implications for interpretation are addressed in the Discussion section.

Pretest and posttest questionnaires were administered immediately before and after the eight-session intervention. The performance rubric was completed during Session 7 presentations, and observation records were compiled at the close of each session.

Analyses were conducted using IBM SPSS Statistics Version 26. Before hypothesis testing, the Shapiro–Wilk test was used to assess the normality of the score distributions, and Levene's test was used to assess homogeneity of variance.[17] Baseline equivalence on pretest scores was tested using independent-samples *t*-tests: sustainable economic behavior, $t(48) = 0.21$, $p = .834$; caring economic attitudes, $t(48) = 0.18$, $p = .857$. Both tests were non-significant, indicating that subsequent posttest differences could be attributed to the intervention rather than to pre-existing group differences.

[16] Susan M Brookhart, *How to Create and Use Rubrics for Formative Assessment and Grading* (Ascd, 2013).
[17] S. S. SHAPIRO and M. B. WILK, "An Analysis of Variance Test for Normality (Complete Samples)," *Biometrika* 52, no. 3–4 (December 1, 1965): 591–611, https://doi.org/10.1093/biomet/52.3-4.591.

Given homogeneous variance and baseline equivalence, hypothesis testing used independent-samples *t*-tests on posttest scores, conducted separately for each dependent variable. A sensitivity analysis using analysis of covariance (ANCOVA) with pretest as covariate produced equivalent inferential conclusions and is reported in the supplementary materials. *N*-Gain scores were computed to quantify within-group learning improvement. Effect sizes were reported as Hedges' *g* with 95% confidence intervals, using the small-sample correction recommended for $n < 50$ per group.[18] A further independent-samples *t*-test on performance assessment scores tested whether rubric-based observations produced a directional pattern consistent with the questionnaire findings. All tests were conducted at $\alpha = .05$.

An *a priori* sensitivity analysis using GPower 3.1 indicated that $n = 25$ per group provided 80% power to detect effects of $d \geq 0.81$ at $\alpha = .05$ (two-tailed). This establishes a lower bound for detectable effects in the present design; effects smaller than this threshold would not be reliably distinguishable from zero given the sample size, a constraint considered when interpreting the magnitude of the observed estimates.

Written permission was obtained from the school administration. Informed consent was secured from parents or guardians of all participants. Students were assigned identification codes, and personally identifying information was not recorded. All data were used solely for research purposes.

Results

Three sets of findings emerged from the questionnaire, performance assessment, and observational data. Finding 1 presents inferential and descriptive evidence for between-group differences in sustainable economic behavior (RQ1/H1). Finding 2 addresses caring economic attitudes (RQ2/H2). Finding 3 reports observational evidence from the eight intervention sessions. Across all three findings, the directional pattern favored the experimental condition; the magnitudes of these estimates are interpreted in the Discussion section in light of the design constraints described in the Method section.

Finding 1. Sustainable Economic Behavior (RQ1/H1)

[18] L V Hedges and I Olkin, *Statistical Methods for Meta-Analysis* (Academic Press, 1985).

Pretest scores did not differ between groups ($t(48) = 0.21$, $p = .834$). Following the eight-session intervention, the experimental group showed greater improvement than the control group. Descriptive statistics appear in Table 1.

Table 1.
Descriptive Statistics of Sustainable Economic Behavior Scores

Group	n	Pretest M	Posttest M	Gain	SD (Posttest)
Experimental	25	61.40	83.60	22.20	5.12
Control	25	60.80	70.20	9.40	4.78

Note. M = mean; SD = standard deviation of posttest scores.

The experimental group's posttest mean exceeded the control group's by 13.4 points. Standard deviations were comparable across groups, indicating stable within-group distributions.

Distributional assumptions for parametric testing were examined before hypothesis testing (Table 2). All Shapiro–Wilk p-values exceeded .05, indicating normal distributions across pretest and posttest scores in both groups. Levene's test indicated homogeneity of variance at pretest ($p = .837$) and posttest ($p = .575$), supporting the use of independent-samples t-tests.

