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Digital Technology Utilisation, Practical Training and Industry Skills Gaps in Tertiary Education in Anambra State, Nigeria

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Abstract: Digital transformation is reshaping workplace skill needs, placing greater emphasis on digital competence and practical training for graduate employability and industry readiness. However, concerns persist that tertiary education may not sufficiently translate digital awareness, technological resources, and curriculum provisions into the practical competencies industry requires. The study was motivated by the desire to gain insight into the use of digital technology, the implementation of practical training and the perceived skills gap in the industry in tertiary education in Anambra State, Nigeria. Specifically, the study examined digital technology utilization among the Polytechnic respondents, considered indicators from a neutral perspective, compared the implementation of practical training and curriculum between the University and Polytechnic respondents and explored reasons for gaps in industry skills among the respondents. Structured questionnaires were used to gather primary data: 84 respondents from the University and 116 respondents from the Polytechnic, as well as industry-related responses. The results indicated that there was a high level of awareness among the Polytechnic students of the digital tools ($M = 4.750$, $p < 0.001$) and preference for using them by the students ($M = 4.543$, $p < 0.001$), but not among the lecturers ($M = 2.862$, $p = 0.106$). University–Polytechnic differences were substantial for practical lessons in curricula, $\chi^2(4) = 151.700$, $p < 0.001$, $V = .871$, and practical-class coverage, $\chi^2(4) = 110.332$, $p < 0.001$, $V = 0.743$. Poor access to tools ($M = 4.105$) and outdated/dated digital tools ($M = 4.000$) were significant factors in self-reported skills gaps ($p < 0.001$). The study concludes that the availability of technology needs to be backed by effective use of technology and practical application. It calls for an upgrade of the digital infrastructure and enhancement of hands-on training based on industry requirements.

Keywords: Digital technology utilization; Practical training; Industry skills gap; Curriculum implementation; Tertiary education; Anambra State

Introduction

State The extensive use of digital technologies in teaching, working and manufacturing has changed the skills that are required of school leavers and workers. The business world is becoming more and more digital, and there is a growing need for people who can use digital tools, troubleshoot technology issues, and learn and master new technology applications and turn theoretical information into real-world productivity. The Fourth Industrial Revolution is a period characterized by the transformation of jobs and skills due to automation, data-driven processes, Artificial Intelligence (AI), digital communication and interconnected technologies. Li (2022) found that the projected rate of reskilling is 50% of employees and the 67% increase in the number of important job skills that will change. The findings suggest that only graduates' disciplinary knowledge alone is no longer sufficient to assess tertiary education; other aspects of the graduates' education, such as practical training, digital competence, and the alignment of educational preparation with the requirements of the workplace, need to be taken into account.

Digital technology, therefore, is now playing an important role in teaching and learning. It facilitates access to information, communication, collaboration, assessment, content delivery and flexible learning. The study conducted by Haleem et al. (2022) found 34 applications of digital technologies in education, such as online libraries, distance learning, Learning Management Systems (LMS), teamwork, real-time assessment, and hybrid learning. These benefits can be limited if the level of Information and Communication Technology (ICT) infrastructure, connectivity, teacher training and access are inadequate, or if they are not equal. However, the presence of digital technologies does not ensure that they are used meaningfully in education. Tech knowledge and willingness are required from lecturers, while opportunities for students to apply technologies in learning and practical activities are needed. Another example of the link between digital competence and employability is the fact that digital competence is increasingly being recognized as a key element in job readiness. In the same way, Saidu et al. (2025), explored digital competence and digital skills development using Partial Least Squares Structural Equation Modelling (PLS-SEM) and found that digital skills development significantly predicted digital competence ($\beta = .790$, $p < .001$), while digital competence significantly predicted employability ($\beta = .701$, $p < .001$). The indirect effect was also substantial ($\beta = .553$, $p < .001$), suggesting that digital competence offers an important pathway by which digital skills can contribute to better employability. Another significant area of graduate training is in the practice itself. The inclusion of practical education in the curriculum is not enough; it has to be implemented

regularly and appropriately in effective tertiary education. Practical activities are used to support students' translating of conceptual knowledge to operational competence and give them some experience with tools and procedures closely similar to those found in the workplace. This is particularly important where curriculum provision is not the same as what has actually been implemented at the university level and the polytechnic level, as educational orientations and practical-training arrangements can vary. In the current study, there were significant differences among the respondents from universities and polytechnics with respect to practical training. The inclusion of practical lessons (mean = 4.798) was significantly higher in the universities than in the polytechnics (mean = 2.655), while the percentage of practical classes covered (mean = 4.534) was significantly higher in the polytechnics than in the universities (mean = 2.976). These trends suggest that there is a need to separate formal curriculum provision from actual practical implementation when evaluating preparation for industry.

