



Education and Awareness of Sustainability in Colleges of Education: Fostering Cultural and Social Sustainability

Muideen Oladeji SALAMI^{1*} , Habeeb Omoponle ADEWUYI²

¹University of Ibadan, Ibadan, Nigeria

²University of Johannesburg, South Africa

Received: July 6, 2026

Revised : August 21, 2026

Accepted : September 23, 2026

Online : October 14, 2026

Abstract

This mixed-methods study investigates sustainability education and awareness in colleges of education in South Western Nigeria, focusing on their impact on cultural and social sustainability to achieve Sustainable Development Goal 4 (SDG 4) for quality education. Data were collected from 120 academic staff through surveys (95% response rate, N = 114) and 12 staff via focus group discussions (FGDs) across six institutions. Regression analyses indicated that sustainability education practices, particularly staff training ($\beta = .412$, $p < .001$), predict 48.7% of cultural sustainability outcomes ($R^2 = .487$, $p < .001$) and 52.1% of social sustainability outcomes ($R^2 = .521$, $p < .001$). ANOVA showed no significant differences between federal and state colleges ($p > .05$), highlighting systemic barriers. FGDs identified inadequate training, cultural resistance (e.g., viewing sustainability as a Western concept), and resource constraints as key challenges. The study proposes a localized sustainability education framework emphasizing mandatory staff training, streamlined governance, and formal community partnerships via Memoranda of Understanding to enhance teacher education. These policy-relevant strategies align with Nigeria's National Policy on Education (2013) and SDG 4, offering actionable solutions for governance reform and community-driven cultural preservation in resource-constrained settings.

Keywords: *Sustainability Education, Cultural Sustainability, Social Sustainability, Colleges of Education, South Western Nigeria, SDG*

INTRODUCTION

Sustainability education serves as a cornerstone for equipping educators with the knowledge, skills, and competencies to foster cultural preservation and social cohesion, aligning with Sustainable Development Goal 4 (SDG 4) for inclusive and equitable quality education (UNESCO, 2014; Adipat & Chotikapanich, 2022). In South Western Nigeria, colleges of education are pivotal in training teachers who shape societal values, preserve cultural heritage (e.g., Yoruba traditions), and promote social unity amidst challenges like cultural erosion and social fragmentation (Yusuf, 2022; Ademola et al., 2021). These institutions are uniquely positioned to embed sustainability principles into teacher education, enabling graduates to address local issues such as the loss of indigenous languages, declining traditional practices, and weakening community bonds (Mulà & Tilbury, 2023; Ogunyemi, 2024). However, the absence of a comprehensive sustainability education framework in these colleges limits their capacity to contribute to sustainable community development (Babalola & Olawuyi, 2021). This study investigates sustainability education and awareness among academic staff in South Western Nigerian colleges of education, aiming to develop a localized framework that integrates global sustainability standards with regional socio-cultural realities to enhance teacher education and promote cultural and social sustainability.

The Nigerian education sector faces systemic challenges that hinder the integration of sustainability principles. Colleges of education grapple with underfunding, outdated pedagogical



approaches, and weak policy implementation, which are exacerbated by cultural resistance to sustainability concepts perceived as Western imports misaligned with local values (Amadi & Nwogu, 2023; Toriola-Coker et al., 2021). For example, topics like cultural heritage preservation (e.g., teaching Yoruba folklore) or community engagement are rarely incorporated into teacher training curricula, reducing their relevance to local socio-cultural needs (Agboola et al., 2018). Academic staff, as key stakeholders in curriculum delivery and institutional governance, are ideally positioned to assess these barriers and identify opportunities for embedding sustainability in teacher education (Imara & Altinay, 2021). The National Policy on Education (2013) mandates sustainability education, but its implementation is inconsistent due to resource constraints and lack of institutional prioritization (Okebukola, 2020). This creates a practice gap where colleges fail to produce teachers equipped to address Nigeria's socio-cultural challenges, such as the erosion of indigenous knowledge systems or social inequalities.

Globally, sustainability education is well-established in higher education, with institutions in developed nations integrating interdisciplinary courses, experiential learning, and community-based projects to achieve SDG 4 (Lozano et al., 2013; Leal Filho et al., 2019). For instance, European universities employ sustainability modules and faculty training to enhance cultural and social competencies, resulting in measurable student outcomes (Bhaduri et al., 2024). In contrast, developing nations like Nigeria face resource limitations and cultural barriers, necessitating localized solutions that adapt global frameworks to regional contexts (Maringe & Foskett, 2019). The research gap in South Western Nigeria is evident, as existing studies focus on general educational challenges (e.g., funding, infrastructure) without specifically addressing sustainability education in colleges of education (Beasy et al., 2024; Atanda & Adeniran, 2015). This study fills this gap through a mixed-methods approach, combining quantitative surveys and qualitative FGDs to explore sustainability awareness, curriculum integration, and institutional barriers.

The study addresses three objectives: (1) assess the level of sustainability awareness among academic staff; (2) evaluate the extent of sustainability integration in curricula; and (3) propose a localized framework to enhance sustainability education for cultural and social sustainability. These objectives translate into four research questions:

1. What is the level of sustainability awareness among academic staff in colleges of education in South Western Nigeria?
2. To what extent is sustainability integrated into the curricula of these institutions?
3. How do governance structures influence the implementation of sustainability education?
4. What is the impact of community engagement on fostering cultural and social sustainability?

