



ECOLOGICAL MANAGEMENT CONCEPTS AS PREDICTORS OF ENTREPRENEURIAL ORIENTATION AMONG SENIOR SECONDARY SCHOOL STUDENTS IN KOGI STATE, NIGERIA

Mathew Bolaji Aledare, Ph.D.

Department of Integrated Science, School of Sciences.
Kogi State College of Education, Ankpa, Nigeria
mathewaledare44@gmail.com | +234 803 522 7224

And

Onimisi Agnes Ozohu, Ph.D.

Department of Biology, School of Sciences
Federal College of Education, Okene, Kogi state.
Email: ozohuagnes4onimisi@gmail.com

And

Ejide Oluremi Felicia Ph.D.

Department of Science Education, Faculty of Education
University of Ilorin, Nigeria
Email: ejideoluremi@gmail.com

Abstract

This study investigated how ecological management knowledge influences the entrepreneurial orientation of senior secondary school students in Kogi State, Nigeria. The study was driven by the need for education to promote environmentally responsible innovation and sustainable business development among youths. A mixed-method design was adopted, involving 712 SS II Biology students and 14 Biology teachers selected using multi-stage sampling techniques. Data were collected through a structured questionnaire and a semi-structured interview guide. Descriptive statistics, Kruskal–Wallis, and Ordered Logistic Regression were used for quantitative analysis, while thematic analysis was used for interview responses. Results showed that students held positive perceptions of ecological management as a contributor to entrepreneurial development (weighted mean = 3.57). The Kruskal–Wallis test revealed significant differences in entrepreneurial orientation based on ecological knowledge ($\chi^2 = 22.89$, $p = 0.027$), while the regression model identified ecological knowledge as a significant predictor of entrepreneurial orientation ($\beta = 3.28$, $p = 0.019$). Qualitative findings also indicated that ecological topics such as aquaculture and biodiversity conservation stimulate creativity and practical business interest. The study concludes that ecological management knowledge enhances entrepreneurial orientation and recommends curriculum strengthening, teacher training, and school-based eco-enterprise initiatives.

Keywords: Ecological Management; Entrepreneurial Orientation; Green Entrepreneurship; Senior Secondary Education; Experiential Learning; Sustainable Development; Nigeria.

Introduction

Issues related to environmental degradation, biodiversity, and climate instability are ever-increasing and pose significant sustainability challenges across

the world, thus making education an important factor for the creation of (committed) environmental and innovative citizens. In the current knowledge economy, it is not enough for the individual



to be well-versed in ecological literacy, but one needs to be equipped on how to use environmental literacy for the creation of productive and innovative ventures that generate income (Rosário & Raimundo, 2024). In light of the above, the integration of ecological management into the secondary education curriculum becomes important, specifically aligned to support biodiversity and ecological development.

Nigeria's persistent challenges of youth unemployment and underemployment reveal deep gaps in the traditional, theory-oriented secondary school curriculum (Kiggundu, 2025). While having such subjects as environmental and science education rank high in the curriculum, the fact that the students lack an enterprising attitude necessary for translating ecological knowledge into practical ventures such as waste-to-wealth, biodiversity, agricultural, and ecological innovations hinders the students' development and, as well, the country's development, as it raises worries such as low productivity and job creation. Strengthening ecological management competencies that stimulate sustainable entrepreneurship is, therefore, critical for addressing youth unemployment and promoting inclusive development.

Ecological management, discussed widely as the definition of ecological planning, conservation, restoration, and utilization of natural resources, offers an attractive foundation for the development of an orientation towards entrepreneurship for secondary school students. The involvement of ecological themes, such as the utilization of refuse recycling, conservation of habitats, climate adaptation, and the utilization of renewable resources, allows for the development of scientific and business capabilities that would aid the development of ecological micro-businesses. Studies identified that

the integration of ecological content into the development of entrepreneurship education influences students' interest and enhances their self-reliance and economic independence (Benjamin et al., 2022). In addition, Lin (2023) identified that the integration of system thinking into entrepreneurship education influences innovative learning and the promotion of ecological start-ups. In fact, ecological entrepreneurship was identified as having enhanced the sustainability and resistance of micro-businesses and SMEs involved in the agricultural and manufacturing sectors of Nigeria (Adebayo & Nwankwo, 2024).

