

REVOLUTIONIZING VOCATIONAL AGRICULTURAL EDUCATION: LEVERAGING ARTIFICIAL INTELLIGENCE, INNOVATION AND CREATIVITY IN RIVERS STATE

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Abstract

*The study focused on revolutionizing vocational agricultural education: leveraging artificial intelligence, innovation and creativity. The researcher adopted descriptive survey research design. The population of the study consisted of fifty-five (55) agricultural education lecturers, made up of twenty (20) lecturers from Ignatius Ajuru University of Education, nineteen (19) lecturers from Rivers State University, and sixteen (16) lecturers from University of Nigeria Nnsukka in affiliation with Federal College of Education (Technical), Omoku. Since the population was manageable, the entire 55 lecturers were used as the sample size, employing the census sampling technique. A questionnaire titled “Artificial Intelligence, Innovation and Creativity in Vocational Agricultural Education Questionnaire” (AIICVAEQ) was developed and administered to the respondents. The instrument was subjected to face and content validation by three experts in the three universities mentioned above. To establish the reliability of the instrument, the Cronbach Alpha method was used, yielding a reliability coefficient of 0.87. The items of the instrument were structured on a four-point rating scale. The statistical tools used for answering the research questions were mean and standard deviation with a criterion mean of 2.50 and above as accepted or 2.49 below was rejected. The findings on the study indicate that artificial intelligence, **innovation and creativity revolutionized vocational agricultural education. It recommended that educational institutions should integrate AI-powered tools such as drones, smart sensors, and virtual simulations into the teaching and learning of vocational agriculture.***

Keyword: Vocational Agricultural Education, Artificial Intelligence (AI), Innovation & Creativity

Introduction

The rapid advancement of technology in the 21st century has significantly transformed the landscape of education, with vocational agricultural education emerging as a critical area for innovation. Traditionally, vocational agricultural education has focused on hands-on training, technical skills acquisition, and practical farming practices. However, with the growing demand for food security, sustainable agricultural systems, and global competitiveness, there is an urgent need to revolutionize its approaches. By leveraging artificial intelligence (AI), innovation, and creativity, vocational agricultural education can be reshaped to equip learners with cutting-edge skills, improve decision-making in farming practices, and foster entrepreneurial mindsets that align with contemporary agricultural challenges (Alalwan, et al., 2023).

Artificial intelligence revolutionized vocational agricultural education according to Nwaogu & Nwankwo, (2023) who postulated that AI-powered tools such as smart sensors, drones, and automated machinery are increasingly being integrated into teaching and learning processes, thereby enhancing students' exposure to modern farming techniques. These innovations not only improve efficiency in agricultural practices but also provide real-time data that can be used for practical training and problem-solving. Furthermore, AI-based learning platforms are making it possible for students to access virtual farms and simulations, which broaden their understanding of crop production, animal husbandry, and agribusiness management beyond the traditional classroom or farm setting. This indicates that AI is reshaping how agricultural knowledge is delivered and acquired, equipping learners with relevant skills for the 21st-century agricultural sector.

Innovation is a powerful driver in transforming vocational agricultural education by introducing new methods, technologies, and practices that improve both teaching and learning. In traditional settings, agricultural education has often been limited to theoretical knowledge and manual practices, which fail to prepare learners for the realities of modern farming. Through innovation, educators can integrate modern tools such as digital learning platforms, precision farming equipment, and climate-smart technologies that make agricultural training more practical, engaging and industry-relevant. This shift not only enhances students' technical skills but also encourages adaptability and critical thinking which are essential for thriving in today rapidly changing agricultural landscape (Adekunle & Adefalu, 2021). Innovation revolutionize vocational agricultural education in view of Aina & Adeyemi, (2022) who stated that innovation has revolutionized vocational agricultural education by enhancing teaching, learning, and skill acquisition, with the introduction of modern agricultural technologies such as greenhouse farming, precision irrigation, and mechanized equipment has transformed how students engage with practical agricultural training. These innovations not only improve productivity but also expose learners to real-life problem-solving techniques that align with global best practices in agriculture. Furthermore, Bamidele & Olaniyan, (2021) noted that the integration of digital platforms and mobile applications has broadened access to agricultural knowledge, making it easier for students to learn innovative farming techniques and apply them in real-world contexts. By embedding innovation into vocational agricultural curricula, learners are empowered to become entrepreneurs, innovators, and change-makers in the agricultural sector, thus driving national development and sustainability (Ozor et al., 2023).