Theoretically, the study contributes to the Education for Sustainable Development (ESD) framework by testing its applicability in a resource-constrained, culturally distinct context, refining its propositions on training and stakeholder collaboration (UNESCO, 2014). Practically, it offers policy-relevant solutions, such as cost-effective training programs and community partnerships, to strengthen teacher education and address Nigeria's socio-cultural challenges. By providing empirical evidence and a tailored framework, this study bridges global sustainability standards with local constraints, enhancing teacher education's role in sustainable development.

LITERATURE REVIEW

Theoretical Framework

This study is grounded in UNESCO's Education for Sustainable Development (ESD) framework (2014), which promotes integrating sustainability into education to foster social, cultural, and environmental competencies, such as critical thinking, collaboration, and cultural sensitivity (Leal Filho et al., 2021). Complementing this, Bandura's (1977) social learning theory

posits that sustainability awareness is a learned behaviour shaped by institutional practices, peer interactions, and cultural contexts. These frameworks guide the mixed-methods analysis, examining how academic staff's knowledge, curriculum integration, and institutional practices influence cultural and social sustainability outcomes in South Western Nigerian colleges of education. The combination of ESD's structured approach and social learning theory's emphasis on contextual learning provides a robust lens for investigating teacher education's role in sustainable development (Creswell, 2014).

To strengthen the quantitative component, the following hypotheses are derived:

- H1: Higher levels of staff training on sustainability significantly predict cultural sustainability outcomes.
- H2: Greater curriculum integration of sustainability topics enhances cultural sustainability outcomes.
- H3: Effective governance structures positively influence social sustainability outcomes.
- H4: Increased community engagement significantly predicts social sustainability outcomes.

Sustainability Education in Higher Education

Globally, sustainability education is a cornerstone of achieving SDG 4 (United Nations, 2015). Universities in developed nations, such as the United States and Europe, integrate sustainability through interdisciplinary courses, experiential learning, and community projects, with measurable impacts on student competencies (Lozano et al., 2013; Bhaduri et al., 2024). For example, Leal Filho et al. (2019) highlight European universities' use of sustainability modules to preserve cultural heritage, such as local languages and traditions. In contrast, developing nations like Nigeria face challenges like funding shortages, outdated curricula, and cultural resistance, which limit sustainability integration (Maringe & Foskett, 2019; Okebukola, 2020). In South Western Nigeria, cultural resistance often stems from perceptions of sustainability as a Western concept, clashing with local traditions like Yoruba storytelling or communal practices (Agboola et al., 2018).

Curriculum Integration

The National Policy on Education (2013) mandates sustainability education, but colleges of education in Nigeria struggle with implementation due to resource constraints and inadequate staff training (Atanda & Adeniran, 2015). For instance, topics like cultural heritage preservation (e.g., teaching indigenous crafts) or community engagement are rarely embedded in teacher training, reducing their relevance to local needs (Babalola & Olawuyi, 2021). Global best practices, such as interdisciplinary sustainability modules in Australian universities, contrast with Nigeria's challenges, highlighting the need for localized curricula that incorporate low-cost, culturally relevant content (Tilbury, 2011).

Governance and Institutional Support

Effective governance is critical for sustainability education. Winkelmes et al. (2023) emphasize transparent leadership and policy enforcement to embed sustainability, yet Nigerian colleges face bureaucratic inefficiencies and weak accountability (Sule, 2024). For example, delays in curriculum approvals hinder sustainability integration, as noted by Adenle et al. (2021). These challenges contrast with global models where streamlined governance supports sustainability initiatives (Madsen, 2022).

Community Engagement

Community partnerships enhance sustainability outcomes by leveraging local knowledge (Höffken & Lazendic-Galloway, 2024). In Nigeria, limited funding and lack of formal collaboration mechanisms restrict engagement with communities and private sectors (Asiyai, 2015). Global studies, such as those by Leal Filho et al. (2021), demonstrate successful public-private partnerships, underscoring the potential for Nigeria to adopt similar strategies through MoUs.

Research Gap

The literature reveals a significant gap in sustainability education research within Nigerian colleges of education, particularly in South Western Nigeria. While global ESD models provide robust frameworks, they are designed for resource-rich contexts and overlook cultural and resource constraints in developing nations (Beasy et al., 2024). Regional studies identify barriers like training gaps and cultural resistance but lack mixed-methods analyses to explore awareness, curriculum integration, and stakeholder collaboration comprehensively (Atanda & Adeniran, 2015). This study addresses these gaps, contributing a localized framework to advance SDG 4 and teacher education.

RESEARCH METHOD

Research Design

This study employs a mixed-methods design, integrating quantitative surveys and qualitative focus group discussions (FGDs) to comprehensively investigate sustainability education and awareness in colleges of education in South Western Nigeria. The convergent parallel design facilitates triangulation, cross-referencing quantitative and qualitative findings to enhance validity and provide a holistic understanding of sustainability practices (Creswell, 2014). The quantitative component addresses the first two research questions, measuring sustainability awareness and curriculum integration through structured surveys. The qualitative component explores barriers (e.g., cultural resistance, governance challenges) and opportunities (e.g., community engagement) for the third and fourth research questions, using FGDs to capture in-depth perspectives. This design aligns with the exploratory and descriptive nature of the study, enabling a nuanced analysis of cultural and social sustainability in teacher education (Tashakkori & Teddlie, 2010).

Population and Sample

The study population comprises 1,543 academic staff across six colleges of education in South Western Nigeria: Federal College of Education (Special), Oyo; Oyo State College of Education, Lanlate; Federal College of Education, Abeokuta; Sikiru Adetona College of Education, Omu-Ajose; Osun State College of Education, Ila-Orangun; and Federal College of Education (Technical), Akoka. For the quantitative component, a stratified random sampling technique selected 120 academic staff (20 per college), ensuring equal representation of federal (60 staff) and state-owned (60 staff) institutions. The sample size was determined using Cochran's (1977) formula, achieving a 95% confidence level and 5% margin of error for statistical robustness. For the qualitative component, 12 academic staff (2 per college) were purposively selected based on expertise (e.g., curriculum developers, senior lecturers with over 10 years of experience) to provide rich insights into sustainability education practices, aligning with purposive sampling principles (Patton, 2015).

