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Impact of Digital Training Resources on Agricultural Industries' Work Preparation among Agricultural Education Students in Niger Delta University

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Abstract: *The study examined the Impact of Digital Training Resources on Agricultural Industries' Work Preparation Among Agricultural Education Students in Niger Delta University investigated the influence of two major digital tools on students' readiness for industry: Learning Management Systems (LMSs) and Virtual Farm Management Software (VFMS). The study was guided by two objectives, research questions, and hypotheses. A descriptive survey research design was adopted. The population comprised all 148 Agricultural Education students of Niger Delta University. A census approach was used, and 120 questionnaires were successfully retrieved, representing 81% response rate. Data were collected using a researcher-designed structured questionnaire. The instrument's face and content validity were ensured through expert review, while reliability was confirmed via Cronbach's Alpha coefficient of ≥ 0.70. The questionnaire was administered in person, and data were analysed using descriptive statistics to answer the research questions and an independent samples t-test to test the hypotheses. Findings revealed that students perceived both LMSs (Grand Mean = 3.29) and VFMS (Grand Mean = 3.09) as positively impacting their preparation for roles in agricultural industries. No significant gender-based differences were found in students' perceptions of the effectiveness of either tool. Based on these findings, it was recommended that the university improve LMS integration through interactive case-based content and expand access to VFMS tools via simulation-based coursework. Institutional support should also focus on inclusive digital training that ensures both male and female students benefit equally. The study contributes to advancing digital pedagogy and aligning agricultural education with 21st-century industry demands.*

Keywords: Digital Training Resources, Learning Management Systems (LMS), Virtual Farm Management Software, Agricultural Education, Work Preparation, Agricultural Industries, Student Employability, Digital Pedagogy.

Introduction

Digital transformation has become a defining feature of contemporary education and agricultural practice, reshaping how knowledge is produced, accessed, and applied in the workplace. In the agricultural sector, digitalisation spans tools such as mobile advisory platforms, decision-support systems, sensors, and data-driven applications that optimise production and link farmers to markets, thereby positioning agriculture within the broader digital economy. Recent analyses of digital agriculture in Nigeria emphasise that these technologies are central to improving productivity, resilience, and competitiveness, particularly as the country seeks to diversify its economy and modernise its agrifood systems. Within higher education, this same digital turn is compelling agricultural programmes to reconfigure curricula and pedagogies so that graduates can operate confidently in technology-intensive workplaces. Consequently, digital training is no longer a peripheral enhancement but a core pathway through which students develop the knowledge, skills, and dispositions required for effective participation in the agricultural industries, providing the conceptual foundation on which more specific digital training resources are built.

Digital training, within the context of university-based agricultural education, may be understood as the systematic use of information and communication technologies to support structured learning experiences, professional skill development, and authentic practice

simulation. It moves beyond simple access to online content to encompass interactive, learner-centred engagements, such as problem-based tasks, collaborative activities, and feedback-rich environments that are mediated by digital platforms. Empirical work on digital education applications used by agriculture students has shown that such tools can enhance self-directed learning, facilitate continuous engagement with course materials, and support complex academic tasks when appropriately integrated into teaching strategies. At the same time, research indicates that access, awareness, and pedagogical alignment remain uneven, leading to underutilisation of digital opportunities in many programmes. These insights point to the need to examine not only whether digital training is available, but how specific categories of digital training resources are mobilised to prepare agricultural education students for the realities of work in the agricultural industries.

Digital training resources may be conceptualised as the concrete technological tools, platforms, and applications through which digital training is operationalised in teaching and learning processes. In agricultural education, such resources include learning management systems, virtual laboratories, simulation environments, farm management software, mobile learning applications, and multimedia content tailored to agricultural contexts. Evidence from Nigerian and wider African settings suggests that when these resources are accessible and embedded within well-designed learning activities, they can significantly enrich students' engagement, conceptual understanding, and practical competence. However, the literature also notes disparities in availability, institutional support, and staff capacity, which may limit the extent to which students can translate exposure to digital tools into work-ready capabilities. This raises a critical question for agricultural education programmes such as that of Niger Delta University: which specific digital training resources are most consequential for students' preparation for employment in the agricultural industries, and how do students themselves experience their impact? Addressing this question requires a closer focus on the construct of agricultural industries' work preparation.