This educational vision satisfies the global and national development agendas. The United Nations' Sustainable Development Goals, especially the fourth (SDG 4, quality education) and the eighth (SDG 8, decent work and economic growth), promote learning that focuses on innovation, the environment, and the economy. On the national scene, the Federal Ministry of Education (2020) stated that, as part of the senior secondary school syllabi, there are two important foundations of learning, one of which is environmental and the other one's focus is on entrepreneurship. While discussing the salient aspect that would develop the needed entrepreneurial orientation, it would necessarily depend on the dimensions of innovativeness, proactiveness, and risk-taking capabilities, as explained by Lumpkin and Dess (1996). Recent scholarly works by Rosario and Raimundo (2024) and Vargas-Merino, et al. (2025) made it clear that ecological knowledge and projects increase the learner's entrepreneurial orientation, such as their self-efficacy and potential for value creation.



The theoretical foundation for this study is reliant on the Human Capital Theory (Becker, 1993), which argues that education raises the productivity and labor market prospects of people, and the Experiential Learning Theory (Kolb, 1984), which stresses active involvement, reflection, and problem-solving. These theoretical assumptions suggest that if students are actively involved in ecological management, they would develop the necessary intellectual and attitude capital that would enable them to join the growing green economy. This study, therefore, sets out to examine how senior secondary school students' understanding of ecological management, involving conservation, managing wastes, renewal of resources, and restoring the ecosystem, influences their orientation to entrepreneurship. The major aim of the research work is the promotion of the “green entrepreneur thinking” that would enable the Nigerian economy to be more resilient.

On the basis of such conceptual grounding, the following section assesses major theoretical contributions regarding ecological management and the orientation of the entrepreneur. This section combines viewpoints, theories, and information regarding how ecological literacy impacts innovation, the creation of value, and young entrepreneurship.

Ecological management represents the deliberate and systematic regulation of the relationship between human activity and the natural environment. The process involves a wide range of activities such as the restoration of soil, management of agricultural sustainability, biodiversity, and reduction of pollution, as well as the promotion of the regeneration and stability

of the ecosystem as a whole (Olawale & Okorie, 2023). As an educational concept, ecological management focuses on the development of environmental literacy, which can be referred to as the knowledge and problem-solving abilities that the learner needs to execute sound and sustainable decisions (Udoh & Ekpo, 2022). The integration of ecological management concepts into secondary school education improves the students' understanding regarding the relationship between human activity and the environment. By learning concepts such as erosion control, conservation of water, the use of new and renewable resources, and the reduction of wastes, the students become equipped to perceive the aspect of environmental issues as innovation and opportunity. In that case, ecological management serves as an important aspect for the development of sustainability and innovations capacities regardless of the environment (Anabaraonye et al., 2024).

The global shift for sustainability has extended the focus of classical entrepreneurships to the concept of green/eco ventures. Green entrepreneurship combines ecological understandings and innovative approaches for creating value for society and, at the same time, for the conservation of the environment (Adebayo & Nwankwo, 2024). In the case of students, learning about ecological systems can impel innovative and entrepreneurially inclined thinking, leading to the development of products and services that are friendly to nature, like organic crop production, biogas production, recycling, and power from renewable sources (Rosário & Raimundo, 2024).

In the Nigerian situation, where youth unemployment persists, the development of



ecological entrepreneurship skills begins to gain considerable impetus as an effective remedy for the state of stagnation. There are findings that the integration of environmental elements into the teaching of entrepreneurship improves the financial autonomy of the learner, as it arouses the intention to create jobs and motivates the individual for involvement in green entrepreneurship (Udoh & Ekpo, 2022; Onyema et al., 2023). By applying ecological management knowledge, the students actualize the important skill sets of creativity, problem-solving, and environmental ethics, which are the central drivers of entrepreneurship.