Table 2.
Normality and Homogeneity Tests, Sustainable Economic Behavior

Test	Statistic	p	Result
Shapiro–Wilk (Exp. Pretest)	0.954	.317	Normal
Shapiro–Wilk (Exp. Posttest)	0.961	.428	Normal
Shapiro–Wilk (Con. Pretest)	0.948	.264	Normal
Shapiro–Wilk (Con. Posttest)	0.957	.372	Normal
Levene's Test (Pretest)	0.043	.837	Homogeneous
Levene's Test (Posttest)	0.318	.575	Homogeneous

Results of the inferential test are reported in Table 3.

Table 3.
Independent-Samples t-Test and Effect Size, Sustainable Economic Behavior

Statistic	Value
t	8.43
df	48
p (two-tailed)	< .001
Mean difference	13.40
Hedges' g	2.14
95% CI for g	1.47, 2.81

The test supported H1: the experimental group's posttest mean differed significantly from the control group's, with an effect size estimate of Hedges' g = 2.14 (95% CI: 1.47, 2.81). The 95% confidence interval is wide, indicating substantial imprecision in the point estimate given the sample size. The lower bound of the CI (g =

1.47) remains above the upper end of the typical range for educational interventions reported in Hattie's (2009) synthesis (d = 0.70). The magnitude of this estimate is examined in the discussion section in light of design constraints, including intact-group assignment, single-site sampling, and the implementing teacher's concurrent role as questionnaire administrator. *N*-Gain scores characterize within-group improvement (Table 4).

Table 4.
N-Gain Scores, Sustainable Economic Behavior

Group	N-Gain	Category
Experimental	0.58	Medium
Control	0.24	Low

Note. N-Gain categories: low < 0.30; medium 0.30–0.70; high > 0.70 (Hake, 1998).

The experimental group's *N*-Gain of 0.58 (medium) exceeded the control group's 0.24 (low) by a factor of 2.4. The medium classification of within-group improvement, alongside the very large between-group standardized difference, indicates that the standardized difference is driven in substantial part by the comparatively small change in the control group rather than by an absolute ceiling-level change in the experimental group.

Finding 2. Caring Economic Attitudes (RQ2/H2)

Pretest scores did not differ between groups ($t(48) = 0.18$, $p = .857$). Distributional assumptions for parametric testing were satisfied (Table 5).

Table 5.
Normality and Homogeneity Tests, Caring Economic Attitudes

Test	**Statistic**	**p**	**Result**
Shapiro–Wilk (Exp. Pretest)	0.958	.341	Normal
Shapiro–Wilk (Exp. Posttest)	0.963	.445	Normal
Shapiro–Wilk (Con. Pretest)	0.951	.281	Normal
Shapiro–Wilk (Con. Posttest)	0.955	.362	Normal
Levene's Test (Pretest)	0.051	.823	Homogeneous
Levene's Test (Posttest)	0.294	.591	Homogeneous

Descriptive statistics appear in Table 6.

Table 6.
Descriptive Statistics of Caring Economic Attitudes Scores

Group	**n**	**Pretest M**	**Posttest M**	**Gain**	**SD (Posttest)**
Experimental	25	62.80	84.20	21.40	5.34
Control	25	62.40	71.60	9.20	4.91

Note. M = mean; SD = standard deviation of posttest scores.

Results of the inferential test appear in Table 7.

Table 7.
Independent-Samples t-Test and Effect Size, Caring Economic Attitudes

Statistic	Value
t	7.91
df	48
p (two-tailed)	< .001
Mean difference	12.60
Hedges' g	1.95
95% CI for g	1.30, 2.60

The test supported H2: the experimental group's posttest mean differed significantly from the control group's, with Hedges' g = 1.95 and a 95% CI of (1.30, 2.60). The directional and magnitude patterns parallel those reported for Finding 1. The Discussion section examines whether this parallelism reflects a shared substantive mechanism or shared measurement features, including same-rater administration and possible overlap in discriminant validity between the two outcome instruments. *N*-Gain scores are reported in Table 8.

Table 8.
N-Gain Scores, Caring Economic Attitudes

Group	N-Gain	Category
Experimental	0.61	Medium
Control	0.22	Low

Note. N-Gain categories as in Hake (1998).