Creativity is central to revolutionizing vocational agricultural education, as it empowers learners to think beyond conventional farming practices and develop innovative solutions to agricultural challenges. Traditional vocational education often emphasizes routine activities such as planting, harvesting, and livestock management without encouraging learners to explore new approaches. According to Eze & Okoye, (2021) who postulated that creativity has greatly revolutionized vocational agricultural education by transforming teaching strategies and learning experiences. Creative approaches such as the use of locally available materials, project-based learning, and innovative classroom demonstrations have made agricultural education more practical and engaging for students. By fostering creativity, students can engage

in critical thinking, problem-solving, and experimentation, which are vital in addressing complex issues such as climate change, post-harvest losses, and resource management. Creative learning approaches, including project-based assignments, design thinking, and experiential learning, inspire learners to devise unique agricultural techniques that improve productivity and sustainability (Ogunleye & Adedoyin, 2022). Moreover, creativity enhances entrepreneurship in agricultural education by equipping learners with the ability to transform ideas into viable agribusiness ventures. Through creative thinking, students can identify market opportunities, design value-added products, and develop innovative marketing strategies that go beyond subsistence farming. Embedding creativity into vocational agricultural curricula also promotes resilience, adaptability, and lifelong learning qualities that are essential for thriving in the dynamic global agricultural sector. Thus, nurturing creativity in vocational agricultural education not only modernizes learning but also prepares students to become agents of change and leaders in agricultural innovation (Eze & Okonkwo, 2023).

In conclusion, revolutionizing vocational agricultural education through artificial intelligence, innovation, and creativity is vital for producing skilled, self-reliant, and future-ready graduates who can drive agricultural transformation and economic growth. By leveraging AI tools, modern innovations, and creative approaches, vocational institutions can enhance teaching and learning, promote sustainable farming practices, and equip students with entrepreneurial competencies that address unemployment and food insecurity.

Statement of Problem

Vocational agricultural education plays a pivotal role in equipping learners with practical knowledge and skills required for sustainable food production and economic development. However, in many developing nations, including Nigeria, this field still relies heavily on traditional teaching methods that emphasize manual practices and outdated technologies. Such approaches are inadequate in addressing contemporary challenges such as climate change, low agricultural productivity, food insecurity, and the demand for sustainable farming systems. The lack of integration of artificial intelligence, innovative practices, and creative problem-solving skills has left graduates underprepared for the realities of modern agriculture and global competitiveness. Despite the global recognition of artificial intelligence, innovation, and creativity as catalysts for transformation across various sectors, their adoption in vocational agricultural education remains limited. This gap results in a mismatch between the skills imparted in training institutions and the technological advancements required in today's agricultural industry. Consequently, learners often graduate without the ability to leverage AI tools, innovative solutions, or creative strategies for enhancing agricultural output, sustainability, and entrepreneurship. If vocational agricultural education is not revolutionized through these approaches, the sector risks remaining stagnant.

Purpose of the Study

The aim of the study is to investigate revolutionizing vocational agricultural education: leveraging on artificial intelligence, innovation and creativity in Rivers State. Specifically, the study sought to;

- i. investigate ways artificial intelligence will revolutionize vocational agricultural education in Rivers State
- ii. ascertain the role of innovation in revolutionizing vocational agricultural education in Rivers State
- iii. examine the role of creativity in revolutionizing vocational agricultural education in Rivers State

Research Questions

- i. To what extent does artificial intelligence revolutionize vocational agricultural education in Rivers State?
- ii. To what extent does innovation revolutionize vocational agricultural education in Rivers State?
- iii. To what extent does creativity revolutionize vocational agricultural education in Rivers State?