There is substantial existing evidence that correlates digital competence with educational outcomes and employment outcomes. Based on the analysis of 144 studies, Mhaske et al. (2025) identified four important enablers of workforce readiness: accessible infrastructure, investment in digital skills training, industry-aligned curricula, and institutional collaboration and digital maturity. However, lack of infrastructure, outdated curricula, regulation and limited training opportunities were cited as challenges. In the same manner, Imama et al. (2025) found that the factors that influenced technological adaptation in Vocational Education and Training (VET) were institutional readiness, digital competence of instructors, curriculum integration and industry-education partnerships. The same is true in Nigeria, as evidenced. Nimfel (2022) observed that digital technology skills in teaching and learning Business Education were required to a great extent, with a weighted mean of 3.53. Akudolu and Onyeneke (2022), who specifically examined Anambra State, observed that the digital competencies of Business Education graduates were comparatively low, as cluster means of 2.67, 2.21 and 1.80 were observed on digital foundation skills, digital communication and cloud computing skills, respectively. Similarly, Iyawa and Binitie (2025) noted that the advanced technologies in tertiary institutions were not fully utilized, with Virtual Reality and Artificial Intelligence tools being particularly low and electricity, connectivity, training and institutional support as major constraints.

However, there are indicators that these may be addressed with proper intervention. Adebagbo et al. (2024) reported that focussed practical training significantly enhanced teachers' ability to apply emerging technologies. Low capacity

participants decreased from 86.02% to 10.75% and high capacity increased from 5.38% to 54.84% ($t(92) = 16.77$, $p < .001$); mean scores of the participants increased from 15.81 to 53.23 ($t(92) = 16.77$, $p < .001$). Enakrime et al. (2025) also noted adaptability, reskilling, innovation and effective use of digital technologies as features of academics' experiences. Research conducted elsewhere in the world confirms the link between resources, skills and employability. Tee et al. (2024) found that 99.5% of employers surveyed deemed digital skills as very or extremely important for graduates, and there were significant skill gaps in all five areas of digital competency explored. Gonzales et al. (2025) reported that learning tools were seldom available (weighted mean = 1.87) and the technical skills of the students were less developed (weighted mean = 1.40), and that there were significant positive relationships between the availability of learning tools and the technical skills of the students. All these studies point to a combination of technological resources, teacher competences, hands-on experience, curriculum implementation and institutional support as being required for digital competence.

Although there is growing awareness that digital competence and, in principle, practical training are crucial for graduate employability, there is still a disconnect between the competence set in education and the competence set of contemporary industries. One does not have to be completely devoid of digital technologies or practical application in tertiary institutions, but rather the extent to which the available technologies and educational materials are integrated into the teaching and learning process and practical preparation. The study is justified by the need for empirical evidence which takes into account the utilization of digital technologies, implementation of practical training and the skills gap in industries in an integrated tertiary education environment. Digital literacy, employability, teacher competence, and technology use and/or vocational education have all been studied in isolation and frequently in isolation from the other. In the context of Sub-Saharan Africa higher education studies, Ndibalema (2025) found ICT tools, internet access, students' information literacy and teachers' competence in ICT to be common challenges. The relevance of this is the interplay between digital utilization and the training and practice that takes place, and also the view held by the industry of the skill deficits in graduates in a given local education context. Anambra State is an appropriate context for the investigation since its tertiary institutions have a high number of graduates contributing to the growing technology-oriented labour market. University and Polytechnic experiences of practical training and adjustments to skills gaps identified by the industry in relation to the use of digital technologies

can be used to establish evidence to inform curriculum planning, institutional investment, lecturer development and more effective alignment with industry skills. The study specifically seeks to:

i. Examine digital technology utilization by the respondents from polytechnics in Anambra state;

ii. Identify if there is a significant difference between Polytechnic respondents and the neutral benchmark in their digital technology utilization indicators; and

iii. Analyze the difference in the practice of training and curriculum implementation by the university and Polytechnic respondents in Anambra State;

iv. Evaluate the implementation of the training and curriculum in University and Polytechnic education against the neutral benchmark; and

v. Investigate the perceived causes of the skill gap in the industry in Anambra State.

1.1 Conceptual Framework

The conceptual framework of the study suggests that three general factors, namely: Digital technology utilization, Practical training and curriculum implementation, and Technological-Resource conditions, interact in the industry skills gap. The framework takes a broader perspective on the issue of graduate skills gaps, acknowledging that readiness for the workforce is shaped by a system of education that involves technology availability, use, curriculum development and application.

Digital technology utilization is defined as awareness of digital technology, access to digital technologies, lecturers' knowledge and use of digital technologies, lecturers' willingness to use digital technologies, students' preference for digital tools, and the use of digital technology in academic activities. In a conceptual sense, this illustrates that the availability and awareness of technology is not sufficient to guarantee that technology is used in the classroom for an extended period of time. The second part is application training and curriculum implementation. It covers lecture regularity, practical-lecture regularity and curriculum coverage, inclusion of practical lessons, practical-class coverage and emphasis on practical courses. The framework also separates practical parts that are explicitly described in a curriculum from being put into practice. This difference is reflected in the significant difference between University–Polytechnic in terms of practical lessons covered in the curriculum and practical lessons covered for the practical classes.

The third relates to technological-resource constraints and to the perceived skills gaps in the industry. The most empirical support was for the causes of the skills gap being due to a lack of necessary tools and the use of obsolete digital

technologies, while explanations involving lecturers and students received less empirical support.