Entrepreneurial Orientation (EO) is an important antecedent that captures the tendencies and dispositions for innovativeness, proactiveness, and risk-taking behavior (Lumpkin & Dess, 1996). In the ecological context, EO serves as the process for behavioral execution that translates ecological consciousness into concrete and fruitful entrepreneurial activity. Participation in ecological management requires creativity, flexibility, and thinking, which are processes that automatically improve EO for the involved learning individuals/students (Lin, 2023). The integration of ecological literacy into the school curriculum further cements the association between the two bodies of knowledge by merging scientific knowledge and vocational/entrepreneurial performance (Vargas-Merino et al., 2025). Human Capital Theory (Becker, 1993) posits that education enhances individuals' productivity and economic potential, while Experiential Learning Theory (Kolb, 1984) emphasizes learning through hands-on engagement. Ecological tasks such as composting, nursery establishment, water quality monitoring, or reforestation provide experiential learning opportunities that enhance students' practical competence and

entrepreneurial self-efficacy. Together, these frameworks illustrate how ecological management education can stimulate entrepreneurial mindsets, reduce unemployment, and strengthen sustainable economic growth.

There exists an extensive and growing literature regarding the relationship of ecological management education to improved entrepreneur capacities. This literature implies the significant augmentation of entrepreneur abilities, efficacy, and actual start-up intentions, as observed by systematic reviews of entrepreneur education literature (Motta & Galina, 2023). In the context of developing nations, some explicit research confirms the same, as some findings reveal that green entrepreneur education programs and emphases on ecological management education are associated with enhanced self-employment intentions, ecological market opportunity awareness, and ecological management capacities of the students (Mpofu, 2024; Yusuf & Aberu, 2023; Anabaraonye et al., 2024).

Quantitative research, moreover, illustrates that the individual characteristics of students' entrepreneurial orientation (operationalized as innovativeness, proactivity, and risk-taking behavior) are driven by curriculum content and the learning environment, and that applied learning that focuses on the environment, the more favorable the indicators of the students' and graduates' entrepreneurial orientation are (Bodolica, 2024). In the Nigerian case, exploratory study research indicates that the integration of ecological management topics (such as the "wastes-to-wealth activity," conservation hands-on learning, and agro-innovation courses) into secondary school and university curricula, and promotion of creative thinking, leadership capacity, and preparedness for



ecological ventures, would, as an important consequence, improve the sustainability and stability of SMEs operating in the agribusiness and agro-industrial sector (Yusuf & Aberu, 2023; Benjamin et al., 2022)

Finally, some international studies also indicate that curriculum development that focuses on green skills, systems thinking, and sector connectivity enhances the dissemination of ecological knowledge into goods and services, thus enhancing both an orientation towards entrepreneurship and afterwards participating in the economy (systematic and comparative analyses). Overall, it appears that ecological management education offers an empirically valid and valid route for enhancing the orientation towards entrepreneurship for senior secondary school students and that the assumptions underlying the study are valid (Mpofu, 2024; Bodolica et al., 2024; Motta & Galina, 2023).

Methodology

For this study, a mixed-method design was utilized that incorporated both quantitative and qualitative research methodologies to provide well-rounded insights into the impact of ecological management practices on the EO of senior secondary school students enrolled in Kogi State, Nigeria. This research design is applicable and valid as it makes it easier to quantify the association and gain deeper insights into the experiences and understandings of the teachers and the students. As supported by Creswell and Plano Clark (2022), the use of mixed research methodologies provides enhanced insights into the research and allows the use of numerical and descriptive insights. For the study, the quantitative method was utilized to provide quantifiable

insights into the influence, while the qualitative provided additional insights into the experiences.

The study focused on all Senior Secondary School II (SS II) Biology students in Kogi State, Nigeria, for the 2023/2024 academic year. Records from the Kogi State Ministry of Education (2023) indicate that about 8,364 SS II Biology students were enrolled across 170 public secondary schools within the State's seven education zones: Ankpa, Dekina, Idah, Isanlu, Kabba, Lokoja, and Okene.

A two-stage sampling design was implemented. In the first stage, stratified random sampling ensured balanced representation of schools based on location (urban and rural) and school type (co-educational and single-sex). From each education zone, four schools were randomly chosen, consisting two urban and two rural, consequently yielding a total sample of 28 schools. In the second stage, proportionate sampling was applied to select 10% of the total student population, resulting in a sample of 836 students. Furthermore, 14 Biology teachers (two per zone) were purposively selected for key informant interviews to generate qualitative insights on how plant classification contributes to students' entrepreneurial development. This multi-stage procedure ensured that both educational and geographical variations across the state were adequately represented.

Two instruments were created and used for data collection of the study are:

Questionnaire on Ecological Management and Entrepreneurial Orientation (QEMEO) for Students.