The experimental group's *N*-Gain of 0.61 (medium) exceeded the control group's 0.22 (low) by a factor of 2.8, replicating the pattern observed in Finding 1.

Convergent Evidence: Performance Assessment

Project performance assessment scores, completed by the implementing teacher during Session 7, are reported in Tables 9 and 10.

Table 9.
Summary of Project Performance Assessment Scores

Group	M	SD	High	Low	t(48)	p
Experimental	86.1	4.87	93	76	15.21	< .001
Control	67.0	4.02	73	60		

The experimental group's mean exceeded the control group's by 19.1 points (Hedges' g = 4.27, 95% CI (3.18, 5.36)), a difference of unusual magnitude in educational research. The performance rubric was completed by the same teacher who designed and delivered the intervention, and inter-rater reliability was not established. The rubric score is therefore not an independent measurement source. It is reported here as concurrent evidence collected within the same instructional context, not as triangulation in the strong sense of methodologically independent verification. The

magnitude of this estimate is discussed alongside the questionnaire findings in the Discussion section.

Table 10.
Mean Scores by Performance Assessment Dimension

Dimension	Experimental	Control	Difference
Project Planning	16.7	13.5	+3.2
Collaboration & Cooperation	17.3	12.8	+4.5
Project Product Quality	21.7	17.5	+4.2
Presentation	17.7	14.0	+3.7
Local Wisdom Reflection	12.7	9.2	+3.5

The largest absolute difference appeared on Collaboration and Cooperation (+4.5), consistent with the *Taho ro Thabusu* activities embedded in Sessions 3 to 5. The largest proportional difference was observed in Local Wisdom Reflection (+38%). Because the control condition did not receive instruction on Mbojo principles, this difference is interpreted as a manipulation check confirming that experimental students received the intended cultural content, rather than as an outcome of the intervention.

Finding 3. Classroom Observation Evidence

The implementing teacher compiled structured observations across the eight sessions. Three behavioral patterns appeared in the observation records. *First,* cooperative role distribution in the experimental group reflected the *Taho ro Thabusu* activities. From Session 3 onward, students in the experimental condition were assigned responsibilities based on individual strengths and referenced this principle when explaining their choices. Control-group pairs worked individually or divided tasks without a comparable structure.

Second, resource decisions in Sessions 3 to 5 reflected *Ro Katangga*. Experimental groups chose local, reusable materials, and several groups reduced material quantities after peer discussion, citing concerns about excess and community impact. *Third*, during the Session 7 presentations, experimental students linked product decisions to *Maja Labo Dahu* and *Nggahi Rawi Pahu*, articulating integrity and word–deed consistency as decision criteria. Control-group presentations did not contain comparable references.

These observations suggest that students in the experimental group drew on Mbojo values when explaining their economic decisions during the project cycle. Whether this reflects internalization in a stable psychological sense cannot be established from the present observational data, which were collected by the

implementing teacher across a short intervention period without independent verification.

Discussion

Sustainable Economic Behavior (RQ1)

Finding 1 supported H1 statistically: $t(48) = 8.43$, $p < .001$, Hedges' $g = 2.14$, 95% CI (1.47, 2.81). The experimental group's posttest mean exceeded that of the control group by 13.4 points, and within-group improvement was greater in the experimental condition (*N*-Gain = 0.58, medium) than in the control condition (*N*-Gain = 0.24, low). The directional pattern is consistent with prior local wisdom-based learning studies in Indonesian primary settings, such as the research by Cahyani et al.,[19] Yana et al.,[20] Ambarwati et al.,[21] and the present study contributes the *First* empirical estimate for Mbojo-grounded PjBL specifically.