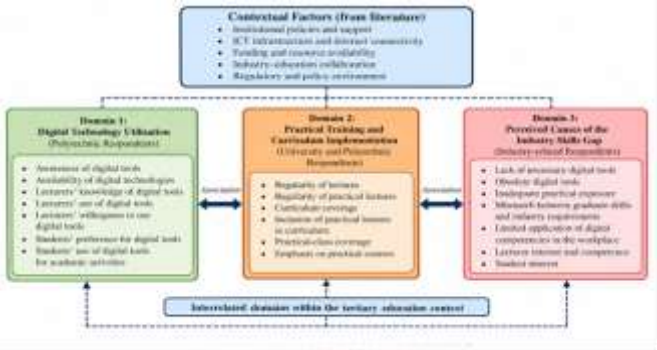


Figure 1. Conceptual Framework Linking Digital Technology Utilization, Practical Training and Perceived Industry Skills Gaps in Tertiary Education

Thus, the conceptual framework addresses three interconnected areas: Polytechnic digital technology utilization, practical training and curriculum implementation, and perceived causes of the industry skills gap. In a wider tertiary-education context, institutional support, ICT infrastructure, funding, and industry–education partnerships and the policy context can be relevant contextual factors for these domains. Mediation, moderation, and causal pathways are not included in the framework as they are not statistically tested. Rather, it offers an associative organization of study variables and interpretation of the observed pattern of digital utilization, practical training implementation and perceived factors of the skills gap in the industry.

2. Materials and Methods

This section presents the research design, data source, analytical processes and statistical framework used to explore digital technology utilization, training and skills shortages in industry.

2.1 Research Design

The study was conducted using a quantitative cross-sectional comparative research design. Considering that this study was undertaken without any attempt to manipulate the study variables, with respondents reporting their experiences and perceptions of the utilization of digital technology in their learning context, curriculum implementation and factors associated with the industry skills gap at a specific point in time, the design was deemed appropriate. The comparative component allowed for comparing differences between practical training and curriculum implementation at the University and Polytechnic level.

The study was designed to be conducted in three related analytical phases. To determine the digital technology utilization, the respondents from Polytechnics were asked about the following indicators: awareness and availability of digital tools, lecturers' knowledge, lecturers' use and willingness to use digital technologies, students' preference for digital tools, and students' use of digital tools for academic assignments, etc. There were 116 respondents for the Polytechnic component. Second, a comparison was made between the practical training and the implementation of the curriculum of 84 university respondents and 116 Polytechnic respondents, which amounted to 200 respondents. The indicators comprised lecture regularity, practical-lecture regularity, curriculum coverage, inclusion of practical lessons, practical-class coverage and emphasis on practical courses. Thirdly, perceptions of causes of the skills gap in the industry were explored through answers to questions on interest in the industry by students and lecturers, availability of required tools, lecturer competence and obsolescence of digital tools. For this component, the average score was around 20, with 19 of the possible observations for necessary-tools. The design was therefore descriptive in nature with the possibility of descriptive evaluation, benchmark and institutional comparison.

2.2 Source of Data Collection

The study employed primary data collected from the survey instrument administered to the relevant respondents in Anambra State in Nigeria. The analytical dataset consisted of responses from the students from the University, as well as responses from the Polytechnic students and the respondents who gave information about the causes of the industry skills gap. The number of students who responded to the question to educational system analysis is 200 with 84 University and 116 Polytechnic students.

Most of the items in the questionnaire were measured on a five-point Likert-type response scale and were structured. The present analysis centred on the utilization of digital technology in Polytechnic, practical training and implementation of the curriculum in the University and Polytechnic, and the perceived causes of the industry skills gap. For digital-technology indicators, awareness, availability, utilization and knowledge of lecturers, willingness to use digital tools, students' preference, and utilization of digital tools for assignments were considered. The indicators for the practical training were related to the regularity of lectures, regularity of practical lectures, coverage of the curriculum, the practical lessons, coverage of the practical lessons, and the emphasis on the practical courses. Since

these items were related to the industry, they evaluated perceived causes of skill gaps such as insufficient and outdated tech support.

2.3 Method of Data Analysis

Descriptive and inferential statistical techniques were used in data analysis. Descriptive statistics included frequency, percentage, mean, standard deviation, standard error and 95% confidence interval, as appropriate. The ratings of the respondents on digital technology use, practical training of digital technology, implementation of the curriculum and perceptions of the cause of the industry skills gap were summarised using mean scores. The neutral point of the five-point response scale was a mean of 3.00. One-sample t-tests were conducted to evaluate whether observed mean ratings were significantly different from the "neutral" rating of 3.00. The test was used individually for digital technology indicators at Polytechnic, practical training indicators at Polytechnic, and perceived causes of the skills shortage in the industry, respectively. The Pearson Chi-square test of independence/homogeneity was used to analyse differences in the distributions of practical training and curriculum responses of University and Polytechnic respondents. Cramér's V was used to measure the extent of institutional differences. The significance of a statistical test was assessed at the 5% level ($\alpha = .05$). The Chi-square results were treated with caution when there was an approximation warning, because some response categories had few observations. The statistical tables were complemented by graphical presentations, which showed important patterns of digital utilisation in education and of practical training, as well as perceived skills-gap factors.