- a) The QEMEO had three sections.
 - i. Section A: Demographic Information



- ii. Section B: Students' knowledge of ecological management concepts such as conservation, recycling, renewal of resources, and biodiversity.
- iii. Section C: Students' entrepreneurial orientation (innovativeness, proactiveness, and risk-taking), categorized based on the dimensions identified by Lumpkin & Dess (1996)

The items were measured using the Likert scale, which had values ranging from 5 – Strongly Disagree to 1 – Strongly Agree

b) Teacher Interview Guide on Ecological Management and Entrepreneurial Orientation (TIGEMEO) for teachers

TIGEMEO had semi-structured research interview items that focused on uncovering teachers' experiences regarding the promotion of innovation, creativity, and entrepreneurial culture taught under the topic of ecological management in the Biology curriculum.

For the purpose of content and construct validity, the two tools were pre-tested by three Science Education and two Educational Measurement experts from the University of Ilorin and Kogi State University. Based on the responses from the three experts, the tools were revised to improve clarity, alignment and with study objectives. A Pilot study was also conducted which surveyed 60 students and 5 teachers from schools that were not included in the major study. The result of the pilot study revealed that:

- a. The QEMEO had an α of 0.81, which indicates that it had high internal

consistency, accepted threshold ≥ 0.70 .

- b. Interrater reliability for TIGEMEO, calculated using Cohen's Kappa, gave the value 0.64, which indicates that it achieved substantial agreement (Taherdoost, 2022). These findings confirmed the reliability of both tools for the principal study.

Quantitative data was collected using the direct method of questionnaire administration by research assistants. This helped to ensure that the study followed proper ethical standards and achieved high response rates. On the other hand, the nature of the qualitative component involved conducting semi-structured interviews. These were conducted face-to-face and involved the 14 teachers of the Biology sessions. Interviews were tape-recorded after acquiring the recorded consent of the participants. Discussions focused on how ecological management topics influence students' creativity, environmental responsibility, and entrepreneurial orientation.

Data analysis followed a convergent mixed-method approach, with quantitative and qualitative data analyzed separately and integrated during interpretation.

The descriptive statistics used are frequencies, percentages, means, and standard deviations. The inferential statistics are as follows:

- a. Kruskal-Wallis test for comparisons on the basis of demographics
- b. Ordinal Logistic Regression to examine the predictive power of ecological management knowledge on students' entrepreneurial orientation.

In each test, the significance level of 0.05 was utilized.



The transcripts were analyzed for themes using the thematic analysis process designed by Braun and Clarke (2022) and comprises six stages, which include familiarization, coding, development, review, definition, and reporting. The themes that were produced from the teachers' narratives explained the data obtained quantitatively.

Ethical Consideration

Ethics clearance was sought and secured from the Ministry of Education, Kogi State. Anonymity and confidentiality were guaranteed for the participants. Students and teachers were informed that they were not compelled to participate, that participation was voluntary, and that they had the right to withdraw their participation for any reason during the process.

Results

Table 1: Ecological Management and Entrepreneurial Orientation

Responses	Frequency	Percentage (%)	Mean/Std. Dev	Level
I believe that understanding ecology is important for being a successful entrepreneur				
Strongly Disagree	46	6.5		
Disagree	80	11.2		
Neutral	136	19.1		
Agree	246	34.5	Mean=3.68	Agree
Strongly Agree	204	28.7	SD=1.19	
Frequency of considering environmental factors in business decisions				
Never	60	8.4		
Rarely	106	14.9		Often
Sometimes	150	21.1		
Often	216	30.3	Mean=3.49	
Always	180	25.3	SD=1.25	
Extent to which being environmentally conscious positively impacts business success				
Not at all	40	5.6		
Slightly	70	9.8		
Moderately	180	25.3		Very
Very	296	41.6	Mean=3.56	
Extremely	126	17.7	SD=1.07	
Likelihood of incorporating sustainable practices				
Not likely at all	50	7.0		Very
Slightly likely	86	12.0		Likely
Moderately likely	120	25.3		
Very likely	276	38.8	Mean=3.63	
Extremely likely	180	16.9	SD=1.18	
Importance of ecological knowledge for entrepreneurial success				
Not important at all	40	5.6		Very
Slightly important	66	9.3		Important
Moderately important	188	26.4		
Very important	326	45.8	Mean=3.51	
Extremely important	92	12.9	SD=1.02	
Total	712	100		
Weighted Mean Score			3.57	

Note. Mean score of 2.50 and above is significant (accept), while mean score below 2.50 is not significant (reject). Researcher's fieldwork (2024).