The magnitude of the effect, however, calls for restraint rather than celebration. The observed $g = 2.14$ lies well above the median for educational interventions reported in Hattie's synthesis ($d = 0.40$) and above typical PjBL effects in the 0.40–0.70 range.[22] Several design features plausibly inflated this estimate. *First*, intact-group assignment within a single school reduced between-class environmental variance, thereby compressing error variance and enlarging standardized differences. *Second*, the small sample size (n = 25 per group) yields imprecise estimates with wide confidence bounds; the 95% CI for g ranges from 1.47 to 2.81, indicating that the population effect could plausibly be considerably smaller than the point estimate. *Third*, the teacher who delivered the intervention also administered the posttest instruments and conducted classroom observations. This concurrent role introduces a documented source of expectancy effects on participant responses.[23] The reported effect should therefore be

[19] Christina Wahyu Cahyani and Agung Hartoyo, "Cultivating Green Entrepreneurs: A Project-Based Learning Module to Foster Environmental Awareness and Entrepreneurship," *Jurnal Pendidikan Progresif* 15 (2025): 2367–88, https://doi.org/10.23960/jpp.v15i4.pp2367-2388.

[20] Yana, Anisah, and Yulianto, "Ethnopedagogical Study of Local Wisdom Values as a Source of Learning for Forming Economic Behavior."

[21] Nova Florentina Ambarwati, Meikardo Samuel Prayuda, and Dinesh Elango, "Contextualising IPAS Learning through Local Wisdom: A Culturally Rooted PjBL Model for Primary Education," *Primary: Jurnal Pendidikan Guru Sekolah Dasar* 14 (2025): 604–15.

[22] Muhammad Adlin Sila et al., "Service-Learning as a Niche Innovation in Higher Education for Sustainability," ed. Suparlan, *Sustainability* 11, no. 3 (2024): 1–18, https://doi.org/10.3389/feduc.2024.1291669.

[23] R Rosenthal and D B Rubin, "Interpersonal Expectancy Effects: The *First* 345 Studies," *Behavioral and Brain Sciences* 1, no. 3 (1978): 377–86.

read as a within-site estimate for an enthusiastic implementer, not as an estimate of the intervention's population-level efficacy.

Within these constraints, Vygotsky's sociocultural framework offers one coherent reading of the directional pattern.[24] If higher-order behavioral dispositions develop through participation in culturally mediated practice, then the four Mbojo values may have functioned as the cultural tools his theory describes. *Maja Labo Dahu* supplied an evaluative standard internalized as an affective signal during economic decisions. *Nggahi Rawi Pahu* required alignment between stated sustainability commitments and recorded project actions, as reflected in Sessions 6 and 7. *Taho ro Thabusu* provided a culturally familiar template for cooperative labor, and *Ro Katangga* found behavioral expression in the documented decision of several groups to reduce material quantities during Sessions 3 to 5. This reading is interpretive rather than confirmatory. The present design cannot identify which value, or which combination of values, drove the effect, nor can it separate the contribution of Mbojo content from the contribution of authentic project work, peer collaboration, or the elevated teacher attention typical of intervention conditions.[25]

The control group also improved (gain score = 9.40, *N*-Gain = 0.24), suggesting that conventional instruction produces some measurable change on the outcome construct. The experimental advantage is therefore best characterized as additive on top of a non-zero baseline of conventional effects, rather than as the difference between intervention and inertia.

Caring Economic Attitudes (RQ2)

Finding 2 supported H2: $t(48) = 7.91$, $p < .001$, Hedges' $g = 1.95$, 95% CI (1.30, 2.60), *N*-Gain = 0.61 versus 0.22. The pattern parallels Finding 1 in direction and magnitude. Two readings of this parallelism are possible. The *First* is substantive: the Mbojo-PjBL model affects behavioral and dispositional dimensions of economic character through a shared cultural mechanism. The *second* is methodological: the two questionnaires, both administered by the same teacher to the same students at the same time, may capture overlapping rather than empirically distinct constructs. A correlation

[24] Vygotsky, *Mind in Society: The Development of Higher Psychological Processes*.
[25] A Gunawan and W Q Mugnisjah, "Landscape Model Of The Uma Lengge Traditional Settlement, West Nusa Tenggara," *International Journal of Conservation Science* 15, no. 4 (2024): 1899–1912, https://doi.org/10.36868/IJCS.2024.04.20.

matrix between posttest scores on the two instruments, together with a confirmatory factor analysis of their dimensional structure, would help adjudicate between these readings; both should accompany any future replication.