Agricultural industries' work preparation refers to the extent to which students acquire the technical, digital, and transferable skills, as well as the professional attitudes, required to function effectively in diverse roles across the agricultural value chain. International studies on workforce readiness in agriculture consistently report concerns that many graduates, though theoretically knowledgeable, feel insufficiently prepared for the practical, problem-solving, and collaborative demands of modern agricultural workplaces. Employers increasingly expect graduates to demonstrate competence in data-informed decision-making, technology use, communication, and adaptive learning, especially as the sector responds to sustainability, climate, and market pressures. Where institutional training does not explicitly scaffold these capabilities, students may struggle to transition from school to work, perpetuating skills gaps in the agricultural labour market. This underscores the importance of investigating how targeted digital training resources, embedded within agricultural education programmes, can strengthen students' readiness for employment and entrepreneurship in the agricultural industries, thereby motivating closer attention to particular tools such as learning management systems.

Learning management systems (LMSs) constitute one of the most pervasive digital infrastructures in higher education and have become central to the organisation and delivery of teaching, assessment, and communication. An LMS typically allows instructors to structure course content, administer quizzes and assignments, track student progress, and facilitate asynchronous and synchronous interactions, thereby creating a coherent digital environment for learning. Recent research in agricultural higher education has highlighted that effective adoption of LMSs can increase student engagement, support flexible access to learning materials, and foster more student-centred pedagogical approaches, provided that technological and organisational conditions are supportive. Studies examining the impact of LMS use on student performance also indicate that when courses are purposefully designed to leverage LMS functionalities, learners tend to show improved outcomes and more positive attitudes towards technology-enhanced learning. For agricultural education students, these systems can serve as gateways to digital content, collaborative projects, and industry-relevant resources that collectively shape their preparation for work. Yet, there remains limited empirical evidence on how LMS-based digital training specifically influences agricultural industries' work preparation in Nigerian universities, or whether male and female students experience its benefits similarly, thus pointing to a significant empirical gap that the present study seeks to address.

Virtual farm management software represents a more specialised category of digital training resources that directly simulates the operational realities of farm and agribusiness management. These platforms, which may incorporate virtual reality, digital twin models, serious games, or simulation dashboards, enable learners to make decisions about cropping systems, livestock management, financial planning, and risk mitigation in immersive or interactive digital environments. Emerging studies demonstrate that such virtual farm tools can substantially enhance agricultural literacy, deepen conceptual understanding, and improve decision-making skills by allowing students to experiment with scenarios that would be costly, risky, or impractical to replicate on real farms. In particular, research on virtual farm simulations and digital twin–based poultry management indicates that these technologies strengthen students' confidence, engagement, and awareness of industry standards, thereby directly supporting work preparation for roles in production, agribusiness, and advisory services. Despite this promise, there is scant evidence from Nigerian agricultural education programmes on the extent to which virtual farm management software is integrated into the curriculum and how its use

shapes students' perceived readiness for work in the agricultural industries, including potential gender-based differences in access or perceived impact. This gap reinforces the need for context-specific inquiry in institutions such as Niger Delta University.

The Nigerian evidence on digital learning in agriculture reveals a complex pattern of opportunity and underutilisation that further justifies a focused investigation in Niger Delta University. Studies on e-learning among agricultural students in public higher institutions have found that, although digital platforms are increasingly available, usage remains relatively low, often due to limited awareness, infrastructural constraints, and insufficient training in effective pedagogical integration. At the same time, research on digital technologies for agriculture in Nigeria underscores their potential to enhance productivity, information access, and innovation when users are adequately trained and supported. Within this national landscape, the Agricultural Education programme at Niger Delta University, with a population of 148 male and female students, offers an important context in which to examine how specific digital training resources—particularly learning management systems and virtual farm management software—relate to students' self-perceived preparation for work in agricultural industries. With an anticipated and achieved retrieval rate of approximately 81 per cent of the student population, the study is positioned to generate robust evidence on patterns of perception across gender and resource type. It therefore becomes pertinent to determine the perceived impact of LMSs and virtual farm management software on agricultural industries' work preparation among these students and to test whether male and female students differ significantly in their responses.

In view of these conceptual, empirical, and contextual considerations, the present study is designed to examine the impact of digital training resources on agricultural industries' work preparation among agricultural education students in Niger Delta University, with particular emphasis on the roles of learning management systems and virtual farm management software and on possible gender differences in students' perceptions.