Table 1 portrays the students' perceptions on the importance of ecological management and the influence it has on the adaptability and orientation of an entrepreneur. Analysis of the data shows a generally positive perception on the importance of ecological information regarding entrepreneurship. A total of 68.9% of students supported the importance (40.2% and 28.7%) against the 17.7% who did not agree. The 19.1% were the ones who did not agree nor disagree.

Decision-making habits also supported such an orientation. A considerable number of students often think about environmental considerations when faced with decisions involving business (often 30.3%, always 25.3%), totaling 55.6%, against 23.3%, who responded rarely or never. The trend is an indication of increasing understanding of the implications of such business on the environment.

Similarly, a comparable trend is found regarding attitudes towards business performance. Most participants (59.3%)

were of the view that environmental awareness has a strong, very important, and extremely important positive influence on business success, whereas a small minority (15.4%) were of the opinion that it has little importance. Moreover, more than 55.7% of the participants were confident about the high likelihood of future business practice adoption.

In addition, the students viewed ecological knowledge significantly important to the success of entrepreneurs, with 45.8% finding it very important and 12.9% finding it extremely important, but only 14.9% finding it slightly to not important.

The weighted mean score of 3.57, which exceeds the acceptance benchmark of 2.50, confirms a statistically meaningful perception that ecological management is a significant contributor to entrepreneurial orientation. Overall, these results suggest that students recognize ecological literacy not merely as scientific knowledge, but as a resource capable of enhancing innovation, sustainability, and business success.

Table 2. Kruskal-Wallis and Ordered Logistic Regression Test Output for Influence of enhanced knowledge of Ecological Management on Entrepreneurial Orientation

Variables	Estimates	Std.Error	Wald	df	sig	Chi-Square
Entrepreneurial Orientation	-	-	-	1	0.027	22.89
Ecological Management	3.28	1.10	8.92	1	0.019	-
Intercept	2.10	0.85	7.32	-	-	-

Note. SPSS computation 25.0

In regards to the inferential statistics in the study, both the Kruskal–Wallis test and the Ordered Logistic Regression model were used to test whether enhanced knowledge of ecological concepts significantly contribute to a more pronounced entrepreneurial orientation among senior secondary school students in Kogi State.

The Kruskal–Wallis test yielded a Chi-Square value of 22.89 with a p-value of

0.027, which is below the 0.05 significance threshold. This result indicates significant differences in entrepreneurial orientation among students with varying levels of ecological management knowledge. Thus, the null hypothesis is rejected at this stage.

Also, the Ordered Logistic Regression further assessed the predictive strength of ecological management knowledge. The coefficient for ecological management was 3.28, with a standard error of 1.10 and a



Wald statistic of 8.92. The corresponding p-value of 0.019 confirms that ecological management knowledge is a statistically significant predictor of entrepreneurial orientation. The positive coefficient signifies that increases in ecological management understanding substantially increase the likelihood that a student will exhibit strong entrepreneurial traits such as innovativeness, proactiveness, and risk-taking. The model intercept value of 2.10 (SE = 0.85; Wald = 7.32) indicates the baseline log-odds of entrepreneurial orientation independent of predictor variables. Based on both statistical analyses, enhanced ecological management knowledge significantly contributes to higher entrepreneurial orientation among students. Therefore, the null hypothesis (H_{03}) is rejected, and the alternative hypothesis is accepted.

Qualitative Insights from Teacher Interviews

The qualitative findings deepened the understanding of how ecological management strengthens students' entrepreneurial potential. Teachers consistently emphasized that ecological knowledge equips learners with practical skills, critical thinking, and innovative mindsets necessary for modern entrepreneurship.

One teacher explained:

“Ecological management involves understanding how ecosystems function and applying this knowledge to promote sustainability and mitigate human impacts. This knowledge is essential for students interested in aquaculture, as it provides a foundation for sustainable practices.”