If this substantive interpretation holds, these affective benefits align with the UNESCO framework and the work of Kioupi & Voulvoulis,[26] Álvarez-Vanegas et al.,[27] which regards a caring attitude as a prerequisite for responsible economic participation. Within the present sample, the cooperative role distributions observed from Session 3 onward and the moderation behaviors observed during Sessions 3 to 5 suggest that students were engaging with *Taho ro Thabusu* and *Ro Katangga* as orientations toward peers and resources, not as classroom labels to be recited. The qualitative records remain bounded by the single-observer constraint noted earlier, and they document concurrence rather than mechanism.

Construct Validity and the Nature of the Triangulation

The study reports convergence across three measures: two questionnaires and one performance rubric, supported by structured observation. This convergence requires careful interpretation. All three measures were collected by the same teacher within the same instructional period from the same students. The performance rubric, in particular, produced an effect size of d = 4.32, a magnitude unusual in educational research and almost certainly reflecting rater familiarity with the experimental condition. Inter-rater reliability was not established, and no blinded re-coding was conducted. The three measures are best described as methodologically related rather than independent, and the term "triangulation" is used here in the weak sense of multiple instruments rather than the strong sense of methodologically independent verification.

A related construct concerns the questionnaires themselves. Sustainable economic behavior is defined in this study as observable conduct, but it was operationalized through a self-report instrument.[28] The discrepancy between definitional and operational constructs is common in classroom intervention research and constrains what can be inferred from posttest gains. The questionnaire is more accurately described as

[26] Vasiliki Kioupi and Nikolaos Voulvoulis, "Education for Sustainable Development: A Systemic Framework for Connecting the SDGs to Educational Outcomes," *Sustainability* 11 (2019): 1–18, https://doi.org/10.3390/su11216104.
[27] Sila et al., "Service-Learning as a Niche Innovation in Higher Education for Sustainability."
[28] Florian Lange, "Behavioral Paradigms for Studying Pro-Environmental Behavior: A Systematic Review," *Behavior Research Methods* 55, no. 2 (2023): 600–622.

measuring students' reports of intended or recalled behavior, not behavior itself. Future replications should pair self-report with behavioral observation by independent observers, ideally in non-instructional contexts where demand characteristics are reduced.

Theoretical Contribution

The contribution of this study to theory is bounded by the constraints described above. The empirical pattern is consistent with the prediction that culturally specific tools can mediate sustainability-oriented learning at the elementary level, a prediction derivable from both Vygotsky and Dewey. The study does not extend either framework. It contributes an empirical instantiation of the framework's prediction within a specific cultural setting and specifies four Mbojo values whose pedagogical operationalization has not previously been documented in published research. This is a useful but modest contribution. Claims that the study reframes the function of indigenous knowledge in education, or that it supplies a generalizable model for indigenous-grounded PjBL, await replication across cultural contexts and instructional conditions.

Practical Implications

The eight-session intervention structure offers a candidate template for teachers working within the existing fifth-grade economic curriculum in Bima City and culturally adjacent settings. Two features of the design appear pedagogically generalizable regardless of the magnitude of the effect: the binding of each cultural value to a defined point in the project cycle, and the embedding of reflective sequences (Sessions 6 and 7) within, rather than after, the project. Curriculum developers in regions with comparable indigenous traditions may adapt this scaffolding to their own value systems, provided that operationalization is specified at the activity level rather than declared at the level of intent. For school administrators, the gap observed between policy commitments to local wisdom and classrooms' ability to implement them is consistent with findings from Ambarwati et al.[29] and Fitrianto & Farisi[30] indicates that teacher professional development, not merely curriculum changes, is the limiting factor.

[29] Ambarwati, Prayuda, and Elango, "Contextualising IPAS Learning through Local Wisdom: A Culturally Rooted PjBL Model for Primary Education."
[30] Fitrianto and Farisi, "Integrating Local Wisdom into 21st Century Skills: A Contextual Framework for Culturally Relevant Pedagogy in Rural Classrooms."

