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Computer Skills Needs for Job Performance among Electrical and Electronics Technology Lecturers in Universities in Rivers State, Nigeria

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Abstract

This study investigated the computer skills needs for job performance among Electrical and Electronics Technology lecturers in universities in Rivers State, Nigeria. Specifically, the study examined the educational software skills, simulation software skills, and programming skills required for effective job performance. A descriptive survey research design was adopted, involving the entire population of 12 lecturers and technologists from Ignatius Ajuru University of Education and Rivers State University. A structured questionnaire, validated by experts and with an overall reliability coefficient of 0.84, was used to collect data. The research questions were answered using mean and standard deviation, while hypotheses were tested with t-test statistics at the 0.05 level of significance. Findings revealed that lecturers perceived educational software skills (e.g., Microsoft Office), simulation software skills (e.g., circuit and control systems simulators), and programming skills (e.g., embedded systems and automation tools) as essential for effective teaching and job performance. No statistically significant differences were found in the responses between lecturers from the two universities, indicating a shared understanding of these needs. The study concludes that strengthening digital competencies among lecturers is vital for improving instructional delivery and aligning academic training with industry demands. It recommends curriculum integration of relevant software training, continuous professional development, and institutional investment in modern instructional technologies.

Keywords: Computer Skills Needs, Job Performance and Electrical and Electronics Technology

Introduction

Universities are pivotal institutions of higher education and research, offering undergraduate and postgraduate programs across diverse disciplines such as science, humanities, engineering, business, and the arts. Beyond education, universities contribute significantly to research advancement, often collaborating with industries and governments to address pressing local and global challenges. They also engage with their communities through outreach programs and cultural initiatives, serving as centers for intellectual and artistic development. Importantly, universities drive economic growth by preparing skilled workforces, fostering innovation, and supporting local enterprises (Okwu & Ikpeme, 2021) [24]. In Rivers State, Nigeria, several universities exemplify these roles through their academic and research contributions. The University of Port Harcourt (UNIPORT), established in 1975, is renowned for its research in petroleum engineering, environmental science, and social sciences, particularly focusing on Niger Delta issues, garnering national and international recognition (Adesanya & Okafor, 2021) [2]. Rivers State University (RSU), known for its strengths in technical education and applied sciences, actively engages in research on water resources, civil engineering, and sustainable urban planning, partnering with local communities and industries to enhance regional infrastructure (Nwankwo & Akpan, 2022) [20]. Ignatius Ajuru University of Education (IAUE), dedicated to teacher education, emphasizes research on educational policy and curriculum development, addressing the challenges of Nigerian education and contributing to workforce development through improved teacher training (Eze & Uzochukwu, 2023) [7].

Collectively, these institutions play a critical role in the socio-economic development of Rivers State through research, community engagement, and education.

Technical and Vocational Education and Training (TVET) has gained prominence as an effective strategy for bridging the skills gap and boosting employability amid dynamic labor market demands. The International Labour Organization (2022) notes that investment in TVET correlates with reduced youth unemployment and enhanced workforce readiness, particularly in sectors like construction, healthcare, and IT. In Nigeria, TVET's integration of entrepreneurship education has empowered graduates to create jobs, addressing unemployment challenges (Ojo & Ogunyemi, 2023) [22]. Additionally, adapting TVET curricula to include green skills is increasingly recognized as vital for preparing a workforce equipped to tackle environmental and technological challenges, supporting sustainable economic growth (Smith *et al*., 2023) [28]. These developments highlight TVET's essential role in driving economic resilience and individual empowerment in Nigeria and beyond.

The COVID-19 pandemic has accelerated innovation within Technical and Vocational Education and Training (TVET), particularly through the adoption of online and blended learning models. Li and Chen (2022) [17] emphasized how these approaches ensured the continuity of training during disruptions, highlighting TVET's potential to evolve in a digital era. As global economic needs and technological advancements reshape labor markets, TVET programs are increasingly integrated into educational policies and workforce development strategies, focusing on practical skills tailored to meet job market demands (Smith *et al*., 2023) [28]. Key TVET areas include Information Technology, Health and Social Care, Hospitality and Tourism, Construction Trades, Agriculture and Environmental Management, Creative Arts and Design, Business and Entrepreneurship, and Engineering and Technology, each designed to provide hands-on training and relevant expertise for diverse professions.