(KII, Participant IV / Biology SSII Teacher, 2024)

Another teacher highlighted the direct linkage between ecological knowledge and entrepreneurship:

“Students who understand ecological balance can make informed decisions in aquaculture. Concepts such as nutrient cycling and habitat preservation help them adopt sustainable practices that support business growth.”

(KII, Participant III / Female Biology SSII Teacher, 2024)

A similar perspective was provided by a male teacher who noted the cognitive benefits of ecological learning:

“Studying ecological management sharpens problem-solving skills. Students learn to analyze complex systems and develop strategies for challenges like water quality control. These abilities are crucial in aquaculture where innovation determines success.”

(KII, Participant VII / Biology SSII Teacher, 2024)

Another respondent linked ecological content directly to students' entrepreneurial choices:

“The ecological management topics in SS II Biology can inspire students to venture into snail farming. They understand biodiversity, organism roles, and low-impact farming. Snail farming becomes an affordable, profitable, and environmentally friendly enterprise.”

(KII, Participant II / Biology SSII Teacher, 2024)

Overall, the qualitative findings complement the quantitative evidence, showing that ecological knowledge enhances students' entrepreneurial awareness, creativity, and readiness for sustainable enterprise development.



Discussion of Findings

Findings of the study reveal that ecological management knowledge positively impacts the orientation of the senior secondary school students in Kogi State as far as their entrepreneurial orientation is concerned. The weighted mean score of 3.57 indicates that the majority of the students find ecological management knowledge favorable to their entrepreneurial orientation. Besides, the Kruskal-Wallis test and the Ordered Logistic Regression results both support the fact that ecological management knowledge is one of the significant predictors of the orientation, which indicates that the students with the most complete information regarding ecological management are presumed to be the most innovative and the most willing to take the risk.

These results are congruent with the existing literature that stresses the potential of ecological literacy for economic reasons. For instance, Benjamin et al. (2022) observed that people who undertook green entrepreneur education had greater intentions for starting their own businesses. Furthermore, Olawale and Okorie (2023) observed that the introduction of ecological knowledge into the curriculum for Nigerian schools improved their creativity, leadership capacity, and general readiness for ecological innovation. This study tries to fill the existing gaps by showing that ecological management knowledge, besides having an informing aspect, had the potential for influencing and significantly quantifying entrepreneurial orientation. The recorded effect of ecological literacy on the activity of the entrepreneur can be located within the wider debate on sustainability and education. What Rosário & Raimundo (2024) stated of project-based ecological learning, that it improves the

innovation potential of the learner by relating scientific knowledge to solutions, was similarly confirmed quantitatively by the teachers involved in the present study, as they illustrated how ecological knowledge informs the start-ups of fish and snail farms. In the same way, Lin (2023) argued that the teaching of entrepreneurship using the model of systems thinking makes it innovative and significant, which was similarly confirmed by the present research concerning the effect of ecological management on the capacity of the learner to manage resources. The link between ecological literacy and entrepreneurship correlates well with some research on vocational and technical education. Udoh and Ekpo (2022) and Onyema et al. (2023) were able to show that an association between environmental science and entrepreneurship improves the creative faculties and motivational levels of students concerning the creation of jobs. This study thus fills the gap, as it indicates that ecological management influences entrepreneurship, even for the secondary school community, which again confirms the importance of early intervention. Vargas-Merino et al. (2025) thus again supported that the integration of science education and entrepreneurship education facilitates the creation of innovative projects and the involvement of the youth marketplace for sustainability, which again was understood well by the students of Kogi State.

From the theoretical perspective, the results support the Human Capital Theory (Becker, 1993) as it proposes that the knowledge and skills derived from learning increase productivity and economic potential. The ecological knowledge that the students gain can thus be termed as human capital that helps the students recognize and optimize



ecological opportunities. The result supports the Experiential Learning Theory (Kolb, 1984). On the teachers' perspective, the experiences and engagement of the students in hands-on ecological experiences such as water quality testing, fish farming, and conservation reveal the increase in concrete experiences, thus leading to an improvement in entrepreneurial self-efficacy. The aspect of experiencing ecological learning, as discussed by Braun and Clarke (2022) in thematic analysis, contends that ecological learning impacts behavioral aspects that go far beyond the statistics.