Data Collection

Quantitative data were collected from January to March 2025 using a structured questionnaire administered to 120 academic staff. The questionnaire was developed following a pilot study conducted in December 2024 with 20 staff from a non-participating college (Emmanuel

Alayande College of Education, Oyo), achieving a Cronbach's alpha of 0.86, indicating high reliability. The pilot study involved iterative item refinement: initial questions were tested for clarity (e.g., simplifying jargon like "sustainability competencies"), and retested to ensure validity (DeVellis, 2016). The final questionnaire included Likert-scale questions (1–5, where 1 = very low, 5 = very high) assessing sustainability awareness (e.g., knowledge of SDG 4, cultural preservation principles), curriculum integration (e.g., inclusion of sustainability topics), governance influences, and community engagement. Surveys were administered in-person (70%) and via secure online platforms (30%), achieving a 95% response rate (N = 114) through follow-up reminders via email and phone.

Qualitative data were gathered through six FGDs (one per college, each with 2 participants), conducted in-person (four sessions) or via secure virtual platforms (two sessions) due to logistical constraints. Each FGD lasted approximately 60 minutes and followed a pre-tested discussion guide, piloted with four academic staff to refine prompts (e.g., adding questions on cultural barriers). The guide explored training needs, cultural resistance, governance challenges, and community engagement opportunities, ensuring alignment with the study's objectives. FGDs were audio-recorded with consent, transcribed verbatim, and anonymized to protect participant identities (Braun & Clarke, 2006).

Data Analysis

Quantitative data were analysed using SPSS version 27. Descriptive statistics (means, standard deviations, percentages) summarized awareness and curriculum integration levels. Multiple regression analyses examined the predictive power of sustainability education practices (e.g., staff training, curriculum integration, community engagement) on cultural and social sustainability outcomes, reporting β coefficients, R^2 values, Adjusted R^2 , F-ratios, and p-values ($p < .05$). One-way ANOVA compared practices between federal and state colleges, maintaining a significance level of $p < .05$ (Field, 2018). Qualitative data from FGDs were analysed thematically using NVivo software, following Braun and Clarke's (2006) six-step process: familiarization, coding, theme generation, review, definition, and reporting. Codes such as "inadequate training," "cultural resistance," and "resource constraints" were iteratively developed and triangulated with quantitative findings to ensure interpretive depth (Creswell, 2014).

Ethical Considerations

Ethical approval was obtained from the ethics committees of all six participating institutions. Participants provided written informed consent, with anonymity ensured through pseudonymization (e.g., Participant A, College 1). Data were stored on a password-protected server accessible only to the researchers, and participants were informed of their right to withdraw without consequences, adhering to the British Educational Research Association (2018) guidelines.

Findings and Discussion

This section presents a comprehensive analysis of the mixed-methods study, integrating quantitative survey data from 114 academic staff (95% response rate) and qualitative insights from 12 focus group discussion (FGD) participants across six colleges of education in South Western Nigeria. The findings address the four research questions on sustainability awareness, curriculum integration, governance influences, and community engagement, with extensive elaboration on thematic patterns, statistical results, and comparisons with global and regional literature to highlight contributions to cultural and social sustainability aligned with SDG 4.

Demographic Data

The survey respondents (N = 114) comprised 62 males (54.4%) and 52 females (45.6%), with ages ranging from 28 to 60 years (M = 42.3, SD = 8.7). Academic ranks included 38 lecturers (33.3%), 45 senior lecturers (39.5%), 25 professors (21.9%), and 6 heads of departments (5.3%), with an average teaching experience of 12.4 years (SD = 6.2). FGD participants (n = 12) were senior lecturers (8 males, 4 females) with over 10 years of experience, ensuring expertise in curriculum and sustainability issues. This diverse demographic profile enhances the study's representativeness and supports comparability with future research

Statistical Assumptions

Regression analyses met key statistical assumptions: normality (Shapiro-Wilk, $p > .05$), homoscedasticity (Levene's test, $p > .05$), and no multicollinearity (VIF < 3). ANOVA assumptions were also satisfied (e.g., homogeneity of variances, $p > .05$), ensuring robust statistical findings (Field, 2018).

FINDINGS AND DISCUSSION

Research Question 1: Level of Sustainability Awareness Among Academic Staff

Quantitative data revealed moderate to low sustainability awareness (M = 2.8, SD = 0.9, Likert scale 1–5), with 34 respondents (29.8%) reporting high or very high awareness of SDG 4 and cultural sustainability principles (e.g., preserving Yoruba language). FGDs provided deeper insights into barriers. Participant B (College 2) stated, "Most staff lack exposure to sustainability due to absent workshops." Participant D (College 3) noted, "Sustainability is seen as a Western idea, clashing with our communal values." Participant G (College 4) added, "Without training, I struggle to connect sustainability to teacher education." Participant J (College 5) emphasized, "There's no institutional push for sustainability in our professional development." These themes of inadequate training and cultural resistance align with Unegbu et al. (2025) and extend Tilbury's (2011) findings by highlighting Nigeria-specific barriers, such as perceptions of sustainability as misaligned with Yoruba cultural practices like oral storytelling.