2.4 Analytical Framework

The analysis was organised around three empirical dimensions:

Digital Technology Utilisation → Educational/Practical Processes → Industry Skills Gap

Digital technology utilisation was represented conceptually by awareness, availability, lecturer knowledge and utilisation, lecturer willingness, student preference and academic application. Practical training and curriculum implementation were represented by lecture regularity, practical-lecture regularity, curriculum coverage, practical lessons, practical-class coverage and emphasis on practical courses. The outcome dimension concerned the perceived industry skills gap, particularly resource, technology and human-related explanations.

For each Likert-scale indicator, the sample mean was expressed as:

$$\bar{X} = \frac{\sum_{i=1}^{n} X_i}{n} \quad (1)$$

where X_i represents the score of respondent *i* and *n* represents the number of valid responses.

The one-sample t-statistic was specified as:

$$t = \frac{\bar{X} - \mu_0}{s/\sqrt{n}} \quad (2)$$

where $\bar{X}$ is the observed mean, $\mu_0 = 3$ is the neutral benchmark, *s* is the sample standard deviation and *n* is the valid sample size. An indicator was considered statistically different from neutrality when $p < 0.05$.

Institutional differences in categorical response distributions were assessed using:

$$\chi^2 = \frac{\sum_{i=1}^{r}\sum_{j=1}^{c}(O_{ij} - E_{ij})^2}{E_{ij}} \quad (3)$$

where O_{ij} and E_{ij} denote observed and expected frequencies, respectively. The magnitude of association was evaluated using Cramér's V:

$$V = \sqrt{\frac{\chi^2}{N[min(r,c) - 1]}} \quad (4)$$

where $\chi^2$is the Pearson Chi-square statistic, N is the total sample size and *k* is the smaller number of categories associated with the contingency table dimensions.

The framework was thus built upon descriptive profiling, followed by neutral-benchmark testing, and finally by comparison and assessment between the University and the Polytechnic on the perceived industry skills-gap factors. It was used as an analytical rather than causal approach; therefore, noted differences and associations were not considered as evidence of causation.

3. Results and Discussion

The empirical results of the study on the utilization of digital technology, practical training, implementation of curriculum, and the perceived skills gap in industries in Anambra State are presented and discussed in this section.

3.1 Results of the Analysis

The findings are reported step-wise in order of the research problems studied from Polytechnic digital technology utilization to the institution practical training comparisons and perceived skills-gap factors.

Table 1. Descriptive Statistics for Digital Technology Utilization among Polytechnic Respondents

Digital Technology Indicator	N	Mean	SD	SE	95% CI
Awareness of digital tools	116	4.750	0.435	0.040	4.670–4.830
Availability of digital tools in laboratories/departments	116	4.121	0.934	0.087	3.949–4.292
Lecturers' use of digital tools while teaching	116	3.233	1.016	0.094	3.046–3.420
Lecturers' knowledge of digital tools	116	3.293	1.063	0.099	3.098–3.489
Lecturers' willingness to use digital tools	116	2.862	0.913	0.085	2.694–3.030
Students' preference for digital tools	116	4.543	0.727	0.068	4.409–4.677
Students' use of digital tools for assignments	116	3.000	0.914	0.085	2.832–3.168

Table 1 indicates favourable perceptions of digital technology among Polytechnic respondents. Students' awareness of digital tools had the highest mean score (M=4.750, SD=0.435), with preference for digital tools (M=4.543, SD=0.727) and availability of digital tools (M=4.121, SD=0.934) coming next. Lecturers' knowledge (M=3.293, SD=1.063) and use (M=3.233, SD=1.016) were moderately above the neutral benchmark of 3.00. The students' assignment uses were neutral (M=3.000, SD=0.914), while lecturers' willingness had the lowest mean (M=2.862, SD=0.913). The findings indicate high levels of awareness, availability, and student preference for digital technologies, although overall, these positive results show weaker translation into the willingness and frequency of the lecturers' academic usage of digital technologies in their teaching.

Table 2. One-Sample Tests of Digital Technology Utilization among Polytechnic Respondents

Digital Technology Indicator	Mean	SD	Mean Difference	*t*(115)	*p*	Decision relative to 3
Awareness of digital tools	4.750	0.435	1.750	43.340	<.001	Significantly above

Availability of digital tools	4.121	0.934	1.121	12.924	<.001	Significantly above
Lecturers' use of digital tools	3.233	1.016	0.233	2.467	0.015	Significantly above
Lecturers' knowledge of digital tools	3.293	1.063	0.293	2.969	0.004	Significantly above
Lecturers' willingness to use digital tools	2.862	0.913	−0.138	−1.628	0.106	Not significant
Students' preference for digital tools	4.543	0.727	1.543	22.86	<.001	Significantly above
Students' use for assignments	3.000	0.914	0.000	0.000	1.000	Not significant

Table 2 reveals that some of the digital-technology indicators were statistically significantly different from the neutral number of 3. Awareness produced the strongest positive result (M=4.750, t=43.340, *p*<.001), followed by student preference (M=4.543, t=22.860, *p*<.001) and availability of digital tools (M=4.121, t=12.924, p<.001). Lecturers' knowledge (M=3.293, t=2.969, *p*=.004) and use (M=3.233, t=2.467, *p*=.015) were also significantly above neutrality. On the other hand, the willingness of the lecturers (M=2.862, t=-1.628, *p*=.106) was not significantly different from the benchmark. Students' assignment use was precisely neutral (M=3.000, t=0.000, *p*=1.000). Therefore, Digital awareness and preference seem to be fairly assured, while willingness and assignment-based application are relatively low among respondents.

