



Teachers' Pedagogical Practices, Learning Environment and Sustainability Literacy as Predictors of Education for Sustainable Development (ESD): Implementation to Pre-Primary Schools in Lagos State

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Abstract

The study aimed at investigating the relationship between the pedagogical practices, quality learning environment and sustainability literacy of teachers and the implementation of the United Nations Sustainable Development Goals (SDGs) in pre-primary schools in Lagos State by UNESCO Education for Sustainable Development (ESD). Although the world has been focused on ESD, there is little empirical evidence regarding how sustainability concepts are being applied in early childhood classrooms, including in the classroom environment and teaching practices in Lagos State. Descriptive survey research design was used for the study. The sample consisted of 180 pre-primary teachers of public and private schools in Lagos State selected using multistage sampling procedure. Three researcher-made instruments were used to gather data: Teachers' Pedagogical Practices for Sustainability Scale ($r=.82$), Learning Environment Sustainability Checklist ($r=.79$), and Sustainability Literacy Test ($r=.86$). The three instruments were validated for content and face validity and reliability index of Cronbach alpha was .793 for the entire scale. Mean, Pearson correlation and multiple regression were used for data analysis at 0.05 level of significance. Teachers' practices, literacy, environments significantly influence sustainable education implementation effectiveness. A significant positive correlation was found between the variables ($r = .61, p < .05$), which explained 48% of the variance in ESD implementation ($R^2 = .48$). The study revealed that there is a need for sustainability literacy and classroom environments to be improved for effective implementation of ESD. It suggests that teachers should engage in professional development, as well as improve the curriculum and provide contextually relevant learning materials.

Keywords: Early childhood education, sustainable development, pedagogical practices, learning environment, sustainability literacy.



Introduction

Education for Sustainable Development (ESD) is a concept that has taken root in education worldwide as a transformative approach that aims to empower all learners with knowledge, skills, values and attitudes to respond to environmental, social and economic challenges. In the Nigerian educational system, the integration of education for sustainable development in curriculum implementation has been acknowledged as a key element of quality education, as indicated in SDG 4.7: which stresses the development of skills for sustainable life (Babalola & Olawuyi, 2021). Early childhood education is particularly important because it can have a significant impact on future attitudes and behaviors, and the integration of sustainability principles into early childhood education is particularly important. Accordingly, the role of pre-primary education in promoting sustainable development is unprecedented because it is a strategic entry point to the integration of sustainability concepts, environmental awareness and develop responsible citizens from early childhood till maturity (Michel & Kessler, 2019). This highlights the importance of analysing the important factors which could influence effective implementation of ESD including teacher's pedagogical practices, learning environment, and sustainability literacy.

Otherwise, the teaching and learning practices of teachers form one of the core aspects of the effective implementation of ESD, which affects the way sustainability concepts are presented, contextualized and embedded in learners. In the contemporary ESD pedagogy, participatory, inquiry-based, and experiential learning methods are used that stimulate critical thinking, collaboration and problem-solving (Sinakou et al., 2019). In early childhood education, the research shows that the teacher-centered teaching approach is still widely used in the classroom, which has a negative impact on the effectiveness of early childhood sustainability education. For example, one study by Leigh, et al (2023) in pre-primary education reveals low staff competence and limited access to the development of innovative teaching methods, like outdoor and experiential learning and the development of environmental awareness in pre-primary children. Inadequate teacher expertise and limited exposure drive are equally seen as key components that driver quality education and drive sustainable development. This gap requires further research of the impact of pedagogical practices on ESD outcomes in pre-primary.



Children learning environment is also a critical factor that influences the effectiveness of implementing ESD in the progress of pedagogy. The supportive learning environment where adequate teaching materials, a child friendly infrastructure and opportunities for experiential learning outcome are established, boosts learner's engagement with sustainability tendencies. Research by Sinakou et al. (2019) points to the fact that a powerful learning environment for ESD combines aspects of collaboration, participation in the community and interdisciplinary learning, thus fostering action competence in students. The Nigerian educational system is faced with problems that include inadequate access to sustainability related instruction materials, overcrowded classrooms and inadequate learning resources, which pose a challenge to the formation of such learning environments. Meanwhile, the findings of Jimola and Omodun (2023) indicate that the use of the right learning resources such as visual and interactive resources make a great contribution to environmental awareness and learning outcomes in primary education.