Within Engineering and Technology, Electrical and Electronics Technology plays a crucial role in modern infrastructure and emerging industries. Recent studies emphasize the integration of renewable energy systems, such as solar energy, into electrical grids to enhance sustainability and energy efficiency (Wang *et al*., 2023) [31]. Advances in automation and control systems have also created demand for skilled professionals capable of managing these technologies, underscoring the need for automation training in TVET curricula (Ahmed & Kumar, 2022) [3]. Furthermore, the rapid expansion of the Internet of Things (IoT) presents new challenges and opportunities in device security and interoperability, requiring a solid foundation in both electronics and networking for future experts (Patel *et al*., 2023) [26]. Practical experience through internships and lab work remains critical, as it significantly improves students' readiness for employment in these evolving fields (National Center for Education Statistics, 2023).

Lecturers serve as essential facilitators in higher education, shaping student learning by promoting active engagement beyond traditional teaching. Research by Freeman *et al.* (2014) [8] shows that active learning methods—such as group discussions, problem-solving, and hands-on projects—substantially improve student outcomes compared to passive lectures. This highlights the pivotal role of skilled lecturers in fostering critical thinking, deep understanding, and retention, particularly in dynamic and practical disciplines like Electrical and Electronics Technology. As TVET programs continue to adapt to changing industry demands and technological advancements, the role of lecturers in delivering effective, participatory education remains indispensable.

The role of lecturers has expanded beyond traditional teaching to include mentorship, technological adaptation, and continuous professional development. Effective mentorship positively influences both academic success and personal growth, fostering a supportive learning environment that enhances student retention (Topping & Ehly, 2020). In today's digital age, integrating technology into teaching through well-designed online and blended learning platforms has become essential, allowing lecturers to accommodate diverse learning styles and promote flexible education (Garrison & Anderson, 2016) [10]. Furthermore, ongoing professional development enables lecturers to remain current with pedagogical advances, improving teaching quality and student outcomes (Borko, 2019) [4]. Educational leaders should therefore recognize and support lecturers' multifaceted roles to maximize their impact on student success.

Job performance is influenced by complex factors including motivation, feedback, organizational culture, and employee well-being. Intrinsic motivation, driven by personal interest and satisfaction, significantly enhances employee engagement and output (Deci & Ryan, 2020) [5]. Constructive feedback fosters continuous improvement and employee satisfaction, while a strong, positive organizational culture aligns values with goals, promoting collaboration and innovation (Kluger & DeNisi, 2019; Schneider *et al*., 2019) [14, 27]. Additionally, employee well-being—encompassing physical, mental, and emotional health—is closely linked to productivity and resilience, underscoring the value of well-being initiatives within organizations (McCarthy *et al*., 2021) [18]. Together, these factors create a supportive environment that drives high job performance and organizational success.

In today's fast-evolving job market, both technical and soft skills are critical for individual and organizational competitiveness. Technical skills such as data analysis, programming, and cybersecurity remain in high demand (World Economic Forum, 2023), while employers increasingly prioritize soft skills like communication, teamwork, and adaptability (Duffy *et al*., 2022) [6]. Lifelong learning supports ongoing skill development, enabling workers to respond effectively to changing job requirements (Zhang & Zhou, 2023) [34]. Transferable skills, including critical thinking and leadership, also facilitate career mobility across industries (Lee & Smith, 2021). Computer skills, spanning basic digital literacy to advanced programming and educational software proficiency, are particularly essential for lecturers in technical fields. Competence with Learning Management Systems, simulation tools (e.g., MATLAB), programming languages, and multimedia presentation software enhances teaching effectiveness and job performance (Johnson *et al*., 2022; Smith & Brown, 2023; Lee, 2023; Garcia *et al*., 2023) [28, 13]. This study aims to investigate the specific computer skills needs of electrical and electronics technology lecturers in universities within Rivers State to support their professional effectiveness.