Statement of the Problem

The contemporary agricultural sector is increasingly driven by digital technologies that influence production, processing, marketing, and management decisions, thereby reshaping the skills and competencies required of its workforce. In this evolving landscape, graduates of agricultural education programmes are expected not only to possess theoretical knowledge of agricultural principles but also to demonstrate proficiency in technology-mediated tools that support planning, decision-making, and farm operations. Within universities, digital training has emerged as a key pathway for cultivating such competencies, with digital training resources providing platforms for flexible learning, simulation of real-world scenarios, and exposure to industry-relevant applications. In the context of Niger Delta University, where agricultural education students are being prepared for diverse roles in agricultural industries, there is a growing expectation that the curriculum and associated learning experiences will effectively harness digital training resources to strengthen students' work preparation and employability in technology-intensive agricultural environments.

Despite the acknowledged importance of digital competencies in modern agricultural practice, there is limited clarity regarding how specific digital training resources currently used in agricultural education programmes translate into concrete improvements in students' readiness for work in the agricultural industries. While learning management systems are widely deployed to organise course content and facilitate communication, and virtual farm management software offers opportunities for simulating real farm and agribusiness operations, there is inadequate empirical evidence on the extent to which these tools actually contribute to students' perceived preparedness for industry demands. More specifically, existing practice within Niger Delta University does not appear to be guided by systematic data on how agricultural education students experience the impact of learning management systems and virtual farm management software on their acquisition of relevant skills, attitudes, and confidence for industry roles. Furthermore, potential differences in the perceptions of male and female students regarding these digital training resources remain underexplored, leaving a gap in understanding that may conceal gender-related inequities in digital learning experiences and outcomes.

If this lack of evidence and clarity persists, there is a risk that agricultural education programmes may continue to invest in and deploy digital tools in ways that do not optimally support agricultural industries' work preparation, thereby undermining the contribution of higher education to the development of a digitally competent agricultural workforce. Graduates who are insufficiently exposed to, or inadequately trained with, learning management systems and virtual farm management software may encounter difficulties in adapting to digitally mediated work environments, limiting their effectiveness, employability, and capacity to drive innovation in the agricultural sector. In addition, unrecognised gender disparities in experiences with digital training resources could perpetuate inequitable access to digital skills and opportunities among male and female students. In light of this context, the goal of this study is to investigate the impact of digital training resources specifically learning management systems and virtual farm management software on agricultural industries' work preparation among agricultural education students in Niger Delta University, with particular attention to possible gender differences in students' perceptions.

Objectives of the Study

The main objective of the study was to examine the Impact of Digital Training Resources on Agricultural Industries' Work Preparation Among Agricultural Education Students in Niger Delta University. The study will specifically determine the impact of:

1. Learning Management Systems on Agricultural Industries' Work Preparation among Agricultural Education Students in Niger Delta University.
2. Virtual Farm Management Software on Agricultural Industries' Work Preparation among Agricultural Education Students in Niger Delta University.

Research Questions

The following research questions was guided the study:

3. What is the impact of Learning Management Systems on Agricultural Industries' Work preparation among Agricultural Education Students in Niger Delta University?
4. What is the impact Virtual Farm Management Software on Agricultural Industries' Work preparation among Agricultural Education Students in Niger Delta University?

Hypotheses

The following hypotheses was tested at 0.05 alpha level of significance:

1. There is no significant difference in the mean response of male and female agricultural education students on the impact of Learning Management Systems on Agricultural Industries' Work Preparation among Agricultural Education Students in Niger Delta University.
2. There is no significant difference in the mean response of male and female agricultural education students on the impact of Virtual Farm Management Software on Agricultural Industries' Work Preparation among Agricultural Education Students in Niger Delta University.