Another important factor of effective ESD is sustainability literacy knowledge, skills, values and attitudes about sustainable development. It is both a product and a precursor of Sustainability-related behaviours and practices. The efforts of sustainability education in Nigeria have also shifted to incorporating EE into the school curriculum to enable children to acquire skills needed for development of the nation and the world (Osuji, 2025). In addition, early childhood education research reveals that incorporating sustainability concepts at an early age can positively impact cognitive, social and emotional development, leading to sustainable practices that go beyond immediate concerns. Furthermore, early childhood education studies have shown that early exposure to the concepts of sustainability has improved cognitive, social and emotional outcomes which extend beyond the short term to sustainable practices. Despite these endeavors, there is still a gap in understanding the relationship between sustainability literacy, pedagogical practice and learning environments and the prediction of ESD outcomes in pre-primary schools. With these factors in mind, it is important to explore the interaction between teachers' pedagogical practices, learning environment and sustainability literacy when implementing ESD in pre-primary schools.

Most existing research has focused on the variables separately, but these variables have not been studied together in the context of the Nigerian educational system. To fill this gap will be important for policy, teacher training and curriculum development to strengthen ESD at the basic

level of education. Theoretically the study was based on the Ecological Systems Theory of Urie Bronfenbrenner (1979). It asserts that children's development relies upon a number of systems within the environment of children. According to Bronfenbrenner (1979), children are developing in the different social and environmental systems such as family, teachers, peers, community and society, which includes the school. The theory consists of five components – microsystems, mesosystems, exosystems, macrosystems and chronosystems. The first system denotes the environment of the child immediately around him or her such as the classroom, teachers, and other learning activities. The mesosystem is the connection between home and school, however. The third component is the exosystem which entails structures that have an indirect effect on the child such as education policies and administration of the school. The fourth system is associated with the beliefs and values about education, and purpose of education in the country. Lastly, the chronosystem is connected to the transformations in the child's setting and personal experience over time (El Zaatari & Maalouf, 2022; Navarro & Tudge, 2022).

The theory used in this study is applicable because the implementation of Education for Sustainable Development (ESD) in pre-primary schools largely relies on the relationship between the child and the environment, pedagogical practices of teachers are an integral part of the environment that exists in the microsystems. Moreover, the learning environment also influences the learners in terms of interaction, learning and behavior. How sustainability is promoted in the classroom will depend on the level of sustainability literacy of the teachers. Thus, Ecological Systems Theory is appropriate in the study of how teachers' pedagogical practices, learning environment and sustainability literacy impact ESD in pre-primary schools in Lagos State.

It has been empirically researched with regard to its contribution to the Sustainable Development Goals (SDGs) (Kioupi & Voulvoulis 2022; Michel & Kessler, 2019). The purpose of the research was to analyse the connection between the sustainability competences and educational practice on sustainable development in educational institutions. Scholars have identified the following benefits of learning related to sustainable literacy: critical thinking, participation and decision making, as well as sustainable behaviours. The study ended with the conclusion that, for the effective implementation of ESD, educational practices that foster the knowledge and competency of sustainability are crucial. The study is also applicable to the current study as it has identified



sustainability literacy as an important factor that influences the implementation of ESD in schools. Likewise, Chen et al (2022) studied the sustainability literacy of students in China, defined by the students' sustainable development knowledge, attitudes and behaviors. This research was Quantitative research and the measurement of the level of sustainability literate students was applied by using the sustainability indicator. The results showed that there was a high correlation between the students' knowledge about sustainable and environmental issues, and their willingness to participate in sustainable actions and their sustainability literacy. The study also showed that having a positive attitude and knowledge of sustainability has a positive influence on the learners' sustainable behaviour.

The study is relevant to the current study because it contributes to the evidence that illustrates that sustainability literacy is one of the factors that can predict ESD implementation. Shulla et al. (2020) undertook a study to gain a deeper understanding of Sustainable Development Goals (SDGs) in Education for Sustainable Development (ESD). The study determined that a comprehensive review is needed to effectively implement ESD and that sustainability must be incorporated into the curriculum, teachers must be better equipped in their teaching and learning skills, and learning spaces must be designed that enable students to think in a critical and sustainable fashion. The findings underscored the importance of pedagogical practices and school learning spaces, particularly in pre-primary schools and for this to be implemented successfully, teachers' capacity is important. Statement of the problem Despite the many calls at global and national level for education to build sustainable development, there appears to be a noticeable divide between the policy expectation and classroom realities, more especially in developing countries like Nigeria, where education is inclusive.