Table 3: Descriptive Statistics for Practical Training and Curriculum Implementation by Educational System

Practical Training Indicator	University N	University Mean ± SD	Polytechnic N	Polytechnic Mean ± SD
Regularity of lectures	84	3.738 ± 0.995	116	4.086 ± 1.068
Regularity of practical lectures	84	3.726 ± 0.986	116	4.086 ± 1.068
Curriculum coverage	84	2.905 ± 1.178	116	3.009 ± 1.034
Practical lessons in curriculum	84	4.798 ± 0.555	116	2.655 ± 0.866
Practical class periods duly covered	84	2.976 ± 0.864	116	4.534 ± 0.751
Emphasis on practical courses	84	3.083 ± 0.764	116	3.034 ± 0.864

Table 3 shows the differences between University and Polytechnic respondents on the basic aspects of practical training. Practical lessons in the curriculum (M=4.798, SD=0.555) were included more by the University respondents compared to the Polytechnic respondents (M=2.655, SD=0.866). On the other hand, the mean score for the Polytechnic respondents (M=4.534, SD=0.751) was significantly higher than that of the University respondents (M=2.976, SD=0.864). The following parameters also showed similar higher scores for lectures (M=4.086) than for practical lectures (M=3.738) and practical-lecture (M=4.086) regularity than on polytechnic (M=3.738) and polytechnic (M=3.726), respectively. The coverage of the curriculum was somewhat similar (M=3.009) compared to (2.905), and the emphasis on practical courses was virtually the same (M=3.034) compared to (3.083). The descriptive findings therefore suggest that the most substantial institutional contrasts concern the inclusion of practical lessons and their actual classroom implementation.

Table 4: Comparison of Practical Training and Curriculum Implementation between University and Polytechnic Respondents

Indicator	χ^2	df	*p*	Cramér's V	Statistical Decision
Lecture regularity	10.713	4	0.030	0.231	Significant
Practical lecture regularity	11.664	4	0.020	0.241	Significant
Curriculum coverage	16.926	4	0.002	0.291	Significant
Practical lessons in curriculum	151.700	4	<0.001	0.871	Significant
Practical class coverage	110.332	4	<0.001	0.743	Significant
Emphasis on practical courses	5.211	4	0.266	0.161	Not significant

Table 5: One-Sample Tests of Practical Training and Curriculum Implementation against the Neutral Benchmark

Educational System	Indicator	Mean	SD	*t*	df	*p*	Decision relative to 3
University	Lecture regularity	3.738	0.995	6.796	83	<.001	Significantly above
University	Practical lecture regularity	3.726	0.986	6.75	83	<.001	Significantly above
University	Curriculum coverage	2.905	1.178	−0.741	83	0.461	Not significant
University	Practical lessons in curriculum	4.798	0.555	29.689	83	<.001	Significantly above
University	Practical class coverage	2.976	0.864	−0.253	83	0.801	Not significant
University	Emphasis on	3.083	0.764	1.000	83	0.320	Not significant

	practical courses						
Polytechnic	Lecture regularity	4.086	1.068	10.955	115	<.001	Significantly above
Polytechnic	Practical lecture regularity	4.086	1.068	10.955	115	<.001	Significantly above
Polytechnic	Curriculum coverage	3.009	1.034	0.090	115	0.929	Not significant
Polytechnic	Practical lessons in curriculum	2.655	0.866	−4.290	115	<.001	Significantly below
Polytechnic	Practical class coverage	4.534	0.751	22.006	115	<.001	Significantly above
Polytechnic	Emphasis on practical courses	3.034	0.864	0.430	115	0.668	Not significant