Methodology

The study adopted a descriptive survey research design, which was considered appropriate because it enabled the researcher to obtain systematic, quantifiable data on students' perceptions without manipulating any variables, thereby providing a snapshot of the existing situation among the target population (Creswell & Creswell, 2018). The population of the study consisted of all 148 agricultural education students (male and female) in Niger Delta University for the relevant academic session, and from this population, an effective sample size representing approximately 81% retrieval rate was obtained, comprising all respondents who correctly completed and returned the research instrument. A census approach was initially employed as the sampling technique, in which the entire population of 148 students was adopted for participation, on the premise that including all members of a relatively small and accessible population enhances the representativeness and generalisability of the findings to that group (Etikan & Bala, 2017). The instrument for data collection was a structured questionnaire titled "Digital Training Resources and Agricultural Industries' Work Preparation Questionnaire (DTRA IWPQ)," which was designed by the researcher to elicit information from the respondents on the impact of Learning Management Systems and Virtual Farm Management Software on their preparation for work in agricultural industries. The questionnaire consisted of two sections: Section A gathered demographic information such as gender and level of study, while Section B contained Likert-type items organised under the key variables of the study, with response options on a four-point scale ranging from "Strongly Agree" to "Strongly Disagree," which facilitated the quantification of students' attitudes and perceptions. To establish face and content validity, the draft instrument was subjected to expert review by three university lecturers two in Agricultural Education and one in Measurement and Evaluation who assessed the clarity, relevance, and coverage of the items in relation to the research objectives; their comments were used to refine ambiguous statements, remove overlaps, and ensure that the items adequately represented Learning Management Systems, Virtual Farm Management Software, and Agricultural Industries' Work Preparation as conceptualised in the study (Taherdoost, 2018). The reliability of the instrument was determined using the internal consistency method; the questionnaire was administered to a pilot group of agricultural education students from a similar programme in another institution within the region, and the responses were analysed using Cronbach's alpha, yielding an acceptable reliability coefficient ($\alpha \geq 0.70$), indicating that the items within each subscale measured their respective constructs with sufficient consistency for educational research (Hair et al., 2019). For the main data collection, the researcher, with the assistance of course representatives, personally administered the validated questionnaire to the 148 students during lecture periods and retrieved the completed copies on the spot or within an agreed short interval, which enhanced the response rate and reduced the likelihood of instrument loss or non-return; ethical considerations such as voluntary participation, informed consent, and confidentiality of responses were also observed. The completed questionnaires were coded and entered into the Statistical Package for the Social

Sciences (SPSS), and data analysis was carried out using descriptive statistics (means and standard deviations) to answer the research questions on the perceived impact of Learning Management Systems and Virtual Farm Management Software on agricultural industries' work preparation, while independent samples t-test was employed to test the null hypotheses on gender differences in mean responses at the 0.05 level of significance, thereby aligning the analytical procedures with the objectives and hypotheses of the study (Field, 2018).

Results

The presentation of results begins with a summary of the return rate of the administered questionnaires, followed by demographic information on respondents based on gender. This descriptive data provides essential context for the interpretation of subsequent findings.

Table 1: Questionnaire Distribution and Retrieval Rate

S/N	Description	Frequency	Percentage (%)
1	Number of Questionnaires Retrieved	120	81
2	Number of Questionnaires Not Retrieved	28	19
	Total	**148**	**100**

Source: *fieldwork, 2025*

Table 1 indicates that out of the total 148 questionnaires administered to Agricultural Education students of Niger Delta University, 120 were successfully retrieved and deemed usable for analysis, representing an effective return rate of 81%. A total of 28 questionnaires were either not returned or invalid, accounting for 19% of the total. This high retrieval rate enhances the credibility and representativeness of the findings.

Table 2: Gender Distribution of Respondents

S/N	Gender	Frequency	Percentage (%)
1	Male	66	55
2	Female	54	45
	Total	**120**	**100**

Source: *fieldwork, 2025*

Table 2 reveals that among the 120 respondents, 66 were male students, representing 55%, while 54 were female students, representing 45%. This gender distribution reflects a relatively balanced representation and allows for meaningful gender-based comparisons in the analysis of digital training resource impacts.

Research Question 1: What is the impact of Learning Management Systems on Agricultural Industries' Work preparation among Agricultural Education Students in Niger Delta University

Table 3: Mean and Standard Deviation Analysis of the Impact of Learning Management Systems (LMS) on Agricultural Industries' Work Preparation

S/N	Item (LMS Component)	Male		Female		Total		Decision
		$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	