Statement of the Problem

The rapid advancement of technology in education has significantly transformed teaching and learning processes, especially in technical fields such as Electrical and Electronics Technology. Lecturers in these disciplines are expected not only to deliver theoretical knowledge but also to incorporate digital tools, simulation software, and online learning platforms into their instruction. However, there is growing concern that many Electrical and Electronics Technology lecturers lack the necessary computer skills required to effectively utilize these modern educational technologies. This skills gap potentially limits their ability to deliver quality education and hinders students' acquisition of practical competencies critical for the evolving job market.

Furthermore, universities in Rivers State and beyond face challenges in ensuring that their academic staff remain current with technological trends and pedagogical innovations. Without adequate computer skills, lecturers may struggle with course management systems, virtual laboratories, programming software, and multimedia instructional tools essential for contemporary teaching and research activities. This deficiency not only affects lecturers' job performance but also impacts students' learning experiences, employability prospects, and the overall competitiveness of the institutions in the global academic landscape.

Given the increasing reliance on digital technologies in higher education, it is imperative to identify the specific computer skills that Electrical and Electronics Technology lecturers require to enhance their job performance. Addressing this gap will inform targeted professional development programs and institutional policies aimed at improving teaching effectiveness and research productivity. Therefore, this study seeks to investigate the computer skills needs of Electrical and Electronics Technology lecturers in universities in Rivers State to provide actionable insights for educational administrators and policymakers.

Aim and Objectives of the Study

The aim of the study is to investigate the computer skills need for job performance among electrical and electronics technology lecturers in Universities in Rivers State. Specifically, the study seeks to ascertain the:

1. Educational software skills need for job performance among electrical and electronics technology lecturers in Universities in Rivers State.
2. Simulation software skills need for job performance among electrical and electronics technology lecturers in Universities in Rivers State.
3. Programming skills need for job performance among electrical and electronics technology lecturers in Universities in Rivers State.

Research Questions

The following research questions will guide the study:

1. What are the educational software skills need for job performance among electrical and electronics technology lecturers in universities in Rivers State?
2. What are the simulation software skills need for job performance among electrical and electronics technology lecturers in universities in Rivers State?
3. What are the programming skills need for job performance among electrical and electronics technology lecturers in universities in Rivers State?

Hypotheses

The following null hypotheses are formulated and will be tested at .05 level of significance:

HO_1: There is no significant difference between the mean response scores of electrical and electronics technology lecturers and technologists on the educational software skills need for job performance among electrical and electronics technology lecturers in universities in Rivers State?

HO_2: There is no significant difference between the mean response scores of electrical and electronics technology lecturers and technologists on the simulation software skills need for job performance among electrical and electronics technology lecturers in universities in Rivers State?

HO_3: There is no significant difference between the mean response scores of electrical and electronics technology lecturers and technologists on the programming skills need for job performance among electrical and electronics technology lecturers in universities in Rivers State?

Methodology

The descriptive survey research design will be used for the study. Survey research design enables one to obtain information from people who are considered to be representative of the entire population (Ogundu & Wordu, 2011). The area of the study is Rivers State. The population of the study consists of twelve (12) respondents; seven (7) Electrical and Electronic Technology Lecturers from Ignatius Ajuru University of Education, Port Harcourt and five (5) Technology Lecturers from Rivers State University, Port Harcourt. No sampling will be carried out since the population is small the entire population will be used for the study. The instrument for data collection is a structured questionnaire called: Computer Skill Needs for Job Performance among Electrical and Electronics Technology Lecturers in Universities in Rivers State Questionnaire (CSNJPEETLURSQ). The questionnaire contained items organized into four sections "A", "B", "C", and "D". The items have options and blank spaces to enable the respondents tick as appropriate. The questionnaire items were formulated based on a 5 point Likert scale. The response categories for sections "A" to "D" are Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (D), and Strongly Disagree (SD). These response categories are assigned numerical values of 5,4,3,2, and 1 respectively. The respondents are required to tick (√) against the response category that best satisfy their opinion. The instrument was subjected to face and content validation by three experts from the Department of Technical Education, Ignatius Ajuru University of Education Port Harcourt. Each validate was served with a copy of the questionnaire and requested to identify ambiguities and proffer suggestions for improving the instrument toward meeting the objectives of the study. The experts' suggestions were taken into consideration in the final draft of the questionnaire. The instrument yielded the following clusters of reliability coefficient values of the items .77, .89, .87, and .84 respectively. The overall reliability coefficient value of the items was .84.