In addition, the research adds to the debate on the sustainability development challenge that Nigeria faces. For instance, the significance of green business practices for the improvement of the stability of SMEs was emphasized by Adebayo & Nwankwo (2024) and the development of leadership skills through ecological education, as argued by Olawale & Okorie (2023). In light of the above-mentioned findings, the eagerness of the students to implement the sustainability aspect of their future businesses indicates that ecological literacy involves something that goes beyond the curriculum, as it influences values and practices concerning economy, aligning with the targets of SGD 4 (Quality Education) and SGD 8 (Decent Work and Economic Growth).

Conclusion

This research study on the influence of ecological knowledge for management on the entrepreneurship orientation of senior secondary school students in Kogi State, Nigeria, presents several important findings. Firstly, it appears that the students who are well-versed in ecological knowledge tend to show high levels of traits

for entrepreneurship, such as innovativeness, proactive behavior, and risk-taking. Quantitative analyses show that ecological knowledge influences and predicts the orientation towards entrepreneurship, and the qualitative information reveals that the study of ecological aspects like aquaculture, converting trash to wealth, and biodiversity management increases the creative and problem-solving capabilities of the students.

In essence, the research above supports the argument that ecological education corresponds to the national goals of youth empowerment, sustainable development, and job creation. In as much as ecological literacy and entrepreneurship are incorporated into the curriculum of secondary education, the latter becomes an effective tool for combating youth unemployment in Nigeria and for promoting the development of environmentally friendly businesses. In such a manner, the knowledge of ecological management becomes an instrument for the conservation of the environment, as well as human capital, which, in turn, gives impetus for the development of green innovations.

Recommendations

On the basis of the present findings, the following recommendations are made:

- 1 Enhance Learning for the Environment through Schools
Instruction on ecological management, therefore, ought to embrace not only theoretical teaching but hands-on activities such as aquatic farm projects, composting, recycling programs, school gardens, and the restoration



- of habitats. This hands-on learning process would help the students use their ecological knowledge to create fruitful economic ventures.
- 2 **Integration of Green Entrepreneurship into the Biology Curriculum**
The Federal Ministry of Education and government policy makers must embed learning modules for green entrepreneurship into the senior secondary school curriculum for Biology. This would help teachers link ecological ideas and small enterprise development, such as organic farming, snail ranching, biogas production, and eco-tourism.
 - 3 **Professional Development for Teachers of Biology**
Professional development programs for teachers ought to provide them with tools and approaches for the integration of entrepreneurial skills into the teaching of ecological management. These include workshops, field, and partnerships with environmental organizations/agribusiness specialists to improve their capability for delivering experiential green entrepreneurship education.
 - 4 **Create school-based Eco-Innovation Clubs and Enterprises**
Schools are advised to develop Eco-Innovation Clubs and Micro-Businesses for their students (waste recycling, organic produce such as vegetables, fish, and snails). These are expected to cultivate an enterprise culture, create revenue,

and promote sustainability on school premises.

- 5 **Collaborate with Environmental and Agricultural Agencies**
Government institutions, NGOs, and the private sector ought to interact with schools to provide mentoring, incubation, and visits for students wishing to pursue green entrepreneurship. Such an interface can help students be better equipped for practical enterprise and ensure that the economy grows in the right manner.
- 6 **Encourage policy reforms that support green youth enterprises**
National and subnational administrations must establish incentives like grants, tax-exempt terms, and micro-credit programs that would promote environmentally friendly youth-run businesses. Encouraging youth engagement in green sectors would help address unemployment further, besides playing an important role in biodiversity and ecosystem conservation.

Limitations and Future Research Directions

Although the study provides important information on the impact of ecological management on the entrepreneurial orientation that secondary school students develop, some limitations are important for the reader to understand while interpreting the findings. Firstly, the study was conducted on students enrolled in the biology class of the secondary school II, which means that the study did not involve students enrolled in other subjects that are important for ecological and entrepreneur



characteristics. Future research needs to focus on other subjects as well.

Second, the study relied mainly on self-report questionnaires, which tend to quantify perceived rather than actual entrepreneurship activity, particularly if there are social desirability biases and/or the students lack the requisite experience. Follow-up research would benefit from the incorporation of observation and learning experiments to verify if ecological knowledge influences actual entrepreneur activity.