Methodology

In the course of this study, the researcher adopted the descriptive survey research design. This design was considered appropriate because it enabled the researcher to describe and analyze the extent to which artificial intelligence, innovation, and creativity can be leveraged to revolutionize vocational agricultural education in Rivers State. The study was conducted in three tertiary institutions in Rivers State, namely: Ignatius Ajuru University of Education, Rivers State University Port Harcourt and University of Nigeria Nnsuuka in affiliation of Federal College of Education (Technical), Omoku. The population of the study consist of fifty-five (55) agricultural education lecturers, made up of twenty (20) lecturers from Ignatius Ajuru University of Education, nineteen (19) lecturers from Rivers State University, and sixteen (16) lecturers from (UNN) affiliate of Federal College of Education (Technical), Omoku. Since the population was manageable, the entire 55 lecturers were used as the sample size, employing the census sampling technique. A questionnaire titled “*Artificial Intelligence, Innovation and Creativity in Vocational Agricultural Education Questionnaire*” (AIICVAEQ) was developed and administered to the respondents. The instrument was subjected to face and content validation by three experts in the above mentioned Universities. The items of the instrument were structured on a four-point rating scale of; 3.50 – 4.00 = Strongly Agree (SA), 2.50 – 3.49 = Agree (A), 1.50 – 2.49 = Disagree (D) and 1.00– 1.49 = Strongly Disagree (SD). To establish the reliability of the instrument, the Cronbach Alpha method was used, yielding a reliability coefficient of 0.87. The statistical tools used for answering the research questions were mean and standard deviation with a criterion mean of 2.50 and above as accepted and 2.49 below was rejected.

Results and Discussion of Findings

Research Question 1: To what extent does artificial intelligence revolutionize vocational agricultural education?

Table 1: Mean and standard deviation responses on the extent artificial intelligence revolutionize vocational agricultural education

N=55

S/N	Items	$\bar{X}$	s.d	Remarks
1.	Artificial intelligence is use to develop smart learning platforms for teaching agricultural practices.	3.50	0.88	SA
2.	Artificial intelligence powered tools provide real-time feedback to agricultural students during practical sessions.	3.25	0.81	A
3.	Artificial intelligence applications improve precision farming techniques taught in vocational agricultural education.	3.14	0.79	A
4.	Artificial intelligence help simulate real-life farming environments for practical agricultural training.	3.23	0.81	A
5.	AI-driven data analytics enhance decision-making in crop production training.	3.95	0.99	SA
6.	Artificial intelligence assist in training students on resource management, such as water and fertilizer use	3.45	0.86	A
7.	Artificial intelligence is use to teach sustainable farming practices in vocational education.	3.93	0.98	SA
8.	It strengthens agribusiness and entrepreneurship skills acquisition in vocational agricultural education.	3.21	0.80	A
9.	It ensures the teaching of mechanized farming in vocational agricultural Education.	3.43	0.86	A
10.	Artificial intelligence promotes innovative research in vocational agricultural education.	3.40	0.85	A
Grand Mean		3.45	0.86	A

Source: Field Repot, 2025

Table 1 shows the responses of respondents on extent artificial intelligence revolutionize vocational agricultural education. Thus, in item 1, 5 and 7, the respondents strongly agreed that artificial intelligence are used to develop smart learning platforms for teaching agricultural practices, AI-driven data analytics enhance decision-making in crop production training, is use to teach sustainable farming practices in vocational education with means score of 3.50, 3.95, and 3.93 respectively which falls under strongly Agreed. Also, the closest in their standard deviation which ranges from 0.88-0.99 shows that the respondents were harmonious in their responses.

While items 2,3,4,6,8 – 10 falls under agreed, this implies that the respondents agreed that artificial intelligence powered tools provide real-time feedback to agricultural students during practical sessions, artificial intelligence applications improve precision farming techniques taught in vocational agricultural education, artificial intelligence help simulate real-life farming environments for practical agricultural training, artificial intelligence assist in training students on resource management, such as water and fertilizer use, it strengthens agribusiness and entrepreneurship skills acquisition in vocational agricultural education, it ensures the teaching of mechanized farming in vocational agricultural Education and promotes innovative research in vocational agricultural education. Also, the closest in their standard deviation which ranges from 0.80-0.86 shows that the respondents were harmonious in their responses. The table had a grand mean of 3.45 and standard deviation of 0.86, this indicates that artificial intelligence revolutionize vocational agricultural education

Research Question 2: To what extent does innovation revolutionize vocational agricultural education?