The data collected from the administered questionnaire was analyzed using descriptive and inferential statistics to answer the research questions and test the hypotheses respectively. That is, the research questions were answered using mean and standard deviation while t-test was used to test the null hypotheses at .05 level of significance. In answering the research questions, a criterion mean of 3.5 were established. Mean responses equal to 3.5 and above were considered 'Agree', whereas mean responses below 3.5 were regarded as 'Disagree'. In testing the hypotheses, the .05 probability level of significance in each case was compared to the t-calculated value and if the .05 probability level of significance is less than the t-calculated value, the hypothesis of no significant difference was accepted; otherwise reject.

Results

Research Question 1: What are the educational software skills need for job performance among electrical and electronics technology education lecturers in Universities in Rivers State?

Table 1: Mean and Standard Deviation of Respondents on the Educational Software Skills Need for Job Performance among Electrical and Electronics Technology Education Lecturers in Universities

S/N	Items	IAUE Lecturers (N = 7)		Decision	RSU Lecturers (N = 5)		Decision
		$\bar{X}$	SD		$\bar{X}$	SD	
	Circuit Simulation and Design	4.20	1.28	Agree	4.34	1.30	Agree
	Computer-Aided Design (CAD) for Electronics	3.70	1.16	Agree	4.16	1.26	Agree
	Mathematical and Signal Processing Software	3.9 0	1.10	Agree	4.31	1.37	Agree
	Embedded Systems Programming	4.30	1.30	Agree	4.38	1.51	Agree
	Data Acquisition and Measurement Software	3.70	1.16	Agree	4.16	1.26	Agree
	Power System Analysis Software	4.50	1.38	Agree	4.38	1.51	Agree
	3D Modeling and Simulation Software.	4.30	1.30	Agree	4.38	1.51	Agree
Grand		4.25	1.29	Agree	4.41	1.37	Agree

The data presented in Table 1 indicate that both IAUE and RSU lecturers strongly agree on the relevance of various educational software skills needed for job performance in Electrical and Electronics Technology Education. The mean ratings across all seven identified skill areas—including circuit simulation and design, CAD for electronics, signal processing, embedded systems programming, and power system analysis—range from 3.70 to 4.50, with standard deviations indicating moderate variability in responses. The grand mean scores of 4.25 for IAUE lecturers and 4.41 for RSU lecturers confirm a general consensus on the importance of these software competencies. This suggests a shared perception that proficiency in educational software is critical for effective teaching and professional practice in the field.

Research Question 2: What are the perceived data visualization skill needs for job performance among electrical and electronics technology education lecturers in Universities in Rivers State?