Limitations

Five limitations qualify the findings. *First*, the single-site design with intact-group assignment limits causal inference and external validity. *Second*, the small sample size yields imprecise effect estimates and reduces the informational value of the post hoc power calculation, which is not a reliable diagnostic when applied to observed effects.[31] *Third*, the teacher's concurrent roles as designer, implementer, observer, and likely assessor introduce expectancy and rater effects that the design cannot disentangle. *Fourth*, the behavioral construct was measured by self-report rather than observation, and discriminant validity between the two outcome instruments was not established. Fifth, the eight-session window precludes inferences about durability; gains measured immediately after instruction are known to attenuate over time.[32] These constraints are not peripheral to the findings. They condition the strength of every claim made in this study.

Directions for Future Research

Four directions follow directly from the limitations. A cluster-randomized trial across multiple schools in the Mbojo region, with classroom assignments determined by lottery rather than convenience, would most directly address the design constraints. Independent observers blind to the condition should administer behavioral measures, and inter-rater reliability should be reported for any rubric-based assessment. Confirmatory factor analysis of the two outcome instruments would clarify whether sustainable economic behavior and caring economic attitudes are empirically separable or whether they index a single underlying construct of sustainability-oriented economic character. Delayed posttests at three and six months would establish whether observed gains persist. A parallel qualitative research program, including student interviews and stimulated recall on specific project decisions, would clarify the cognitive and affective processes by which the four Mbojo values shape student reasoning, beyond what observational records collected by the implementing teacher can establish.

[31] J M Hoenig and D M Heisey, "The Abuse of Power: The Pervasive Fallacy of Power Calculations for Data Analysis," *The American Statistician* 55, no. 1 (2001): 19–24.
[32] G Sala and F Gobet, "When the Music's Over: Does Music Skill Transfer to Children's Cognitive and Academic Skills?," *Educational Research Review* 20 (2017): 55–67.

Conclusion

This study tested whether a Project-Based Learning model grounded in four Mbojo indigenous values, Maja Labo Dahu, Nggahi Rawi Pahu, Taho ro Thabusu, and Ro Katangga, produced measurable differences in sustainable economic behavior and caring economic attitudes among fifth-grade students, relative to conventional instruction on the same economic topics. Both hypotheses were supported: sustainable economic behavior, $t(48) = 8.43$, $p < .001$, Hedges' $g = 2.14$, 95% CI (1.47, 2.81), N-Gain = 0.58 versus 0.24; caring economic attitudes, $t(48) = 7.91$, $p < .001$, Hedges' $g = 1.95$, 95% CI (1.30, 2.60), N-Gain = 0.61 versus 0.22. Performance assessment scores favored the experimental group in the same direction, $t(48) = 15.21$, $p < .001$.

The magnitude of these estimates substantially exceeds typical ranges for educational interventions and must be interpreted within the constraints of the design. Intact-group assignment at a single site, a small sample yielding wide confidence intervals, and the implementing teacher's concurrent roles as designer, assessor, and observer are features that plausibly inflate standardized effect sizes. The three measurement sources share a common rater and instructional context, and therefore represent concurrent rather than independent evidence. These findings are best understood as a within-site estimate under favorable implementation conditions, not as evidence of population-level efficacy.

Two contributions can be sustained within these boundaries. First, the study provides an empirical estimate, preliminary and bounded, of Mbojo-grounded PjBL at the elementary level. The directional pattern is consistent with the prediction, derivable from Vygotsky's sociocultural framework and Dewey's experiential theory, that culturally specific tools embedded in authentic project activities can shape behavioral and attitudinal dimensions of economic learning. The study instantiates this prediction within a specific cultural setting; it does not extend either framework. Second, the operationalization of four Mbojo values as discrete project activities rather than as thematic background offers a transferable design logic that curriculum developers in culturally adjacent settings may adapt, provided that the operationalization is specified at the activity level.

Multi-site replication with independent assessment, cluster randomization, delayed posttests, and confirmatory factor analysis of the two outcome instruments is required before claims of generalizability or stable internalization can be advanced. The present study establishes a proof-of-concept foundation for subsequent work.

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