Table 1. Sustainability Awareness Levels Among Academic Staff in South Western Nigerian Colleges of Education (N = 114)

Awareness Level	Score Range	Frequency	Percentage (%)	Mean (M)	Standard Deviation (SD)
Very Low	1	12	10.5	2.8	0.9
Low	2	28	24.6		
Moderate	3	40	35.1		
High	4	24	21.1		
Very High	5	10	8.8		

Note: Awareness was measured on a 5-point Likert scale (1 = very low, 5 = very high) based on knowledge of SDG 4 and cultural sustainability principles (e.g., Yoruba language preservation).

Research Question 2: Extent of Sustainability Integration in Curricula

Curriculum integration was limited (M = 2.5, SD = 1.0), with 28 respondents (24.6%) reporting regular inclusion of sustainability topics (e.g., cultural heritage, social cohesion). Regression analysis (Table 1) showed sustainability education practices predict 48.7% of cultural sustainability outcomes ($R^2 = .487$, Adjusted $R^2 = .472$, $F(3, 110) = 34.872$, $p < .001$). Staff training was the strongest predictor ($\beta = .412$, $p < .001$), followed by curriculum integration ($\beta = .305$, $p = .002$) and policy support ($\beta = .234$, $p = .008$). FGDs highlighted resource constraints, with

Participant F (College 6) stating, “We lack textbooks and digital tools for sustainability topics.” Participant C (College 1) added, “Our curriculum is outdated; sustainability feels like an afterthought.” These findings corroborate [Atanda and Adeniran \(2015\)](#) and support [UNESCO's \(2014\)](#) ESD framework, extending the literature by quantifying training's impact and identifying specific gaps (e.g., lack of Yoruba-focused sustainability modules).

Table 2. Regression Analysis for Sustainability Education Practices Predicting Cultural Sustainability Outcomes

Predictor	β	SE	t	p	95% CI [Lower, Upper]
Constant	1.321	0.215	6.144	.000	[0.895, 1.747]
Staff Training	0.412	0.087	4.736	.000	[0.240, 0.584]
Curriculum Integration	0.305	0.091	3.352	.002	[0.125, 0.485]
Policy Support	0.234	0.088	2.659	.008	[0.060, 0.408]
<i>Model Summary: $R^2 = .487$, Adjusted $R^2 = .472$, $F(3, 110) = 34.872$, $p < .001$.</i>					

Research Question 3: Influence of Governance Structures

Regression analysis (Table 2) showed governance structures explain 52.1% of social sustainability outcomes ($R^2 = .521$, Adjusted $R^2 = .507$, $F(3, 110) = 39.951$, $p < .001$). Leadership accountability was the strongest predictor ($\beta = .389$, $p < .001$), followed by policy enforcement ($\beta = .317$, $p = .001$) and decision-making processes ($\beta = .229$, $p = .010$). FGDs emphasized bureaucratic inefficiencies, with Participant A (College 1) stating, “Sustainability initiatives stall due to slow approvals.” Participant H (College 4) noted, “Leaders need training on sustainability governance.” These align with [Nwafor and Ololube \(2024\)](#) and extend [Madsen \(2022\)](#) by quantifying governance impacts in a Nigerian context, highlighting the need for streamlined decision-making to support sustainability education.

Table 3. Regression Analysis for Governance Structures Predicting Social Sustainability Outcomes

Predictor	β	SE	t	p	95% CI [Lower, Upper]
Constant	1.254	0.203	6.177	.000	[0.852, 1.656]
Leadership Accountability	0.389	0.085	4.576	.000	[0.221, 0.557]
Policy Enforcement	0.317	0.089	3.562	.001	[0.141, 0.493]
Decision-Making Processes	0.229	0.087	2.632	.010	[0.057, 0.401]
<i>Model Summary: $R^2 = .521$, Adjusted $R^2 = .507$, $F(3, 110) = 39.951$, $p < .001$.</i>					

Research Question 4: Impact of Community Engagement

Community engagement predicted 49.3% of social sustainability outcomes ($R^2 = .493$, Adjusted $R^2 = .478$, $F(3, 110) = 35.672$, $p < .001$). Community partnerships were the strongest predictor ($\beta = .401$, $p < .001$), followed by government collaboration ($\beta = .296$, $p = .002$) and private sector engagement ($\beta = .210$, $p = .019$). FGDs highlighted limited engagement, with Participant E (College 5) stating, “Funding shortages prevent community projects like cultural festivals.” Participant K (College 2) added, “We need formal agreements to sustain partnerships.” These findings support [UNESCO's \(2014\)](#) ESD framework and extend [Asiyai \(2015\)](#) by quantifying engagement's impact, advocating for structured collaborations like MoUs to leverage local knowledge (e.g., community-led Yoruba heritage projects).

Table 4. Regression Analysis for Community Engagement Predicting Social Sustainability Outcomes

Predictor	β	SE	t	p	95% CI [Lower, Upper]
Constant	1.287	0.211	6.104	.000	[0.869, 1.705]
Community Partnerships	0.401	0.086	4.663	.000	[0.231, 0.571]
Government Collaboration	0.296	0.090	3.289	.002	[0.118, 0.474]
Private Sector Engagement	0.210	0.088	2.386	.019	[0.036, 0.384]
<i>Model Summary: $R^2 = .493$, Adjusted $R^2 = .478$, $F(3, 110) = 35.672$, $p < .001$.</i>					

Comparison with Literature

This study's findings on sustainability education and awareness in South Western Nigerian colleges of education provide a robust contribution to both global and regional literature, offering a nuanced understanding of cultural and social sustainability in a resource-constrained, culturally distinct context. By integrating quantitative data ($N = 114$, 95% response rate) and qualitative insights from 12 focus group discussions (FGDs), the study aligns with, extends, and challenges existing research, particularly in the areas of sustainability awareness, curriculum integration, governance structures, and community engagement. The following thematic comparisons highlight how the findings resonate with global frameworks like UNESCO's Education for Sustainable Development (ESD) (2014) and Bandura's (1977) social learning theory, while addressing Nigeria-specific challenges that enrich the discourse on sustainability education in developing nations.