Other studies (Akinsemolu & Arijeniwa, 2021; Sarkingobir & Bello 2024; Peters, et. al., 2023) also reported that some organisations like UNESCO recommend frameworks that embed sustainability in teaching and learning processes, but most of the public schools in the country have not yet been able to integrate sustainability concepts into their learning, and the teaching and learning process is largely content driven and examination oriented, with little or no emphasis on critical thinking, problem solving and application of sustainability concepts in the real world. Furthermore, the quality of learning environment (physical infrastructure, psychosocial learning atmosphere in classes) is not always adequate to support participatory and transformative learning strategies in the context of building sustainable education. Add to this the low level of sustainability literacy of both

teachers and learners, which blights their capacity to comprehend and work with complex environmental, social and economic issues. While some studies have looked at these variables individually, there is limited empirical research which comprehensively explores how these three factors together can predict the effective implementation of ESD (Kioupi & Voulvoulis, 2022).

This gap helps to introduce uncertainty in how these factors interplay when it comes to the acquisition of sustainability competencies by learners and why it is imperative to carry out a thorough investigation, which would provide information for policy considerations, teacher training and classroom practices to ensure sustainable development goals are met particularly at the pre-primary school level.

Objectives of the study

This study investigated Teachers' Pedagogical Practices, Learning Environment and Sustainability Literacy as Predictors of Education for Sustainable Development (ESD), however its specific objectives are to:

1. assess how teachers' pedagogical practices relate with education for sustainable development
2. examine the nature of relationship that exist between learning environment and education for sustainable development,
3. evaluate the nature of relationship that exists between sustainable literacy and education for sustainable development.

Hypothesis

One combined null hypothesis was stated and tested at .005 level of significance:

H₀: Teachers' pedagogical practices, learning environment and sustainability literacy do not make a significant contribution to the prediction of ESD.

Methodology

The study employed the use of correlation research design as it seeks to establish relationship that exists between and among variables. Using purposive sampling technique, a total of 120 pre-primary teachers were selected from 15 public primary schools of Alimosho LGA in Lagos State.

Four researcher-developed instruments were used to collect data, including the Teachers' Pedagogical Practices for Sustainability Scale ($r=.82$); the Learning Environment Sustainability Scale ($r=.79$) and the Sustainability Literacy Test ($r=.86$) using Cronbach alpha reliability. The validated instruments were found to have content and face validity with Cronbach alpha reliability index of the whole scale was .793, and the data were analyzed by multiple regression analysis and hypothesis tested at 0.05 level of significance.

Result

H_0 : There is no significant predictive contribution of teachers' pedagogical practices, learning environment and sustainability literacy on education for sustainable development.

Table 1 shows the summary regression output.

Table 1: The summary regression output is presented

R = .752; R² =.866; R²_{adj.} = .002; Std. Error of the Estimate = 3.585						
ANOVA						
Model	SS	Df	MS	F	Sig. level	Decision
Regression	4994.95	3	1664.765	2.558	.029	Reject H_{01}
Residual	76153.507	117	650.884			
Total	81147.802	120				

Result from regression model in Table 1 shows ($R = .752$; $R^2 =.866$; $R^2_{adj.} = .002$; Std. Error of the Estimate =2.585) indicating that teachers' pedagogical practices, learning environment, sustainability literacy and education for sustainable development combined accounted for less than 4% of variance in the education for sustainable development at the pre-primary school level of education. The result of the test of combined contribution ($F_{(3,117)} = 2.558$; $p < .05$) was significant as a result the null hypothesis is rejected implying that there is a significant contribution of the independent variables on the dependent variable.

