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From Printers to Visual Media Specialists: Digitalization and the Employability of Printing Technology Graduates in Nigeria

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Abstract

Poverty is intrinsically linked to insecurity. Evidence suggests that unemployment-driven poverty holds sway in Nigeria, with attendant socio-economic consequences. At the root of the growing unemployment in Nigeria is the emergence of digitalization in industries, which is changing the world of work in no small measure. This study examines technology-induced unemployment in relation to printing technology careers in Nigeria. The issues under focus are; i) the extent the ND & HND printing technology programmes in Nigerian polytechnics enhance the employability of printing technology graduates in a changing world of work, ii) the link between labour market needs in the media industry and the contents of training of printing technology programmes in Nigeria. Data for analysis and discussion are generated through content analysis of relevant documents. Analysed data reveal employment opportunities for printing technology graduates in visual media and communications, provided they are empowered with the right set of skills required in a changing world of work. Recommendations given to improve the employability of graduates of printing technology programmes in Nigeria include: the inclusion of courses in information and communication technology in printing technology curriculum, and increasing the number of courses in visual media taught in the programmes, especially at the HND level. Lastly, the introduction of social psychology and human development to inculcate personal attribute skills in printing technology students is suggested.

Keywords*:* Poverty, Insecurity, Digitalization, Employability, Printing Technology

Introduction

Global security has been a front-burner issue in the world today. Broadly, it is associated with military and diplomatic measures taken by nations to ensure mutual safety and the well-being of people across the world. However, scholars have added a new dimension to the discourse on global security. Al-Rodhan (2015), for example, proposes five dimensions of global security: human security, environmental security, national security, transnational security, and transcultural security. In tune with this, Saier & Trevors (2008), as well as Wallace (2023), identify terrorism as one of the threats to global security, which they aver is caused by factors including corruption, incompetent leadership, overpopulation, limited resources and poverty. They argue that poverty, in particular, is a catalyst for terrorism and thus a threat to national security. This analysis is very much applicable to the Nigerian context, where unemployment-driven poverty holds sway. As affirmed by Ibietan *et al.* (2016), poverty, unemployment, and ignorance are major contributors to the spread of violence and insecurity in Nigeria.

To tackle the problem of poverty in society, it is important to address the issue of unemployment. Of particular importance in this respect is the issue of technological unemployment caused as a result of the displacement of people by technological innovations in the labour market. With the emergence of automation in industries, the world of work has changed tremendously. Hooley (2019) explores the changing world of work and the impact on career choices, especially the role of educators in preparing students for the dynamics in today's workforce development. In a similar vein, Peters *et al.* (2019) provide insights on how automation reduces the chances of young people entering the labour market, with suggestions on how education and training can help buffer the negative impacts of technological unemployment. A recent study by Somoye (2024) reports that while technology has been established to enhance labour and capital productivity, technological progress can lead to unemployment. Similarly, Shi (2024) affirms that the continuous advancement of technology will prompt the disappearance of traditional positions, urging workers must continually upgrade their skills to remain employable as innovation unfolds.

Although there are various insights on the impact of technological developments on unemployment in different contexts, as captured previously, there is a noticeable gap in empirical research specifically addressing technology-induced unemployment within sector-specific vocational fields,

such as printing technology in Nigeria. Indeed, there exists a lack of targeted investigation into how well Nigeria's National Diploma (ND) and Higher National Diploma (HND) printing technology curricula equip graduates with the necessary skills to remain employable in a technologically evolving printing industry. This will help with understanding how technological change impacts the employability of printing technology graduates.

Given the identified gap, this study focuses on technology-induced unemployment in relation to printing technology careers in Nigeria. To what extent do the ND & HND printing technology programmes in Nigerian polytechnics enhance the employability of graduates in a changing world of work? Is there a link between the labour market needs in the media industry and the content of training of printing technology programmes in Nigeria? These issues are examined from the backdrop that printing technology students should be given a relevant, innovative and adaptable type of training that helps them cope in the ever-evolving media marketplace.

Conceptual Review

Technological unemployment is a critical matter of concern: it may result in entrenched poverty in contemporary society, especially for low-skilled workers who face heightened risks of displacement (Carvalho & Di Guilmi, 2020). Technological unemployment, according to Peters (2019), is the result of a set of disruptive technologies that 'create jobless growth and worldwide unemployment'. In another form, Peters (2016) describes technological unemployment as the type of technology that is increasingly making skilled workers obsolete. Peters argues that it is an impending problem in the sense that there will be far more inequalities between labour market needs and the skills possessed by workers.