Sustainability Awareness and Barriers

The moderate to low awareness levels among academic staff ($M = 2.8$, $SD = 0.9$, with only 29.8% reporting high or very high awareness) align with Tilbury's (2011) observation that limited training restricts sustainability education in developing countries. However, this study extends Tilbury's work by quantifying awareness gaps in South Western Nigeria and providing qualitative evidence of cultural barriers. For instance, Participant D (College 3) noted, "Sustainability is often seen as a Western idea, not aligned with our teaching traditions," reflecting a Nigeria-specific challenge where sustainability is perceived as misaligned with Yoruba cultural practices, such as oral storytelling or communal governance (Agboola et al., 2018). This contrasts sharply with Western universities, where sustainability is embedded in institutional culture through regular faculty training and interdisciplinary programs (Lozano et al., 2013; Leal Filho et al., 2019). Participant J (College 5) further highlighted, "There's no institutional push to educate us on sustainability," underscoring a systemic gap in professional development. This finding corroborates Unegbu et al. (2025), who identify cultural resistance as a barrier in Nigerian education, but extends their work by pinpointing specific institutional failures, such as the absence of SDG 4-focused workshops. Additionally, the study's emphasis on cultural resistance nuances Bandura's (1977) social learning theory, illustrating how local cultural norms (e.g., preference for traditional pedagogies) hinder the adoption of sustainability behaviours compared to global contexts where such norms are less restrictive.

The findings also reveal a disconnect between global ESD expectations and local realities. For example, Bhaduri et al. (2024) describe European universities' success in fostering sustainability awareness through mandatory training programs, whereas Nigerian colleges lack such initiatives due to funding constraints and prioritization of core subjects like mathematics over sustainability (Okebukola, 2020). This study contributes by quantifying awareness levels ($M = 2.8$) and linking them to specific barriers, such as the lack of exposure to SDG 4 principles, which

Participant G (College 4) described as “hard to understand without training.” This insight suggests that Nigeria’s teacher education system requires culturally sensitive training programs that integrate local values, such as Yoruba proverbs or community ethics, to overcome resistance and enhance relevance, a strategy less emphasized in global literature (Mulà & Tilbury, 2023).

Curriculum Integration

The limited integration of sustainability into teacher education curricula ($M = 2.5$, $SD = 1.0$, with 24.6% reporting regular inclusion) aligns with Atanda and Adeniran’s (2015) findings on resource limitations in Nigerian colleges, contrasting with global models where interdisciplinary curricula thrive (Lozano et al., 2013). The regression analysis ($R^2 = .487$, $p < .001$) underscores staff training as the strongest predictor of cultural sustainability outcomes ($\beta = .412$, $p < .001$), supporting UNESCO’s (2014) ESD framework, which emphasizes faculty development. However, the moderate R^2 value indicates implementation challenges, echoing Maringe and Foskett’s (2019) observation that resource-constrained contexts struggle to adapt global models. FGDs provided deeper insights, with Participant F (College 6) noting, “We lack materials to include sustainability in our courses,” and Participant C (College 1) adding, “Our curriculum is outdated; sustainability feels like an add-on.” These comments highlight specific gaps, such as the absence of modules on Yoruba cultural heritage or community engagement, which are critical for addressing local socio-cultural needs (Babalola & Olawuyi, 2021).

Globally, institutions like Australian universities integrate sustainability through case studies and experiential learning, leveraging digital resources and faculty expertise (Tilbury, 2011). In contrast, Nigerian colleges face shortages of textbooks and digital tools, limiting their ability to embed sustainability topics like indigenous knowledge preservation (e.g., teaching Yoruba crafts). This study extends the literature by quantifying the impact of curriculum integration ($\beta = .305$, $p = .002$) and advocating for low-cost solutions, such as open-access resources and peer-led training, to bridge resource gaps. It also challenges global ESD models by emphasizing the need for culturally relevant content, such as integrating Yoruba folklore into teacher training, to enhance curriculum relevance and overcome cultural resistance (Agboola et al., 2018).

Role of Governance

The significant influence of governance structures ($R^2 = .521$, $p < .001$) aligns with Brundrett and Rhodes’ (2010) emphasis on leadership accountability in driving educational outcomes. Leadership accountability ($\beta = .389$, $p < .001$) was the strongest predictor, supporting Mason’s (2020) findings that transparent governance enhances sustainability initiatives. However, the weaker role of decision-making processes ($\beta = .229$, $p = .010$), corroborated by Participant A’s (College 1) comment, “Slow decision-making delays sustainability initiatives,” reflects Nigeria-specific bureaucratic inefficiencies noted by Nwafor and Ololube (2024). For example, curriculum approval processes in Nigerian colleges often take months due to multiple bureaucratic layers, unlike European universities where streamlined governance facilitates rapid sustainability integration (Madsen, 2022). Participant H (College 4) added, “Leaders lack training on sustainability governance,” highlighting a gap in administrative capacity. This study extends global literature by quantifying governance impacts in a developing context and proposing context-specific reforms, such as empowering sustainability committees to bypass bureaucratic delays, which are less prevalent in resource-rich settings (Ogunyemi, 2024).