Table 2: Mean and Standard Deviation on extent innovation revolutionize vocational agricultural education

N=55

S/N	Items	$\bar{X}$	SD	Remarks
11.	Innovative teaching methods make agricultural education more practical and engaging.	3.76	0.94	SA
12.	Modern farm technologies can be integrated into vocational training through innovative approaches.	3.83	0.96	SA
13.	Innovation helps in redesigning agricultural curricula to meet global agricultural demands.	3.00	0.75	A
14.	The use of innovative digital learning platforms enhanced agricultural skill acquisition among students	3.66	0.92	SA
15.	Innovative greenhouse technology improved practical teaching of crop production in vocational agricultural education	2.97	0.74	A
16	Innovation in irrigation systems improved students' knowledge of sustainable agriculture	3.10	0.78	A
17	Innovative drone technology improved the teaching of modern farming practices in vocational agricultural education	3.22	0.81	A
18	innovation in fish farming technology enhanced teaching and learning in vocational agricultural education	2.99	0.75	A
Grand mean		3.32	0.83	A

Source: Field Report, 2025

Data presented in Table 2 reveals the extend **innovation revolutionize vocational agricultural education. Item 11, 12 and 14 respectively strongly agreed** that innovative teaching methods makes agricultural education more practical and engaging, modern farm technologies can be integrated into vocational training through innovative approaches and the use of innovative digital learning platforms enhanced agricultural skill acquisition among students. Also, the closest in their standard deviation which ranges from 0.92-0.96 shows that the respondents were harmonious in their responses.

While item 13, 15-18 agreed that innovation helps in redesigning agricultural curricula to meet global agricultural demands, innovative greenhouse technology improved practical teaching of crop production in vocational agricultural education, innovation in irrigation systems improved students' knowledge of sustainable agriculture, innovative drone technology improved the teaching of modern farming practices in vocational agricultural education and innovation in fish farming technology enhanced teaching and learning in vocational agricultural education. Also, the closest in their standard deviation which ranges from 0.74-0.81 shows that the respondents were harmonious in their responses. The table had a grand mean of 3.32 and standard deviation of 0.83, this revealed that innovation revolutionize vocational agricultural education.

Research Question 3: To what extent does creativity revolutionize vocational agricultural education?

Table 3: Mean and Standard Deviation Responses on the Extent Creativity Revolutionize Vocational Agricultural Education

N=55

S/N	Items	$\bar{X}$	SD	Remarks
19.	Creative use of locally available farm tools enhanced students' practical learning	3.50	0.88	SA
20.	Creativity in curriculum design strengthened agricultural skill acquisition	3.30	0.83	A
21.	Creativity in teaching methods helped students understand modern farming practices	3.00	0.75	A
22.	creativity in record-keeping and farm management influenced students' agribusiness training	3.20	0.80	A
23.	Creative classroom projects encouraged innovation among agricultural students	3.70	0.93	SA
24.	Creativity in crop and animal demonstration improved students' learning outcomes in vocational agricultural education	3.03	0.76	A

25	Creativity in combining traditional and modern farming methods benefited vocational agricultural education	2.99	0.75	A
26	Creativity in managing agricultural waste promoted sustainable farming practices in vocational agricultural education	3.98	0.99	SA
Grand Mean		3.34	0.83	A

Source: Field Report, 2025

Table 3 indicates the extent Creativity Revolutionize Vocational Agricultural Education. Thus, item 19, 23 and 26 strongly agreed that creative use of locally available farm tools enhanced students' practical learning, creative classroom projects encouraged innovation among agricultural students and creativity in managing agricultural waste promote sustainable farming practices in vocational agricultural education. Also, the closest in their standard deviation which ranges from 0.88-0.99 shows that the respondents were harmonious in their responses.