1	Structured content sequencing and syllabus mapping align modules with industry-relevant competencies.	3.42	0.57	3.36	0.60	3.39	0.58	Agree
2	Flexible access and scheduling support timely engagement with learning tasks.	3.35	0.61	3.27	0.64	3.31	0.62	Agree
3	Assessment tools and timely feedback develop professional accountability.	3.28	0.65	3.19	0.70	3.24	0.67	Agree
4	Collaborative discussion forums and peer support enhance teamwork and communication.	3.31	0.59	3.24	0.62	3.28	0.60	Agree
5	Analytics and progress-tracking promote self-regulation and planning.	3.22	0.68	3.15	0.72	3.19	0.70	Agree
6	Integration of industry resources and multimedia improves relevance and authenticity.	3.38	0.54	3.30	0.58	3.34	0.56	Agree
7	Mobile accessibility and notifications sustain continuity of learning off-campus.	3.29	0.62	3.21	0.66	3.25	0.64	Agree
	Grand Mean / SD	**3.32**	**0.61**	**3.25**	**0.65**	**3.29**	**0.62**	**Agree**

Keys: cut off mean = 2.50, Total Respondents = 120, Male=66 and Female = 54

The result in Table 3 indicates that the overall perceptions of the LMS as a vehicle for industry-oriented work preparation were positive across all seven components, with a Grand Total Mean of 3.29 (SD = 0.62) indicating stable agreement among respondents. The highest total mean emerged for structured content sequencing and syllabus mapping (M = 3.39), suggesting that students recognised the value of coherent, industry-aligned curriculum organisation in cultivating workplace-ready knowledge. The integration of industry resources and multimedia (M = 3.34) also scored prominently, implying that exposure to authentic materials such as standards, case media, and tool demonstrations contributes meaningfully to preparedness. While still above the agreement threshold, analytics and progress-tracking recorded the lowest total mean (M = 3.19), indicating comparatively less perceived benefit from self-monitoring features; this may reflect variability in how lecturers use analytics for formative guidance or how students interpret dashboards for self-regulation. Across all items, male means were marginally higher than female means (differences ~0.06–0.09), but dispersion remained moderate (Total SDs ≈ 0.56–0.70), suggesting broadly convergent experiences. Taken together, the pattern indicates that foundational LMS affordances coherent structure, flexible access, assessment and feedback, collaboration, analytics, integration of industry resources, and mobile continuity are perceived by students as enabling conditions for agricultural industries' work preparation. These descriptive results justify the subsequent inferential tests on gender differences to examine whether the observed mean gaps are statistically significant.

Research Question 2: What is the impact Virtual Farm Management Software on Agricultural Industries' Work preparation among Agricultural Education Students in Niger Delta University?

Table 4: Mean and Standard Deviation Analysis of the Impact of Virtual Farm Management Software on Agricultural Industries' Work Preparation

S/N	Item (Virtual Farm Management Software Component)	Male		Female		Total		Decision
		$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	
1	Realistic simulation of production systems mirrors industry operations.	3.18	0.66	3.06	0.70	3.13	0.68	Agree
2	"What-if" decision scenarios build strategic reasoning and problem-solving.	3.12	0.70	3.00	0.74	3.07	0.72	Agree
3	Financial planning modules (budgeting, cost–benefit, cashflow) improve business acumen.	3.09	0.72	2.96	0.76	3.03	0.74	Agree
4	Data entry and digital record-keeping train compliance and traceability.	3.20	0.65	3.08	0.69	3.15	0.67	Agree
5	Risk-management features (weather, pests, diseases) develop adaptive responses.	3.14	0.69	3.02	0.73	3.09	0.71	Agree
6	Performance dashboards and analytics aid evidence-based decisions.	3.11	0.71	2.98	0.75	3.05	0.73	Agree
7	Alignment with industry standards and good agricultural practices enhances readiness.	3.16	0.67	3.05	0.71	3.11	0.69	Agree
	Grand Mean / SD	**3.14**	**0.69**	**3.02**	**0.73**	**3.09**	**0.70**	**Agree**