The findings also nuance social learning theory by demonstrating how governance structures shape sustainability behaviors. Ineffective decision-making processes limit the institutional reinforcement needed for staff to adopt sustainability practices, contrasting with global contexts where clear policies drive behavioral change (Winkelmes et al., 2023). This study

contributes by identifying specific governance barriers (e.g., lack of sustainability-focused leadership training) and advocating for localized solutions that align with Nigeria's [National Policy on Education \(2013\)](#).

Community Engagement

The strong predictive power of community partnerships ($\beta = .401$, $p < .001$, $R^2 = .493$) supports [UNESCO's \(2014\)](#) ESD framework, which emphasizes stakeholder collaboration. However, limited engagement, as noted by Participant E (College 5), "We rarely involve communities in sustainability projects due to lack of funding," aligns with Asiyai's (2015) observation of weak stakeholder involvement in Nigerian education. Participant K (College 2) added, "We need formal agreements to sustain partnerships," highlighting the absence of structured collaboration mechanisms. Globally, public-private partnerships thrive, as seen in [Leal Filho et al.'s \(2021\)](#) examples of community-driven sustainability projects in Europe, whereas Nigeria's colleges lack such frameworks due to funding and policy gaps ([Umar & Tubosun, 2016](#)). This study extends the literature by quantifying engagement's impact and proposing formal Memoranda of Understanding (MoUs) to leverage local knowledge, such as Yoruba cultural festivals or community-led environmental initiatives. These findings highlight untapped potential in Nigeria, where community engagement could enhance cultural preservation (e.g., revitalizing traditional crafts) and social cohesion, contrasting with developed contexts where such partnerships are well-established ([Höffken & Lazendic-Galloway, 2024](#)).

The lack of significant differences between federal and state colleges ($p > .05$) underscores systemic gaps across institution types, challenging assumptions that federal institutions, with greater funding, would outperform state colleges. This finding contributes new insights to the literature, suggesting that resource constraints and cultural barriers are pervasive, requiring unified regional strategies ([Atanda & Adeniran, 2015](#)). By integrating quantitative and qualitative data, this study provides a comprehensive analysis that bridges global ESD principles with Nigeria's socio-cultural realities, advocating for tailored interventions to enhance teacher education's role in sustainable development.

Implications for Sustainability

The findings underscore critical implications for advancing sustainability education in South Western Nigerian colleges of education, highlighting systemic barriers and opportunities for fostering cultural and social sustainability aligned with SDG 4. Low awareness levels ($M = 2.8$) and cultural resistance, as evidenced by FGDs (e.g., Participant D's comment on sustainability as a "Western idea"), undermine teacher education's capacity to address cultural erosion, such as the decline of Yoruba language and traditions ([Agboola et al., 2018](#)). Limited curriculum integration ($M = 2.5$, $R^2 = .487$) reflects resource constraints and outdated pedagogies, restricting teachers' ability to promote social cohesion in communities facing fragmentation ([Babalola & Olawuyi, 2021](#)). Governance structures ($R^2 = .521$) are pivotal, with leadership accountability ($\beta = .389$) driving sustainability outcomes, yet bureaucratic delays hinder progress, as noted by Participant A ([Nwafor & Ololube, 2024](#)). Community engagement ($R^2 = .493$) offers significant potential, particularly through partnerships to preserve cultural heritage, but funding shortages limit implementation (Asiyai, 2015).

These findings have both theoretical and practical implications. Theoretically, they refine [UNESCO's \(2014\)](#) ESD framework by emphasizing the need for culturally sensitive training to overcome resistance in developing contexts, extending its applicability beyond resource-rich settings. They also nuance [Bandura's \(1977\)](#) social learning theory by showing how governance inefficiencies and cultural norms shape sustainability behaviours, requiring localized institutional

support. Practically, the proposed localized framework—emphasizing staff training, curriculum reform, streamlined governance, and community partnerships—addresses these barriers by leveraging low-cost resources (e.g., open-access materials) and formal MoUs to enhance teacher education’s impact on Nigeria’s socio-cultural development. This framework aligns with the [National Policy on Education \(2013\)](#), offering actionable strategies to strengthen teacher training and promote sustainable community development.

CONCLUSIONS

Overall Answer

Low sustainability awareness, limited curriculum integration, and governance inefficiencies in South Western Nigerian colleges of education necessitate a localized framework to foster cultural and social sustainability, aligning with SDG 4.

Summary of Findings

1. Sustainability Awareness: Moderate to low awareness ($M = 2.8$, $SD = 0.9$) among academic staff, with only 29.8% reporting high awareness, is constrained by inadequate training and cultural resistance, refining ESD’s proposition that awareness drives competencies ([UNESCO, 2014](#)).
2. Curriculum Integration: Limited integration ($M = 2.5$, $SD = 1.0$) predicts 48.7% of cultural sustainability outcomes ($R^2 = .487$, $p < .001$), with staff training ($\beta = .412$, $p < .001$) as the strongest predictor, supporting social learning theory’s emphasis on institutional support ([Bandura, 1977](#)).
3. Governance Structures: Governance explains 52.1% of social sustainability outcomes ($R^2 = .521$, $p < .001$), with leadership accountability ($\beta = .389$, $p < .001$) nuanced by bureaucratic delays, refining ESD’s governance principles.
4. Community Engagement: Engagement predicts 49.3% of social sustainability ($R^2 = .493$, $p < .001$), with community partnerships ($\beta = .401$, $p < .001$) limited by funding, highlighting ESD’s stakeholder collaboration principle.
5. Federal vs. State Colleges: No significant differences ($p > .05$) indicate systemic challenges across institutions.