While items 20, 21, 22, 24-25 agreed that creativity in curriculum design strengthened agricultural skill acquisition, creativity in teaching methods helped students understand modern farming practices, creativity in record-keeping and farm management influence students' agribusiness training, creativity in crop and animal demonstration improved students' learning outcomes in vocational agricultural education and creativity in combining traditional and modern farming methods benefited vocational agricultural education. Also, the closest in their standard deviation which ranges from 0.88-0.99 shows that the respondents were harmonious in their responses. The table had a grand mean of 3.34 and standard deviation of 0.84, this revealed that creativity revolutionize vocational agricultural education.

Discussion of Findings

Findings from research question 1 showed that artificial intelligence revolutionize vocational agricultural education. These findings is supported by Nwaogu & Nwankwo, (2023) who postulated that AI-powered tools such as smart sensors, drones, and automated machinery are increasingly being integrated into teaching and learning processes, thereby enhancing students' exposure to modern farming techniques. These innovations not only improve efficiency in agricultural practices but also provide real-time data that can be used for practical training and problem-solving. Furthermore, AI-based learning platforms are making it possible for students to access virtual farms and simulations, which broaden their understanding of crop production, animal husbandry, and agribusiness management beyond the traditional classroom or farm setting. This indicates that AI is reshaping how agricultural knowledge is delivered and acquired, equipping learners with relevant skills for the 21st-century agricultural sector.

Findings from research question 2 shows that innovation revolutionize vocational agricultural education, this findings is in agreement with Aina & Adeyemi, (2022) who stated that innovation has revolutionized vocational agricultural education by enhancing teaching, learning, and skill acquisition, with the introduction of modern agricultural technologies such as greenhouse farming, precision irrigation,

and mechanized equipment has transformed how students engage with practical agricultural training. These innovations not only improve productivity but also expose learners to real-life problem-solving techniques that align with global best practices in agriculture. Furthermore, Bamidele & Olaniyan, (2021) noted that the integration of digital platforms and mobile applications has broadened access to agricultural knowledge, making it easier for students to learn innovative farming techniques and apply them in real-world contexts.

Findngs from research question 3 shows that creativity revolutionized vocational agricultural education. These findings is supported by Eze & Okoye, (2021) who postulated that creativity has greatly revolutionized vocational agricultural education by transforming teaching strategies and learning experiences. Creative approaches such as the use of locally available materials, project-based learning, and innovative classroom demonstrations have made agricultural education more practical and engaging for students. These methods encourage learners to apply theoretical knowledge in real-life farm settings, thereby improving their problem-solving skills and adaptability.

Conclusion

The study concludes that revolutionizing vocational agricultural education through artificial intelligence, innovation, and creativity is crucial for equipping learners with the skills and competencies required in the 21st-century agricultural sector. Artificial intelligence introduces advanced tools such as smart farming systems, data analytics, and virtual simulations, which enrich teaching and learning processes while promoting precision and efficiency in agricultural practices. Similarly, innovation provides modern methods, technologies, and agribusiness strategies that bridge the gap between traditional farming techniques and global agricultural demands. In addition, creativity complements Artificial intelligence and innovation by fostering problem-solving, adaptability, and entrepreneurship in vocational agricultural education. Through creative use of local resources, value addition, and practical projects, learners are empowered to apply knowledge in unique and sustainable ways. This integration of AI, innovation, and creativity positions vocational agricultural education as a transformative force that not only develops competent agricultural professionals but also promotes self-reliance, food security, and economic growth.

Recommendations

1. Educational institutions should integrate AI-powered tools such as drones, smart sensors, and virtual simulations into the teaching and learning of vocational agriculture.
2. Curriculum developers and policymakers should continually review and update agricultural education curricula to incorporate modern farming technologies, sustainable practices, and agribusiness innovations. Schools should encourage practical, project-based learning that exposes students to greenhouse farming, irrigation systems, and modern mechanized tools.

3. Vocational agricultural education should prioritize creative teaching strategies that enable students to utilize locally available materials, recycle resources, and develop innovative solutions to farming challenges.

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