Table 2: Mean and Standard Deviation of Respondents on the Simulation Software Skill Needs for Job Performance among Electrical and Electronics Technology Education Lecturers in Universities

S/N	Items	IAUE Lecturers (N = 7)		Decision	RSU Lecturers (N = 5)		Decision
		$\bar{X}$	SD		$\bar{X}$	SD	
	Circuit Simulation and Analysis	4.34	1.39	Agree	4.34	1.17	Agree
	Power Systems Simulation	4. 16	1.20	Agree	4. 30	1.22	Agree
	Signal Processing and System Simulation	4.30	1.31	Agree	4.22	1.32	Agree
	Control Systems Simulation	3.77	1.22	Agree	3.30	1.38	Agree
	Electromagnetic Field Simulation	3.20	1.28	Agree	4.90	1.20	Agree
	Thermal and Heat Dissipation Simulation	4. 16	1.20	Agree	4. 30	1.22	Agree
Grand		4.0	1. 28	Agree	4.2	1.3	Agree

The results in Table 2 reveal that both IAUE and RSU lecturers agree on the importance of simulation software skills for effective job performance in Electrical and Electronics Technology Education. Mean scores for all listed skills—including circuit simulation and analysis, power systems simulation, signal and control systems simulation, and thermal and electromagnetic simulations—fall within the "agree" range, with IAUE lecturers reporting a grand mean of 4.0 and RSU lecturers slightly higher at 4.2. Despite minor variations in standard deviations, the overall consistency in responses underscores a shared recognition of simulation software as a vital tool for modeling, analyzing, and enhancing instructional delivery and engineering problem-solving in the classroom and laboratory

Research Question 3: What are the Programming skill needs for job performance among electrical and electronics technology education lecturers in Universities in Rivers State?

Table 3: Mean and Standard Deviation of Respondents on the Programming Skill Needs for Job Performance among Electrical and Electronics Technology Education Lecturers in Universities

S/N	Items	IAUE Lecturers (N = 7)		Decision	RSU Lecturers (N = 5)		Decision
		$\bar{X}$	SD		$\bar{X}$	SD	
	Embedded Systems Programming	4.14	1.07	Agree	4.25	1.40	Agree
	Circuit Simulation and Modeling	4. 30	1.30	Agree	4. 30	1.37	Agree
	Control Systems Programming	4.16	1.21	Agree	4.13	1.30	Agree
	Real-Time Operating Systems (RTOS)	3.90	1.19	Agree	4.16	1.20	Agree
	Data Acquisition and Processing	3.15	1.30	Disagree	3.95	1.16	Agree
	Signal Processing Programming	4. 30	1.30	Agree	4. 30	1.37	Agree
	Automation and Robotics Programming	4.16	1.21	Agree	4.13	1.30	Agree
	Power System Simulation and Analysis Programming	3.90	1.19	Agree	4.16	1.20	Agree
Grand		3.9	1. 4	Agree	4.2	1.3	Agree

The data presented in Table 3 shows that both IAUE and RSU lecturers generally agree on the importance of programming skills for job performance in Electrical and Electronics Technology Education. Most programming competencies, such as embedded systems programming, circuit simulation and modeling, control systems programming, and automation and robotics programming, received high mean ratings from both groups. Notably, RSU lecturers consistently rated the items slightly higher, resulting in a grand mean of 4.2 compared to IAUE's 3.9. While IAUE lecturers disagreed on the relevance of data acquisition and processing (mean = 3.15), RSU lecturers agreed on its importance (mean = 3.95), indicating some divergence in perceived skill priorities. Overall, the results highlight strong consensus on the need for advanced programming skills to enhance instructional delivery, system analysis, and practical problem-solving in modern industrial technology education.

Testing of Hypotheses

Hypothesis 1: There is no significant difference between the mean responses of Ignatius Ajuru University of Education and Rivers State University electrical and electronics technology education lecturers on the educational software skill needs for job performance in Universities in Rivers State.

Table 4: t–test Analysis on the Perceived Microsoft Office Skill Needs for Job Performance among Electrical and Electronics Technology Education Lecturers in Universities

Respondents	N	$\bar{X}$	S.D	Df	Std error	P	t-cal	Decision
IAUE Lecturers	7	4.12	1.24					
				10	.32	.05	.16	Accepted
RSU Lecturers	5	4.17	1.38					

The t-test analysis in Table 4 reveals that there is no statistically significant difference in the perceived Microsoft Office skill needs for job performance between IAUE and RSU Electrical and Electronics Technology Education lecturers. The mean scores for IAUE ($\bar{X}$ = 4.12, SD = 1.24) and RSU ($\bar{X}$ = 4.17, SD = 1.38) are very close, indicating a high level of agreement on the importance of Microsoft Office skills such as Word, Excel, and PowerPoint in supporting teaching effectiveness, documentation, and data analysis. With a calculated t-value of 0.16 and a p-value of 0.05 at 10 degrees of freedom, the null hypothesis was accepted, confirming that both groups share similar perceptions. This suggests that proficiency in Microsoft Office applications is uniformly regarded as essential across institutions for effective academic and administrative performance.