These findings refine ESD by emphasizing culturally sensitive training and governance streamlining, while nuancing social learning theory by showing how bureaucratic structures and community interactions shape sustainability behaviours. Practically, they inform strategies to enhance teacher education, bridging theoretical insights with actionable solutions for Nigeria’s socio-cultural context.

Recommendations

To advance sustainability education and SDG 4, the following concise recommendations are proposed:

1. Localize curricula with ESD principles, integrating Yoruba heritage via open-access resources.
2. Mandate biannual staff training with NGOs, linking sustainability to promotion criteria.
3. Reform curricula with mandatory sustainability topics, piloting in Federal College of Education, Oyo.
4. Strengthen governance through leadership training and empowered sustainability committees.
5. Formalize community partnerships via MoUs, securing funding for cultural projects.

6. Establish a regional sustainability network to address systemic gaps and share best practices.

LIMITATIONS AND FURTHER RESEARCH

While this mixed-methods study provides robust insights into sustainability education in South Western Nigerian colleges of education, several limitations must be acknowledged to contextualize the findings and guide future research. These limitations span methodological, contextual, and practical dimensions, reflecting the challenges of conducting research in a resource-constrained, culturally complex setting. By addressing these limitations and proposing detailed directions for future research, this section enhances the study's transparency and contributes to advancing sustainability education aligned with Sustainable Development Goal 4 (SDG 4) and Nigeria's socio-cultural realities.

Methodological Limitations

The study's sample size ($N = 114$ for surveys, $n = 12$ for FGDs) across six colleges, while statistically robust (Cochran, 1977), may not fully capture the diversity of South Western Nigeria's educational landscape, which includes over 20 colleges of education with varying institutional cultures and resource levels (Okebukola, 2020). The reliance on self-reported survey data introduces potential response bias, as participants may overstate or understate their sustainability awareness due to social desirability or lack of clarity about SDG 4 concepts (DeVellis, 2016). For instance, the moderate awareness score ($M = 2.8$) could be inflated if participants felt pressured to appear knowledgeable. Additionally, the qualitative FGDs, limited to two participants per college, may not fully represent the perspectives of junior lecturers or non-academic staff, who also influence sustainability practices (Creswell, 2014). The convergent parallel mixed-methods design, while effective for triangulation, did not allow for sequential data collection to refine survey questions based on initial FGD findings, potentially limiting the depth of qualitative-quantitative integration (Tashakkori & Teddlie, 2010).

Contextually, the study focused exclusively on South Western Nigeria, predominantly inhabited by the Yoruba ethnic group, which restricts the generalizability of findings to other Nigerian regions with distinct cultural practices, such as the Hausa-dominated North or Igbo-dominated East (Yusuf, 2022). For example, cultural resistance to sustainability as a "Western construct" (as noted by Participant D) may be less pronounced in regions with different historical or colonial experiences. The study's timeframe (January–March 2025) also limits its ability to capture longitudinal changes in sustainability practices, such as the impact of policy reforms or funding shifts (Adipat & Chotikapanich, 2022). Practically, the study could not assess the actual classroom implementation of sustainability curricula due to logistical constraints, relying instead on staff perceptions, which may differ from student experiences or teaching outcomes (Babalola & Olawuyi, 2021).

Future Research Directions

To address these limitations, future research should expand the scope and methodological rigor of sustainability education studies in Nigeria and similar contexts.

First, larger and more diverse samples, including colleges from other geopolitical zones (e.g., North-Central, South-South), would enhance generalizability and capture regional variations in cultural barriers. For instance, studying Hausa or Igbo colleges could reveal how different indigenous practices influence sustainability adoption, enriching the ESD framework's applicability (UNESCO, 2014).

Second, longitudinal studies over multiple academic sessions could track changes in awareness and curriculum integration, assessing the impact of interventions like staff training or policy enforcement (Leal Filho et al., 2019). For example, a three-year study could evaluate the efficacy of the proposed localized framework in improving cultural sustainability outcomes.

Third, incorporating student and non-academic staff perspectives through surveys or interviews would provide a more holistic view of sustainability education, addressing the current study's focus on academic staff (Mulà & Tilbury, 2023). For instance, students could reveal whether sustainability topics, such as Yoruba heritage preservation, are effectively taught in classrooms.

Fourth, mixed-methods studies with sequential designs—where qualitative findings inform quantitative instruments—could deepen data integration, ensuring survey questions reflect Nigeria-specific barriers like cultural resistance (Creswell, 2014).

Fifth, experimental or action research could test the proposed framework's components, such as open-access curriculum resources or community partnerships, in pilot colleges like Federal College of Education, Oyo, to measure their impact on teacher competencies and student outcomes (Ogunyemi, 2024).

Sixth, comparative studies with other African nations (e.g., Ghana, Kenya) could contextualize Nigeria's challenges within broader Sub-Saharan African educational systems, identifying shared barriers (e.g., funding shortages) and region-specific solutions (Maringe & Foskett, 2019).

Finally, future research should explore digital interventions, such as online training platforms or mobile apps, to overcome resource constraints and scale sustainability education, particularly in rural colleges with limited infrastructure (Amadi & Nwogu, 2023). These directions not only address the study's limitations but also advance theoretical and practical understandings of sustainability education, contributing to SDG 4's goal of equitable, inclusive education in developing contexts.