Table 4 shows that statistically significant differences in 5 out of the 6 practical-training indicators exist between the institutions. Lecture regularity differed significantly, ($\chi^2(4)=10.713$, $p=0.030$,$V=0.231$), as did practical-lecture regularity, ($\chi^2(4)=11.664$, $p=0.020$, $V=0.241$), and curriculum coverage, ($\chi^2(4)=16.926$, $p=.002$,$V=.291$). Much bigger differences occurred for practical lessons in the curriculum ($\chi^2(4)=151.700$, $p<.001$, $V=.871$), and practical-class coverage ($\chi^2(4)=110.332$, $p<.001$, $V=.743$). However, emphasis on practical courses was not significantly different ($\chi^2(4)=5.211$, $p=.266$, $V=.161$). Therefore, the most evident institutional differences are those related to the implementation and practical delivery of the curriculum. Table 5 presents various trends in the two educational systems. Lecture regularity ($M=3.738$, $t=6.796$, $p<0.001$), practical-lecture regularity ($M=3.726$, $t=6.750$, $p<0.001$), and practical lessons in the curriculum ($M=4.798$, $t=29.689$, $p<0.001$) were significantly beyond neutral. However, not significant was the coverage of curriculum and practical class coverage and emphasis on practical courses. The lecture regularity score ($M=4.086$, $t=10.955$, $p<0.001$), the practical-lecture regularity score ($M=4.086$, $t=10.955$, $p<0.001$), and the practical-class coverage score ($M=4.534$, $t=22.006$, $p<0.001$) were significantly higher than the benchmark scores for Polytechnic respondents. There was a significant neutrality deficit in the practical lessons in the curriculum, with a mean score of $M=2.655$, $t=-4.290$, ($p<.001$), while the curriculum coverage and emphasis on practical lessons

were statistically neutral. These results reinforce differences between reported curriculum provision and practical implementation.

Table 6: Perceived Causes of the Industry Skills Gap

Perceived Cause	N	Mean	SD	95% CI	*t*	*p*	Decision relative to 3
Lack of student interest	20	2.75	0.444	2.542–2.958	−2.517	0.021	Significantly below
Lack of lecturer interest	20	3.5	1.433	2.829–4.171	1.561	0.135	Not significant
Lack of necessary tools in schools	19	4.105	0.875	3.683–4.527	5.504	<.001	Significantly above
Lecturer incompetence	20	3.3	1.218	2.730–3.870	1.101	0.285	Not significant
Obsolete digital tools	20	4	0.973	3.544–4.456	4.595	<.001	Significantly above

Table 6 highlights technology-resource gaps as the most highly endorsed perceived reasons for the industry skills gap. The mean (M=4.105, SD=0.875) for the answer "Lack of necessary tools" was the highest and significantly higher than the neutral mark (t=5.504, p<0.001). Obsolete digital tools were similarly prominent (M=4.000, SD=0.973, t=4.595, p<0.001). Lack of lecturer interest (M=3.500, p=0.135) and lecturer incompetence (M=3.300, p=0.285) both had means above 3.00, but were not significantly different from neutrality. The lowest mean (M=2.750) and the lowest value compared to the benchmark (t=-2.517, p=0.021) were recorded for lack of student interest. Hence, the evidence more strongly supports inadequate and outdated technological resources than lecturer- or student-related explanations for the perceived skills gap.

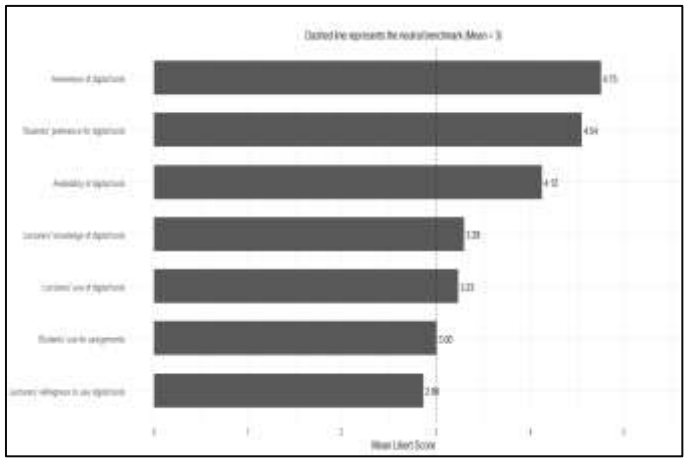


Figure 2. Digital Technology Utilization among Polytechnic Respondents in Anambra State, Nigeria

Figure 2 indicates generally favourable digital-technology conditions among Polytechnic respondents. Awareness of digital tools recorded the highest mean score (M=4.75), followed by students' preference for digital tools (M=4.54) and availability of digital tools (M=4.12). Lecturers' knowledge (M=3.29) and actual use of digital tools (M=3.23) were moderately above the neutral benchmark of 3.00. Students' use of digital tools for assignments was exactly neutral (M=3.00), whereas lecturers' willingness to use digital tools recorded the lowest score (M=2.86). Overall, the pattern suggests strong awareness and preference but comparatively weaker integration of available technologies into teaching and learning activities.

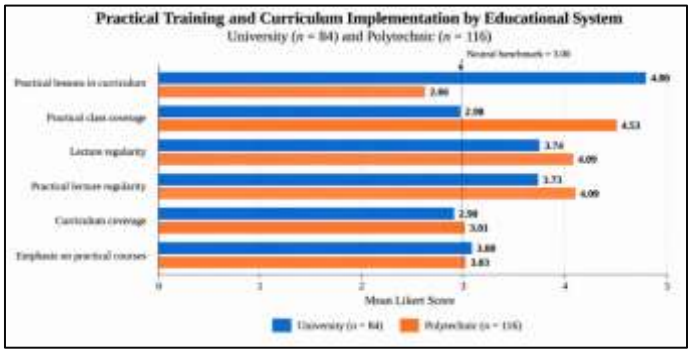


Figure 3. Practical Training and Curriculum Implementation by Educational System

Figure 3 reveals notable differences in practical training and curriculum implementation between University and Polytechnic respondents. Universities recorded substantially higher inclusion of practical lessons in the curriculum (M=4.80) than Polytechnics (M=2.66). Conversely, Polytechnics reported considerably greater practical-class coverage (M=4.53) than Universities (M=2.98). Polytechnic respondents also reported higher lecture regularity (M=4.09) versus

(3.74) and practical-lecture regularity (M=4.09) versus (3.73). Curriculum coverage was similar (M=3.01) versus (2.90), as was emphasis on practical courses (M=3.03) versus (3.08). Thus, the strongest contrasts concern the inclusion and actual delivery of practical training.