Keys: cut off mean = 2.50, Total Respondents = 120, Male=66 and Female = 54

The result in Table 4 indicates that the Perceptions of virtual farm management software were consistently favourable, with a Grand Total Mean of 3.09 (SD = 0.70) indicating agreement that simulation-based tools support work preparation. The strongest endorsement pertained to decision-scenario training (M = 3.15 for data entry/record-keeping and M = 3.15 for decision scenarios; the highest single item was decision-making scenarios at M = 3.15, closely followed by realistic simulation at M = 3.13 and alignment with standards at M = 3.11), underscoring the perceived value of hands-on digital practice for strategic reasoning, operational compliance, and standard-driven performance. Financial planning and performance analytics, although positively rated, exhibited comparatively lower means (M = 3.03 and M = 3.05, respectively) and slightly higher dispersion (Total SDs ≈ 0.73–0.74), which may indicate unequal prior exposure or differences in the instructional emphasis placed on enterprise management functions. As with the LMS results, male averages exceeded female averages across all items (differences ~0.11–0.13), but the standard deviations show overlapping variability between groups, motivating the planned inferential tests to determine whether these descriptive gaps reflect statistically significant differences. On balance, students perceived that virtual farm software through realism, scenario-based decision-making, financial planning, digital record-keeping, risk management, and dashboard analytics contributes to readiness for roles across the agricultural value chain.

Test of Hypotheses

Hypothesis One: *There is no significant difference in the mean response of male and female agricultural education students on the impact of Learning Management Systems on Agricultural Industries' Work Preparation among Agricultural Education Students in Niger Delta University.*

Table 5: t-test analysis of the *mean response of male and female agricultural education students on the impact of Learning Management Systems on Agricultural Industries' Work Preparation.*

Group	N	Mean	SD	df	t-cal	t-crit	p-value	Decision
Male	66	3.32	0.61	118	0.64	1.98	0.52	NS
Female	54	3.25	0.65					

NS = Not Significant at 0.05 alpha level

The computed *t*-value of 0.64 is less than the critical *t*-value of 1.98 at 118 degrees of freedom, and the corresponding *p*-value of 0.52 is greater than 0.05. Therefore, the null hypothesis is retained. This result implies that there is no statistically significant difference between male and female students in their perception of the impact of Learning Management Systems on their preparation for work in agricultural industries. Although males had a slightly higher mean score (3.32) than females (3.25), this difference was not large enough to suggest a gender-based disparity in experience or exposure. This suggests that the LMS is equally accessible and impactful across genders within the context of the university's agricultural education programme.

Hypothesis Two: *There is no significant difference in the mean response of male and female agricultural education students on the impact of Virtual Farm Management Software on Agricultural Industries' Work Preparation among Agricultural Education Students in Niger Delta University.*

Table 6: *t-test analysis of the mean response of male and female agricultural education students on the impact of Virtual Farm Management Software on Agricultural Industries' Work Preparation*

Group	N	Mean	SD	df	t-cal	t-crit	p-value	Decision
Male	66	3.14	0.69	118	0.91	1.98	0.36	NS
Female	54	3.02	0.73					

NS = Not Significant at 0.05 alpha level

The analysis yielded a *t*-calculated value of 0.91, which is less than the critical value of 1.98 at 118 degrees of freedom. The *p*-value of 0.36 exceeds the 0.05 level of significance. Hence, the null hypothesis is accepted. This indicates that there is no significant gender-based difference in the way male and female students perceive the impact of virtual farm management software on their readiness for industry work. Despite a modest numerical difference in mean scores (3.14 for males and 3.02 for females), the variance

does not reflect a statistically meaningful disparity. Thus, both male and female students reported comparable experiences and benefits from the use of simulation software in relation to their industry preparation.

Discussion of Findings

This section provides a detailed interpretation of the results of the study by addressing each research question alongside its corresponding hypothesis. The findings are compared with relevant empirical studies to determine alignment or divergence in scholarly discourse. The aim is to situate the present results within broader academic and practical contexts in digital agricultural education.

Research Question 1:

What is the impact of Learning Management Systems on Agricultural Industries' Work Preparation among Agricultural Education Students in Niger Delta University?

The findings showed that both male and female students agreed that Learning Management Systems (LMSs) significantly support their preparation for work in agricultural industries. The Grand Mean score of 3.29 (SD = 0.62) demonstrates a high level of perceived effectiveness across various LMS components such as structured content delivery, multimedia integration, assessment tools, collaboration forums, and progress-tracking features. This outcome aligns with the work of Obielodan et al. (2020), who found that LMS platforms enhanced student engagement and promoted independent learning among agriculture undergraduates in South-West Nigeria. Similarly, Olaniran and Adebayo (2021) highlighted that LMSs improve students' cognitive and affective learning outcomes in applied agricultural courses when instructors adopt an intentional pedagogical approach.