According to Campa (2018), the concept of technological unemployment is not new: it has been around for ages, but has only recently resurfaced in scholarly discourse. Early attempts at conceptualising technological unemployment began with James Steuart's 1767 acknowledgement that the sudden mechanisation of a segment of production can produce temporary unemployment. Steuart, on this premise, urged the adoption of public policies to cushion the effect by reabsorbing displaced skilled workers into other industrial roles (Campa 2018). In 1930, John Keynes reintroduced the concept of technological unemployment, noting that 'we are being afflicted with a new disease of which some readers may not yet have heard' (cited in Campa 2018:

68). Campa (2018) also acknowledges that concerns about the problems arising from the displacement of skilled workers by machines are real. As the scholar puts it, replacement of skilled workers by technologies has far-reaching economic, psychological and sociological consequences. He acknowledges the various forms of political response to the issue, including public policymaking by the government, as a result of agitations by the workers' union.

However, some scholars aver the possibility of hype about the effects of technological unemployment. Kapeliushnikov (2019), for instance, opines that the implementation of new technologies does not necessarily translate to high unemployment as espoused by the proponents of the idea of technological unemployment. He argues that the scholarly attention devoted to the concept amounts to technological alarmism, which, in his view, can be described as the fear associated with the crowding out of people by machines. He avers that the idea of mass unemployment, following the introduction of new technologies, is a recurring one that usually fades with time. In Kapeliushnikov's view, the problem with technological change arises when there is a mismatch between skills possessed by workers and the jobs they are expected to perform. He argues for continuous learning or reskilling to match labour market needs in this scenario. In sum, Kapeliushnikov comes to terms with technological unemployment as a short-term phenomenon that is always at play in modern labour market.

Empirical Review

The rise of digitalization in the print and graphic arts industry has led to extensive paradigm shifts. This is not limited to this industry alone. According to Bughin et al. (2019), digitization has had broad impacts on the world of work and social welfare. They report that immense economic potential is linked to digitalization, noting that in 2018, the Mckinsey Global Institute estimated that $13 billion could be added to the global GDP by 2030 through digitization, automation and artificial intelligence. This submission shows that digitalization enhances productivity, with the growth of industries built around it. In an earlier study, Manyika et al. (2017) express the view that the pace and extent of the adoption of automation will be greatly controlled by technical, economic and social factors. While they report that by 2055, half of today's work will have been automated, they offer a beacon of hope that workers displaced by automation will find other employment. Nonetheless,

they urge policymakers to make innovative policies that will help workers cope with a new work environment, particularly by rethinking education and training.

The World Bank (2019) acknowledges that digital technologies have given rise to automation of work, which is replacing the nature of work, resulting in the elimination of low-skill jobs in the labour market. However, the body notes a bright side to this development: the creation of new opportunities that are paving the way for new jobs built on increasing productivity and improved service delivery. Concerning the print and graphic arts industry, Bandgar and Meshram (2024), Afolabi (2009) and Lewis (1997) argue that work is no longer static with evolving technology, thus vocational and technical curriculum must reflect these changes. In particular, Lewis (1997) asserts it is vital to enhance the employability of graduates by incorporating new developments in the print and graphic arts industry into the curriculum of training of institutions. This is similar to the positions of Abd Latif and Mohammed (2025), Smith (2014), and Faiola (1999) that the rise of automation in the print industry has led to increased demands on workers to update their skills. Also, Levenson (2014) posits that a sustainable career in the print and graphic arts industry can be assured with continuous training and re-training. This helps ensure the employability of workers in the contemporary print industry.

Similar previous research suggests that the rise of high technologies in printing is driving digital transformation (Makatora et al., 2023), prompting the need for advanced skills that are not readily available (Latif & Ali, 2025). As Liang et al. (2023) submit, these changes make education reform and targeted upskilling imperative for enhanced employability in the printing industry.

Employability, broadly, is the set of knowledge, skills and personal attributes that make it more likely for people to gain employment and excel in their careers. Employability skills, as captured by Brewer (2013), refer to "the skills, knowledge and competencies that enhance a worker's ability to secure and retain a job, progress at work and cope with change". Ismail & Muhammed (2015) identify three categories of employability skills; Core skills (technical knowledge, skills and competencies), generic skills (non-technical competencies like problem solving, lifelong learning, teamwork, leadership skills), and personal attributes (attitude, traits required on the job).