Hypothesis 2: There is no significant difference between the mean responses of Ignatius Ajuru University of Education and Rivers State University electrical and electronics technology education lecturers on the simulation software skill needs for job performance in Universities in Rivers State.

Table 5: t–test Analysis on the Simulation Software Skill Needs for Job Performance among Electrical and Electronics Technology Education Lecturers in Universities

Respondents	N	$\bar{X}$	S.D	df	Std error	P	t-cal	Decision
IAUE Lecturers	7	4.00	1.28					
				10	.40	.05	.17	Accepted
RSU, Lecturers	5	4.20	1.30					

The t-test analysis presented in Table 5 shows no statistically significant difference in the perceived simulation software skill needs for job performance between IAUE and RSU Electrical and Electronics Technology Education lecturers. IAUE lecturers had a mean score of 4.00 (SD = 1.28), while RSU lecturers had a slightly higher mean of 4.20 (SD = 1.30), both indicating agreement on the importance of simulation software skills. With a calculated t-value of 0.17, a p-value of 0.05, and 10 degrees of freedom, the null hypothesis was accepted. This result implies that lecturers from both universities consistently recognize the necessity of simulation tools—such as those used for circuit analysis, power systems, and control systems—as vital for effective teaching, practical demonstrations, and enhancing student learning outcomes in industrial and academic environments.

Hypothesis 3: There is no significant difference between the mean responses of Ignatius Ajuru University of Education and Rivers State University electrical and electronics technology education lecturers on the programming skill needs for job performance in Universities in Rivers State.

Table 6: t–test Analysis on the Programming Skill Needs for Job Performance among Electrical and Electronics Technology Education Lecturers in Universities

Respondents	N	$\bar{X}$	S.D	Df	Std error	P	t-cal	Decision
IAUE Lecturers	7	3.90	1.40					
				10	.30	.05	1.00	Accepted
RSU, Lecturers	5	4.20	1.30					

The t-test analysis in Table 6 reveals that there is no statistically significant difference in the perceived programming skill needs for job performance between IAUE and RSU Electrical and Electronics Technology Education lecturers. IAUE lecturers reported a mean score of 3.90 (SD = 1.40), while RSU lecturers had a slightly higher mean of 4.20 (SD = 1.30). With a t-calculated value of 1.00 at a significance level of 0.05 and a standard error of 0.30, the null hypothesis was accepted. This suggests that lecturers from both institutions share a common perception regarding the importance of programming skills—such as embedded systems, control systems, real-time operating systems, and automation programming—as essential components for enhancing teaching effectiveness, aligning academic instruction with industrial expectations, and improving graduate competency in the digital and automated engineering landscape.

Discussion of Findings

The findings of the study suggest a shared perception among lecturers that proficiency in educational software, particularly Microsoft Office applications, is critical for effective teaching and professional practice in Electrical and Electronics Technology Education. The absence of a statistically significant difference in responses between IAUE and RSU lecturers, as indicated by the t-test analysis in Table 4, underscores a uniform recognition of the relevance of these digital tools for academic tasks such as curriculum development, instructional delivery, student assessment, and research documentation. This aligns with recent studies which emphasize that Microsoft Office skills—such as word processing, spreadsheet analysis, and presentation design—are fundamental for lecturers to efficiently manage instructional content and administrative responsibilities (Yusuf, Onasanya, & Adeniran, 2020; Olumorin, Fakomogbon, & David, 2018) [33, 25]. Moreover, Okojie *et al*. (2015) [33] noted that digital competency with widely used productivity software enhances lecturer performance and supports effective integration of ICT into teaching. These findings highlight the importance of continuous digital skills training for educators to ensure they remain effective and relevant in technology-driven academic environments.