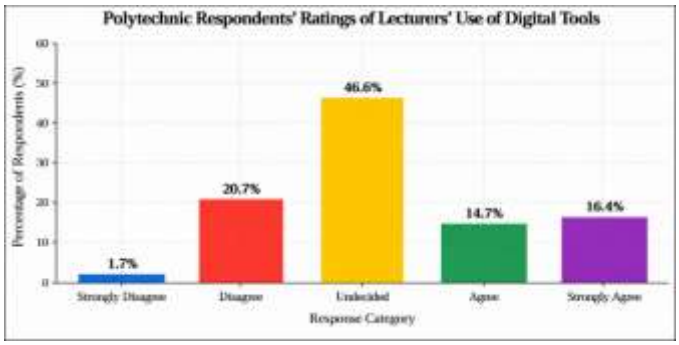


Figure 4. Polytechnic Respondents' Ratings of Lecturers' Use of Digital Tools in Teaching

Figure 4 shows the distribution of Polytechnic respondents' ratings of lecturers' use of digital tools while teaching. The largest proportion of respondents were undecided (46.6%), followed by those who disagreed (20.7%), strongly agreed (16.4%), and agreed (14.7%), while only 1.7% strongly disagreed. Combined agreement and strong agreement accounted for 31.1%, compared with 22.4% expressing disagreement or strong disagreement. The corresponding mean score of 3.23 was slightly above the neutral benchmark and statistically significant (t=2.467, p=.015). Thus, although reported lecturer use was moderately positive overall, the large undecided proportion indicates substantial uncertainty regarding the consistency of digital-tool integration in teaching.

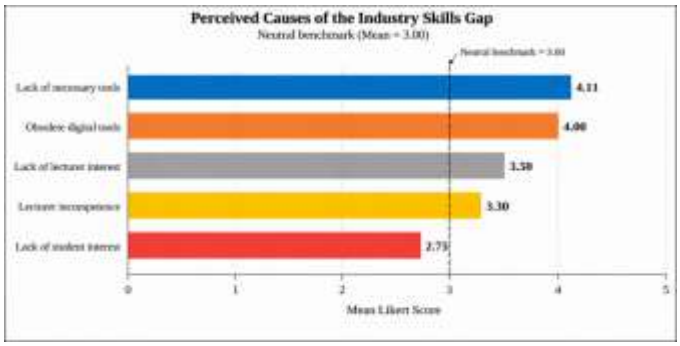


Figure 5. Mean Ratings of Perceived Causes of the Industry Skills Gap in Anambra State, Nigeria

Figure 5 shows that lack of necessary tools received the highest rating as a perceived cause of the industry skills gap (M=4.11), followed by obsolete digital tools (M=4.00). Both were significantly above the neutral benchmark of 3.00 (p<.001). Lack of lecturer interest (M=3.50, p=.135) and lecturer incompetence (M=3.30, p=.285) exceeded the benchmark descriptively but not significantly. Conversely, lack of student interest recorded the lowest mean (M=2.75) and was significantly below neutrality (p=.021). The findings therefore provide stronger statistical evidence for inadequate and obsolete technological resources than for lecturer- or student-related explanations of the skills gap.

3.2 Discussion of Findings

The results showed that awareness and availability of digital technology did not necessarily correspond to its use in the classroom, even though the overall picture of digital technology conditions in Polytechnic was not bad. This was followed by students' preference (M = 4.543) and availability (M = 4.121), both of which were well above the neutral level (p < .001). The willingness of lecturers to use digital tools for assignments (M = 2.862, p = .106) and the use of digital tools by students for assignments (M = 3.000, p = 1.000) were not significantly different from neutrality. This implies technology exposure without regular academic use. The discovery aligns with Haleem et al. (2022), who noted that the applications of digital technologies to improve accessibility and support learning are limited by infrastructure, connectivity and teacher preparedness. It also aligns with the efforts of Nimfel (2022), who highlighted that the digital competence of lecturers is very important in technology-supported teaching supported by technology.

A significant difference was also found between University and Polytechnic respondents with respect to practical training and the curriculum implementation. In the case of the inclusion of practical lessons in the curriculum, universities obtained a much higher mean score (M = 4.798) than Polytechnics (M = 2.655); while in the case of the coverage of practical classes, Polytechnics obtained a much higher mean score (M = 4.534) than Universities (M = 2.976). These differences were particularly pronounced for practical lessons in the curriculum, $\chi^2(4) = 151.700$, $p < .001$, Cramér's V = .871, and practical-class coverage, $\chi^2(4) = 110.332$, $p < .001$, Cramér's V = .743. Therefore, the curriculum provision is not always delivered as intended. The finding aligns with both Imama et al. (2025), who found curriculum integration and the readiness of the institutions as key factors to technological adaptability, and Yusvana

(2025), who highlighted the importance of competency-based practical training and industry collaboration to minimize skill mismatches.