They blame the Nigerian education system for the lack of employability skills in the curriculum of training.

The scare of technological unemployment would be allayed by coming to terms with the idea of a changing world of work. As Hooely (2019) notes, this concerns how people's careers are changing, the impact of organizations in the change, and the rise of a new work culture. Another vital aspect of this narrative is the fundamental change in the way work is organized through innovation. Indeed, Vieira et al. (2019) assert that evidence in the literature suggests that innovation does not necessarily translate to job losses. While automation may make some jobs disappear or become obsolete, new jobs are also created to provide employment that assures human security.

Statement of Problem

The transition from analogue to digital technology in the print media industry is not without implications; there are threats and opportunities in the mix. According to Picard (2011), digitalization, amongst other effects, leads to convergence of processes, platforms, and combined job roles of several skilled workers. Also, Merritt and Vilchis-Flores (2024) report that digitization of the printing industry has resulted in a marked decline in workforce size, as many traditional roles become redundant. The report by Merritt and Vilchis-Flores is a reflection of a changing world of work that requires new knowledge and skills that, if not possessed by workers, may lead to unemployment, at a time when the unemployment situation in Nigeria is already at its worst.

As the records show, Nigeria's unemployment landscape has experienced significant shifts over time, highlighting both persistent challenges and recent improvements. In the third quarter of 2018, the National Bureau of Statistics (NBS) reported a sharp year-on-year increase in unemployment, rising by 3.3 million to 20.9 million people. This represents an increase of 19% from the same period in 2017 (Nnorom & Adegbesan, 2018). However, by the second quarter of 2024, the national unemployment rate had declined to 4.3%, with underemployment at 9.2%, indicating a downward trend (The Nigerian Economic Summit Group, 2024). Despite the reported decline in the unemployment rate, Nigeria's misery index (the sum of unemployment and inflation rates) rose sharply to 38.3% in Q2 2024, up from 36.9% in Q1 2024 and 26.7% in Q2 2023 (The Nigerian Economic Summit Group, 2024). This suggests that many Nigerians are still experiencing a severe cost-of-living

crisis, driven by rising inflation, which has pushed more citizens into poverty. This evolving pattern underscores the need for a deeper investigation into the quality, inclusiveness, and sustainability of employment growth in Nigeria.

Human security becomes a concern if unemployment in the Nigerian society is not tackled. It entails a set of actions that complement national security, aimed at protecting people from threats to life, ensuring their livelihood and dignity. First espoused by the United Nations Development Programme (UNDP) in 1994, the human security concept recognizes the factors that hinder human development (Institute for International Cooperation, 2006). From this angle, human security focuses on two key issues: 1) freedom from violent conflict, 2) freedom from deprivation. In other words, focused attention must be given to situations that cause fear in the populace and threats that imperil their lives, such as poverty and unemployment.

Methodology

This study is aimed at investigating: i) the extent the ND & HND printing technology programmes in Nigerian polytechnics enhance the employability of graduates in a changing world of work, ii) the link between the labour market needs in the media industry and the content of training of printing technology programmes in Nigeria. Data for analysis and discussion is generated through a qualitative content analysis of two sets of documents.

The first set of documents is the curriculum of training of ND and HND printing technology programmes, as approved by the National Board for Technical Education (NBTE). Summary tables of modules of the ND and HND curricula are listed in Tables 1 and 2, respectively. In line with Ismail and Muhammed (2015), the content categories used are: 1) Core skills in printing processes, 2) Core skills in visual and multimedia, 3) Generic skills, and 4) Personal attributes skills. The content analysis of job adverts has precedent in the literature, including Zhang et al.'s (2021) study, in which job advertisements were collected and used to analyse job titles, functions, duties and requirements about digital humanities-related positions in academic libraries. Indeed, a systematic literature review of studies that researched skill identification from job adverts, undertaken by Khaouja et al. (2021), validates the use of job adverts as a credible source of data for studying skills requirements in emerging industries. Similar prior studies are Bernhard and Russmann (2024) and Rios et al. (2020).