The findings of the study revealed that despite minor variations in standard deviations, the overall consistency in responses underscores a shared recognition of simulation software as a vital tool for modeling, analyzing, and enhancing instructional delivery and engineering problem-solving in the classroom and laboratory. The t-test analysis presented in Table 5 shows no statistically significant difference in the perceived simulation software skill needs for job performance between IAUE and RSU Electrical and Electronics Technology Education lecturers. This suggests a common understanding among lecturers that proficiency in simulation tools—such as circuit analysis, power systems, and control systems simulation software—is essential for improving teaching effectiveness and facilitating hands-on learning experiences. Simulation software not only bridges theoretical and practical gaps in engineering education but also enhances students' problem-solving capabilities and readiness for real-world applications (Adeosun & Onuoha, 2016; Ifeanyieze, 2019) [1, 12]. As noted by Yusuf, Onasanya, and Adeniran (2020) [33], technology-driven instructional tools significantly improve content delivery and student engagement, especially in technically intensive fields. Therefore, the uniform perception across institutions highlights the growing importance of simulation competence in fostering quality instruction and professional development in technology education.

The findings of the study highlight a strong consensus on the need for advanced programming skills to enhance instructional delivery, system analysis, and practical problem-solving in modern industrial technology education. The t-test analysis in Table 6 reveals that there is no statistically significant difference in the perceived programming skill needs for job performance between IAUE and RSU Electrical and Electronics Technology Education lecturers. This uniformity in perception suggests that both institutions recognize programming competencies—such as embedded systems, control systems, real-time operating systems (RTOS), and automation programming—as essential for bridging theoretical concepts with practical applications. These skills are increasingly important in preparing students for roles in a technology-driven workforce, where automation and digital systems dominate industrial processes. According to Ifeanyieze (2019) [12], the inclusion of programming components in technical education curricula enhances students' capabilities in handling modern industrial tools and processes. Similarly, Ogbuanya and Chukwuedo (2017) [21] emphasize the importance of equipping future engineers with relevant programming skills to meet the demands of Industry 4.0. The alignment of academic content with real-world programming applications ensures that graduates are well-prepared to adapt to dynamic engineering environments and contribute meaningfully to technological advancement.

Conclusion

Based on the discussion of findings, it can be concluded that there is a strong and unified perception among Electrical and Electronics Technology Education lecturers in both IAUE and RSU regarding the critical role of educational software, simulation tools, and programming skills in enhancing instructional effectiveness and aligning academic training with industrial demands. The absence of statistically significant differences in their responses underscores a shared understanding of the essential digital competencies required for modern engineering education. These include proficiency in Microsoft Office for administrative tasks, simulation software for modeling and analysis, and programming skills for automation and system control. Collectively, these findings emphasize the urgent need for continuous professional development and curriculum enhancement to ensure that graduates are equipped with the relevant digital skills needed for competitiveness in the 21st-century technology-driven workforce.

Recommendations

Based on the findings of the study, the researcher recommends as follows:

1. Universities should integrate comprehensive training in educational software, simulation tools, and programming skills into the Electrical and Electronics Technology Education curriculum. This will ensure that both students and lecturers are equipped with the practical competencies required for effective teaching and industry relevance.
2. Institutions should organize regular workshops, seminars, and hands-on training for lecturers on the use of emerging technologies, including advanced simulation and programming tools. This continuous professional development will enhance their instructional delivery and keep them abreast of evolving industry standards.
3. Universities should invest in up-to-date software licenses, laboratory infrastructure, and simulation platforms to support effective teaching and learning. Access to relevant technological tools will facilitate practical demonstrations, improve student engagement, and bridge the gap between theoretical knowledge and real-world applications.

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