Inadequate technological resources were raised more frequently than explanations relating to humans as the reasons behind the problem of the skills gap in the industry. Lack of necessary tools recorded the highest mean ($M = 4.105$, $t = 5.504$, $p < .001$), followed by obsolete digital tools ($M = 4.000$, $t = 4.595$, $p < .001$). University lecturers' interest and incompetence, on the other hand, did not differ significantly from neutrality, whereas lack of student interest was significantly below the neutral scale ($M = 2.750$, $p = .021$). The limited availability of ICT tools and the lack of connectivity are recurring challenges identified in higher education by Ndibalema (2025) and Gonzales et al. (2025), respectively, along with poorly developed technical skills. The overall results show that closing the education–industry skills gap does not simply involve awareness about digital technologies, but about the availability of functional and modern technological resources, the regular use of digital technology in the classroom, and the effective application and better integration of digital technology and tertiary education with industry demands.

4. Conclusion

The study provides empirical evidence on the interconnected issues of digital technology utilization, practical training, curriculum implementation, and perceived industry skills gaps within tertiary education in Anambra State, Nigeria. In today's industry climate that demands digitally competent and practically equipped graduates, tertiary institutions need to move beyond mere content and technology awareness to sustained application of appropriate technologies and effective delivery of practical learning. The study shows that having digital resources doesn't necessarily mean that they are successfully used in teaching and learning. Likewise, the integration of practical aspects in the formal curriculum cannot ensure students' skill development unless practical activities are properly carried out. The observations highlight the need to view technology, curriculum, practical exposure, and industry needs as interrelated aspects of graduate preparation rather than as stand-alone educational issues.

The overall findings showed that generally, digital technology conditions among the respondents at Polytechnic were considered favourable, especially in terms of awareness of digital tools ($M = 4.750$), preference for the use of digital tools ($M = 4.543$), and availability of digital technologies ($M = 4.121$). In contrast, lecturers' willingness to use digital tools ($M = 2.862$, $p = .106$) and students' usage of digital technologies in assignments ($M = 3.000$, $p = 1.000$) were not significantly different from the neutral level of 3.0 and thus less successful in translating the availability of

digital tools into routine use in learning. There were also marked differences in practice in the training areas. There was a significantly higher level of inclusion of practical lessons in the curricula for universities ($M = 4.798$) and a significantly higher level of coverage of practical lessons for Polytechnics ($M = 4.534$). Particularly large differences occurred for practical lessons in the curriculum, $\chi^2(4) = 151.700$, $p < .001$, Cramér's V = .871, and practical-class coverage, $\chi^2(4) = 110.332$, $p < .001$, Cramér's V = .743. In addition, one of the most prevalent perceived causes of the industry skills gap was lack of tools ($M = 4.105$, $p < .001$) and obsolete digital tools ($M = 4.000$, $p < .001$).

The results have implications for tertiary education policy, institutional management, curriculum design, and preparing graduates for the workforce. The evidence indicates that closing the industry skills gap needs to do more than just raise awareness among students about digital technologies or formally plug in digital hands-on courses in curricula. Institutions require current and functional digital equipment that is relevant to the industry, as well as mechanisms to ensure lecturers and students utilize the digital equipment on a regular basis. The difference between what is in the curriculum and what is actually being covered in the practical classes also suggests that curriculum evaluation should be based on implementation rather than course provisions. The universities may benefit especially by giving further effort to making the regular delivery of practical sessions, and the Polytechnic education needs to pay attention to the formal integration and coherence of practical components in the curriculum. Policy-wise, long-term investment in modern technological infrastructure, lecturer capacity building, and curriculum updates, and greater interaction between tertiary institutions and industries is needed. Together, these measures can aim to bring education closer to the evolving needs of the workplace and enhance the graduates' practical and digital readiness for today's jobs.

4.1 Limitations of the Study

The study has methodological and contextual limitations that should be considered when interpreting its findings and implications cautiously.

i. The cross-sectional design captures perceptions at one period, preventing causal conclusions about technology, practical training, and industry skills gaps.
ii. The relatively small industry-related sample restricts generalization of perceived skills-gap causes beyond the respondents and institutions investigated in Anambra State.
iii.

4.2 Recommendations

Based on the findings, institutional and policy interventions are required to strengthen practical training and digital workforce preparedness.

i. Government should fund modern digital laboratories and regularly upgrade technological infrastructure to strengthen practical training across tertiary institutions.
ii. Tertiary institutions should strengthen industry partnerships, ensuring curricula, practical instruction, and digital competencies reflect contemporary workplace requirements consistently.
iii. Future studies should employ longitudinal, multi-institutional designs to examine how digital technology integration influences graduates' workplace competency development.

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