Table 1: Semester-by-Semester Summary of 2009 ND Printing Technology Curriculum

Year	Semester	Courses
First Year	Semester One	Communication in English I; Citizenship Education I; Printing Science I; Computer Application I; Prepress I; Health and Safety; Printing Production Processes
	Semester Two	Communication in English II; Printing Science II; Desktop Publishing I; Book Binding and Print Finishing I; Printing Materials; Litho Printing I
Second Year	Semester Three	Introduction to Entrepreneurship; Computer Graphics; Digital Prepress I; Prepress II; Litho Printing II; Book Binding and Print Finishing II; Design for Print I; Introduction to Quality Control in Printing
	Semester Four	Practice of Entrepreneurship; Digital Prepress II; Printing and Environment; Design for Print II; Costing and Estimating; Printing Project

Table 2: Summary of Modules in the 2009 HND Printing Technology Curriculum

Year	Semester	Courses
Third Year	Semester One	Communication in English III; Bookbinding and Print Finishing III; Digital Prepress III; Desktop Publishing III; Lithography III; Colour Management; Design for Print; Administration I
	Semester Two	Communication in English IV; Costing and Estimating II; Packaging; Design for Print III; Lithography IV; Administration II; Research Methodology; Entrepreneurship Development; Physical & Health Education
Fourth Year	Semester Three	Literary Appreciation; Assessing Environmental Impact; Organised Quality Systems; Print Production Processes II; Bookbinding and Print Finishing IV; Industrial Relations; Practice of Entrepreneurship
	Semester Four	Introduction to Psychology; Lithography V; Colour Management II; Schedule of Print Production; Printing Project

Job adverts published in the media for recruitment into job roles involving visual storytelling and communication constitute the second set of analysed documents. Hundreds of job adverts were harvested from the following five online job sites between January and April 2018: CareerJet.com, Jiji.com, NgCareers.com, Jobzilla.ng and Jobguru. From these, fifty were selected for content analysis. This sample size was guided by thematic saturation benchmarks for content analysis (Krippendorff, 2018). To ensure sectoral diversity, the samples were randomly selected from five major platforms, as mentioned earlier. Although the job advert data are from 2018, they are used in this study as a baseline for examining early skill demands in Nigeria's transition toward high-technology printing. The core competencies identified then, including digital literacy, multimedia design, and cross-disciplinary skills, are foundational to the new media print industry.

Content categories for the content analysis were based on: i) Types of skills required, ii) qualifications required for employment. In brief, according to Neuendorf (2017), content analysis is an acceptable and popularly adopted approach for generating research data. In this study, coding was conducted manually, following the procedures outlined by Neuendorf (2017). Since the data were obtained from publicly accessible sources, no ethical clearance was required. Nevertheless, identifiers such as company names were deliberately left out to safeguard the anonymity of the organizations that placed the job adverts.

Results

Table 3: Distribution of Employability Skills in ND and HND Printing Technology Curricula

Content category	ND (%)	HND (%)
Technical skills (printing)	58	57
Technical skills (visual & multimedia)	13	11
Generic skills	29	32
Personal attribute skills	0	0

Curriculum Focus

Analysis of the NBTE-approved ND and HND Printing Technology curricula reveals a disproportionate emphasis on traditional printing process skills compared to visual and multimedia competencies. At both levels, printing process skills dominate at 58% (ND) and 57% (HND), while visual and multimedia skills account for only 13% and 11%, respectively. Generic skills rank second (29% ND; 32% HND), but personal attribute skills are absent. This imbalance, as displayed in Table 3, suggests that current training underprepares graduates for the digital and cross-disciplinary demands of today's printing and media industries.

Table 4: Industry Distribution of Surveyed Firms

Industry Category	%
Manufacturing	2
Media/Technology	32
Services	66

Table 5: Skills Required by Studied Firms

Skills Required	%
Visualisation Skills	100
Design/Software Skills	100
Strategy/Communication	82
IT/Multimedia Skills	68

Print Production Skills	58

Industry Skill Demands

Of the 50 job adverts analyzed, 2% of the firms seeking visual media specialists' function in the manufacturing sector of the Nigerian economy, 32% are in the media and technology sector, while 66% are in the service sector (as shown in Table 4). The two top skills required by these firms are visualization skills and design and software skills, both with 100% frequency. After these come strategy and communication skills, with 82% frequency. The next requested skill is IT and multimedia skills, with a frequency of 68%. The least requested skills by the firms in their job adverts are print production skills, with 58% frequency. As displayed in Table 5, industry demand is heavily weighted toward digital and creative proficiencies, which is in contrast to the curricula's focus on traditional print processes.