Furthermore, the absence of a significant gender-based difference in responses ($t = 0.64$, $p = .52$) suggests that male and female students have equitable experiences with LMSs, a finding consistent with the study of Etim and Ibekwe (2022), who reported no significant gender disparities in the perceived usefulness of LMSs among students in science-based faculties in Nigerian universities. This implies that the technological environment at Niger Delta University is not only accessible but also inclusive, ensuring that all learners benefit from its affordances in preparing for the demands of the agricultural sector. The findings reinforce the growing consensus that LMSs when well-integrated serve as foundational digital platforms that facilitate flexible, engaging, and industry-relevant education, thereby positioning students for meaningful roles in agricultural value chains.

Research Question 2:

What is the impact of Virtual Farm Management Software on Agricultural Industries' Work Preparation among Agricultural Education Students in Niger Delta University?

The results indicate that Virtual Farm Management Software (VFMS) is positively perceived by students as a vital digital tool that enhances their readiness for agricultural work. With a Grand Mean of 3.09 (SD = 0.70), students affirmed that features such as virtual simulations of production systems, financial planning modules, risk management dashboards, and data entry platforms contributed meaningfully to their understanding of practical farming and agribusiness operations. These findings corroborate the study by Ibrahim et al. (2019), which found that virtual agricultural environments improved students' decision-making skills and boosted confidence in farm planning and resource management.

In a more recent investigation, Aliyu et al. (2022) observed that students who engaged in digital farm simulations demonstrated better retention of operational strategies and an enhanced ability to assess agricultural risks, especially in climate-sensitive crop production. Moreover, like in the LMS results, the statistical test for gender differences ($t = 0.91$, $p = .36$) showed no significant disparity, indicating that both male and female students benefit comparably from VFMS tools. This finding is supported by Nwankwo and Uzochukwu (2020), who asserted that when provided equal access to digital simulation environments, students across gender identities exhibit similar competence gains in applied agricultural tasks.

The implications of these findings are important for curriculum developers and policymakers. As agricultural industries become more digitised, the demand for graduates proficient in software-based farm management will increase. By integrating virtual tools into practical courses, universities like Niger Delta University are equipping students with transferable skills applicable across production, advisory, and agribusiness roles, thereby narrowing the gap between academic preparation and labour market expectations.

Conclusion

This study examined the impact of digital training resources on agricultural industries' work preparation among Agricultural Education students in Niger Delta University, focusing specifically on two digital tools: Learning Management Systems (LMSs) and Virtual Farm Management Software (VFMS). The findings revealed that both LMSs and VFMSs are perceived by students as

effective in enhancing their readiness for roles in the agricultural sector. LMSs were valued for their structured content delivery, flexibility, assessment features, and integration of industry-relevant resources, while VFMSs were appreciated for simulating real-life farming scenarios, enabling strategic decision-making, and fostering business planning skills. Importantly, no statistically significant differences were found between male and female students in their responses, indicating that the perceived benefits of digital training resources are gender-inclusive within this educational setting.

These results contribute meaningfully to the discourse on digital transformation in agricultural education, highlighting that well-integrated digital training tools can bridge the gap between theoretical knowledge and practical, industry-specific competencies. By reinforcing the relevance of digital engagement in learning, institutions such as Niger Delta University can foster a digitally competent graduate workforce, better prepared for the complexities of modern agricultural industries. The absence of gender-based disparities in perceived impact further suggests that existing digital systems are equitably accessible and provide uniform learning opportunities across the student population.

Recommendations

Based on the study's specific objectives, the following recommendations are proposed:

1. University management and course lecturers should strengthen the pedagogical integration of LMSs by embedding real-life agricultural case studies, interactive multimedia, and collaborative projects into course modules. This will deepen students' industry-aligned learning and further reinforce their readiness for agricultural work environments.
2. It is recommended that the Faculty of Agriculture increase access to and training in the use of virtual farm management software. Course instructors should design simulation-based assignments and assessments that require students to engage in scenario-based planning, budgeting, and decision-making reflective of actual farm conditions.
3. Although no significant gender difference was found, institutional support should continue to ensure inclusive access to digital training resources through awareness campaigns, mentorship, and tailored digital literacy workshops that target both male and female students equally.

By implementing these recommendations, Niger Delta University and similar institutions can optimise the use of digital training resources to prepare agricultural education students for the demands of the 21st-century agricultural workforce, ultimately contributing to national food security, employment generation, and rural transformation.

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