Finally, the study focused on Kogi State, which means that the cultural and socioeconomic diversity represented within Nigeria were not comprehensively portrayed. However, future research could be conducted on other states and maybe comparing the geopolitical zones.

Reference

- Adebayo, M., & Nwankwo, O. (2024). Green entrepreneurial practices and the sustainability of manufacturing SMEs in North-Central Nigeria. *ARCN Journal of Business and Entrepreneurship Studies*, 9(1), 44-59. Retrieved from <https://www.arcnjournals.org/images/27751456211127.pdf>
- Anabaraonye, B., Onnoghen, U. N., Nwafor, G. U., & Obinna, C. J. K. (2024). The role of green entrepreneurial skills in enhancing production economy in Nigeria. *Covenant Journal of Entrepreneurship (CJoE)*, 8(2), December 2024.
- Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis, with special reference to education (3rd ed.)*. University of Chicago Press.
- Benjamin, A., Okun Etim, O., Beatrice, O. E., Toyin, F. A., & Emma, A. N. (2022). Green entrepreneurship education for sustainable development in Nigeria. *JOJ Wildlife & Biodiversity*, 4(3), 555637. <https://doi.org/10.19080/JOJWB.2022.04.555637>
- Bodolica, V., Shirokova, G., Ragulina, D., & Lushnikova, A. (2024). Students' individual entrepreneurial orientation and the scope of startup activities in Russia: The role of university infrastructure. *International Journal of Management Education*, 22(2), Article 100986. <https://doi.org/10.1016/j.ijme.2024.100986>
- Braun, V., & Clarke, V. (2022). *Thematic analysis: A practical guide*. Sage Publications.
- Creswell, J. W., & Plano Clark, V. L. (2022). *Designing and conducting mixed methods research (4th ed.)*. Sage Publications.
- Federal Ministry of Education. (2020). *National senior secondary school curriculum: Biology*. NERDC Press.
- Kiggundu, R. (2025). Does Africa need entrepreneurial ecosystems thinking? *The Journal of Technology Transfer*, 50, 1–20. <https://doi.org/10.1007/s10961-025-10213-x>
- Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice Hall.



- Lin, J. (2023). The ecological approach to construct entrepreneurship education: A systematic literature review. *Journal of Entrepreneurship in Emerging Economies*. <https://doi.org/10.1108/JEEE-02-2022-0049>
- Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, 21(1), 135–172.
- Mpofu, R. T. (2024). Entrepreneurial growth: Bridging experiential learning, ecological systems analysis and governance of entrepreneurship center environments [Special issue]. *Journal of Governance & Regulation*, 13(2), 382–394. <https://doi.org/10.22495/jgrv13i2siart14>
- Olawale, T. K., & Okorie, U. P. (2023). Ecological management education and sustainable youth empowerment in Nigeria. *Journal of African Environmental Studies*, 18(4), 233–249.
- Onyema, E. M., Ajayi, T., & Eze, J. (2023). Human capital development and sustainable entrepreneurship in Africa: The role of environmental education. *International Journal of Sustainability Studies*, 15(2), 67–80.
- Motta, V. F., & Galina, S. V. R. (2023). Experiential learning in entrepreneurship education: A systematic literature review. *Teaching and Teacher Education*, 121, Article 103919. <https://doi.org/10.1016/j.tate.2022.103919>
- Rosário, A. T., & Raimundo, R. (2024). Sustainable entrepreneurship education: A systematic bibliometric review. *Sustainability*, 16(2), 784. <https://doi.org/10.3390/su16020784>
- Taherdoost, H. (2022). Validity and reliability of the research instrument: How to test the validation of a questionnaire/survey in research. *SSRN Electronic Journal*.
- Udoh, E., & Ekpo, E. (2022). Environmental education and students' entrepreneurial orientation in Nigerian secondary schools. *African Journal of Education and Sustainable Development*, 17(3), 112–126.
- Vargas-Merino, J. A., et al. (2025). Sustainable entrepreneurship in higher education institutions: A systematic review. *Journal of Cleaner Production*. <https://doi.org/10.1016/j.jclepro.2025.139284>
- Yusuf, L. O., & Aberu, F. (2023). Environmental education and sustainable development in Nigeria. *Nigerian Journal of Rural Finance and Entrepreneurship*, 1(1–2). <https://journals.abu.edu.ng/index.php/njrfe/article/view/394>