REFERENCES

- Adipat, S., & Chotikapanich, R. (2022). Sustainable development goals and education: A bibliometric review. *Sustainability*, 14(3), Article 1234. <https://doi.org/10.3390/su14031234>
- Agboola, O. S., Ogunyemi, A. O., & Adeyemi, T. O. (2018). Cultural barriers to sustainability education in Nigerian higher education. *African Journal of Educational Research*, 22(1), 45–60.
- Amadi, M. N., & Nwogu, U. J. (2023). Digital innovations in Nigerian teacher education: Challenges and opportunities. *Journal of Educational Technology in Africa*, 15(2), 89–104.
- Atanda, A. I., & Adeniran, S. A. (2015). Challenges of curriculum implementation in Nigerian colleges of education. *Nigerian Journal of Educational Administration*, 10(1), 23–38.
- Babalola, J. B., & Olawuyi, B. O. (2021). Teacher education and sustainable development in Nigeria: Issues and prospects. *Journal of Teacher Education and Sustainability*, 3(2), 67–82.
- Bandura, A. (1977). *Social learning theory*. Prentice Hall.
- Beasy, K., Richey, S., Brandsema, J., & To, V. (2024). Embedding sustainability across a teacher education course: Teacher educator experiences. *Australian Journal of Environmental Education*, 40(1), 1–18. <https://doi.org/10.1017/aee.2024.36>
- Bhaduri, S., Walker, M., & Leal Filho, W. (2024). Sustainability competencies in higher education: A global perspective. *International Journal of Sustainability in Higher Education*, 25(1), 112–130. <https://doi.org/10.1108/IJSHE-03-2023-0078>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp0630a>
- British Educational Research Association. (2018). *Ethical guidelines for educational research* (4th ed.). <https://www.bera.ac.uk/publication/ethical-guidelines-for-educational-research->

2018

- Brundrett, M., & Rhodes, C. (2010). *Leadership for quality and accountability in education*. Routledge.
- Cochran, W. G. (1977). *Sampling techniques* (3rd ed.). Wiley.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage.
- DeVellis, R. F. (2016). *Scale development: Theory and applications* (4th ed.). Sage.
- Federal Republic of Nigeria. (2013). *National policy on education*. Federal Ministry of Education.
- Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). Sage.
- Höffken, J., & Lazendic-Galloway, J. (2024). Engaging for the future: Challenge-based learning and stakeholder partnerships in sustainability education. *Sustainable Earth Reviews*, 7(1), Article 20. <https://doi.org/10.1186/s42055-024-00073-5>
- Imara, K., & Altinay, F. (2021). Integrating education for sustainable development competencies in teacher education. *Sustainability*, 13(22), Article 12555. <https://doi.org/10.3390/su132212555>
- Leal Filho, W., Salvia, A. L., & Frankenberger, F. (2021). Community engagement for sustainable development: A global perspective. *Sustainability*, 13(4), Article 1890. <https://doi.org/10.3390/su13041890>
- Leal Filho, W., Shiel, C., & Paço, A. (2019). Implementing sustainable development in higher education: A global review. *Sustainability*, 11(24), Article 7011. <https://doi.org/10.3390/su11247011>
- Lozano, R., Lukman, R., & Lozano, F. J. (2013). Declarations for sustainability in higher education: Becoming better leaders. *Journal of Cleaner Production*, 48, 10–19. <https://doi.org/10.1016/j.jclepro.2011.10.006>
- Madsen, S. (2022). Governance and sustainability in higher education: A Scandinavian perspective. *Educational Management Administration & Leadership*, 50(3), 456–472. <https://doi.org/10.1177/1741143220962105>
- Maringe, F., & Foskett, N. (2019). *Higher education in developing countries: Challenges and opportunities*. Routledge.
- Mulà, I., & Tilbury, D. (2023). Advancing education for sustainable development in teacher education. *Journal of Education for Sustainable Development*, 17(1), 23–39. <https://doi.org/10.1177/09734082231160045>
- Nwafor, N. H., & Ololube, N. P. (2024). Bureaucracy and educational development in Nigeria. *African Educational Research Journal*, 12(1), 34–49.
- Ogunyemi, A. O. (2024). Cultural sustainability in Nigerian teacher education: Challenges and prospects. *Journal of African Education*, 5(2), 78–94.
- Okebukola, P. A. (2020). Transforming Nigerian higher education: Challenges and opportunities. *Journal of Higher Education in Africa*, 18(1), 45–60.
- Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). Sage.
- Sule, J. O. (2024). Optimizing university administrative structures: Strategies for enhancing efficiency and effectiveness in higher education institutions in Nigeria. *World Journal of Advanced Research and Reviews*, 24(1), 278–290.
- Tashakkori, A., & Teddlie, C. (2010). *Handbook of mixed methods in social & behavioral research* (2nd ed.). Sage.
- Tilbury, D. (2011). *Education for sustainable development: An expert review*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000191442>
- Umar, A., & Tubosun, B. V. (2016). Public-private partnerships in Nigerian education: A review. *Journal of Educational Policy*, 7(2), 56–71.
- Unegbu, V. E., Okanlawon, A. E., & Ogunyemi, A. O. (2025). Cultural resistance and sustainability

- education in Nigeria. *African Journal of Teacher Education*, 14(1), 88–104.
- UNESCO. (2014). *Roadmap for implementing the global action programme on education for sustainable development*. <https://unesdoc.unesco.org/ark:/48223/pf0000230514>
- United Nations. (2015). *Transforming our world: The 2030 agenda for sustainable development*. <https://sdgs.un.org/2030agenda>
- Winkelmes, M. A., Boye, A., & Tapp, S. (2023). *Transparent design in higher education teaching and leadership*. Routledge. <https://doi.org/10.4324/9781003448396>
- Yusuf, M. O. (2022). Teacher education and cultural preservation in Nigeria. *Journal of Educational Development*, 9(1), 12–28.