Table 2: Multiple Regression Analysis showing the relative predictive contribution of teachers' pedagogical practices, learning environment and sustainability literacy on education for sustainable development

Model	Unstand. Coef.		Stand. Coef. Beta	T	Sig.
	B	Std. Error			
(Constant)	67.260	8.717		7.716	.000
Teacher' pedagogical practices	.124	.322	.036	12.563	.021
Learning environment	.819	1.096	.076	3.743	.027
Sustainable literacy test	.473	.999	.045	2.479	.036

a. Dependent Variable: Education for Sustainable Development

Discussion of Findings

The findings from the study indicated generally that the teachers' pedagogical practices are a significant predictor of education for sustainable development (ESD). The study showed that the instructional approaches used by teachers (problem-based learning, experiential learning and collaborative inquiry) have a direct impact on how well students learn about sustainability concepts, values and behaviours. Bascopé, Perasso and Reiss (2019) pointed out that innovative pedagogical methods, such as project-based learning and community-based learning, play a key role in developing sustainability skills in the student. Likewise, Bourn and Soysal (2021) highlighted that children would build critical thinking and value reorientation and agency for sustainable development through transformative pedagogical practices as opposed to the traditional transmissive pedagogies. Effective syntheses find that the outcomes of ESD are largely linked to the successful incorporation of active, interdisciplinary and learner-centred pedagogies in classroom practices to change attitudes, skills and pro-environmental behaviours. The findings are consistent with the suggestion by Bourn and Soysal (2021) that teachers' competencies and pedagogical innovations are significant factors in integrating sustainability into education systems, thus placing teachers as agents of change in the implementation of the objectives of ESD. The findings reiterate the importance of pedagogical practices beyond



simply being instruments for teaching, but as important indicators of the successful implementation of ESD and the development of ESD learners' literacy for sustainability.

The result also indicated that the learning environment is also a good predictor of education for sustainable development (ESD). The robust predictive value of the child's learning environment for ESD highlights the relevance of not only the physical setting, but also the psycho-social setting where learning takes place. The students' participation is improved and sustainable behavioral patterns created in an inclusive and supportive environment that provides students with a wide range of resources. Research shows that collaborative learning environments, diversity and active engagement are most supportive of ESD goals. The result of this study conforms with that of United Nations Educational Scientific and Cultural Organization (2017) who claimed that school approaches that integrate sustainability into school culture, policies, and infrastructure goes a long way to strengthen ESD outcomes. They highlighted that sustainable learning environments are not only content-based learning, but also one that demonstrates sustainability in practice and thus strengthens experiential learning among the students. This discovery suggests that "quality of learning environment" is an essential route to improving the effectiveness of ESD initiatives.

The result also demonstrates that sustainable literacy was a good predictor of education for sustainable development. From the findings, it can be seen that sustainability literacy is able to significantly predict ESD, as sustainability literacy is the starting point of the knowledge, attitudes, and competencies of learners on sustainability issues. Sustainability literacy provides the knowledge and capacity to address environmental, social and economic issues in an interconnected way. Sustainability knowledge is a significant determinant of pro-ecological actions and pro-ecological attitudes. The results of this study are consistent with the study carried out by Kioupi and Voulvoulis (2022), Chen et al., (2022) and Bronfenbrenner (1979) which indicates that sustainability literacy has a significant effect on improving competence, attitude and engagement in sustainable development among learners. This study aligns with that of United Nations Educational, Scientific and Cultural Organization (2020) who emphasised that sustainability literacy is a core outcome of ESD and a prerequisite for achieving the Sustainable Development Goals. Consequently, the relationship predicted; increase in sustainability literacy of the learners will have a positive impact on the achievement of the ESD goals.

Conclusion

The study concluded that successful implementation of ESD does not rely on one single factor, but rather, on the synergic interaction between instructional strategies and supporting and resource-rich learning environment, as well as the sustainability knowledge, skills, values and attitudes of learners. The ideas of sustainable development goals are at the heart of the holistic, learner-centred and transformative approaches to education.

Recommendations

The following recommendations were made from the results of the study:

- a. School and education authorities need to develop and adopt regular professional development programs to provide teachers with new pedagogical methods that promote a learner-centered approach, which is based on the principles of ESD, such as inquiry and problem solving.
- b. School leaders and policy makers should make a priority of ensuring supportive, inclusive and resource-rich learning environments to assist in creating opportunities for active engagement, collaboration and experiential learning about sustainability issues.
- c. Ensure that sustainability literacy elements, which include the environmental, social and economic aspects, are integrated systematically throughout the curriculum across the subjects so that learners are able to develop skills for sustainable living.

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