Table 6: Qualification Requirements of Surveyed Firms

Qualification Requirement	%
Graphic Design/Fine Art strictly	8
Graphic Design/Fine Art & related fields	34
Broad qualifications accepted	58

Qualification Preferences

The majority of the firms, representing 58% of the firms under study, did not put a restriction to the type of qualifications they expect to be possessed by the visual media specialist being sought. 34% of the firms expect applicants to have qualifications in fine arts, graphic design, applied arts and related fields. Only 8% insist that job applicants must have qualifications in fine art and graphic design to be considered for employment. The summary, as presented in Table 6, reflects the preference for broader qualifications, revealing the industry's openness to diverse skill backgrounds, provided applicants possess the required creative and technical capabilities.

Discussion

This study seeks to investigate the extent to which Nigeria's National Diploma (ND) and Higher National Diploma (HND) printing technology curricula equip graduates with the necessary skills for employability in a technologically evolving printing industry. On the whole, the findings reveal a significant education-industry mismatch in the ND and HND printing

technology curriculum being used in Nigeria. While the creative media and communication industry requires top-notch visualization and design skills from creatives regardless of their educational background, the printing education curriculum in Nigeria is disproportionately tilted in favour of printing production skills, as demonstrated in Figure 1. Remarkably, the curriculum disproportionately emphasizes printing process skills despite industry demand prioritizing digital/visual competencies. Notably, critical workplace skills, especially personal attributes, are absent from course content. While most employers do not require specialized degrees for roles in visual design, the ND/HND printing technology programs' excessive emphasis on printing processes to the detriment of visualization and design software skills is considered inadequate.

These findings underscore a pressing disconnect between pedagogical focus and labour market needs, highlighting the necessity for curriculum realignment toward digital literacy, soft skills development, and more flexible qualification pathways to better prepare graduates for evolving industry requirements.

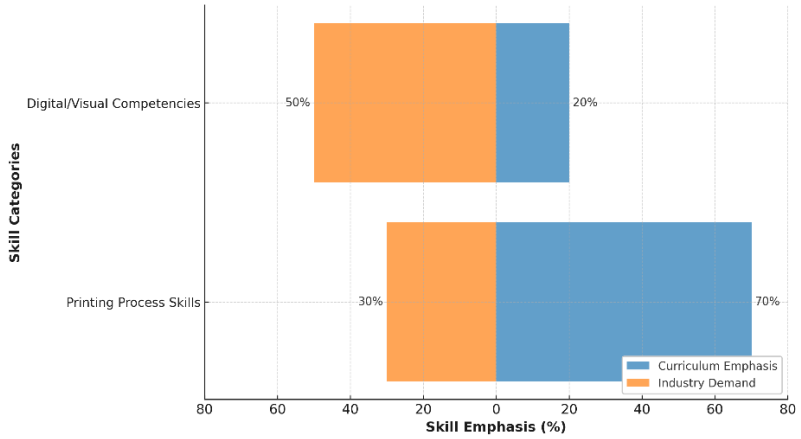

Figure 1: Nigeria's Printing Technology Curriculum vs. Industry Demand Mismatch

On the first focus of this study (*investigating the extent the ND & HND printing technology programmes in Nigerian polytechnics enhance the employability of graduates in a changing world of work)*, it has been established in previous studies that the rise of digital technology and the subsequent digitalization of the printing industry have led to an extensive paradigm shift (Gladysz et al. 2021; Martins et al.,2023; Rahmat, 2022). Now, printing has become a vital part of the graphic communication industry that

covers all forms of visual media (Politis, 2019). Thus, printers have transformed into visual media specialists. Against this backdrop, there is a need to increase the number of visual and multimedia courses in the printing technology curriculum, especially at the HND level. The imperative for the inclusion of multimedia courses is situated in Smith's (2014) argument that the changing structure of consumer demand in the media industry has prompted an increasing transition from print to non-print products, especially through digital media. These changes, Smith avers, impact directly on the skills and abilities of graduates required to work in the contemporary graphic communications industry.

In addition, Fakhrunnisa and Munadi (2019) posit that graduates of vocational fields must have multimedia competencies. They argue that if graduates are deficient in this aspect, their ability to work with the latest technologies in industries will be affected, thus diminishing their chances for employment. Given this, the visual and multimedia content of the printing technology curriculum in Nigeria must be raised a notch higher, even if it requires scaling down on the number of print production courses. Quite a number of the core printing courses, particularly at the HND level, can be merged if their contents are thoroughly examined for obsoleteness, repetition and duplicity.

The key goal in making a case for an increase in visual, design and software skills is career adaptation in a digital workplace. Sartorius (2000) argues that with digitization, the realms of image generation and reproduction have converged into one, with technology literacy emerging as a priority over craft practice. To support the idea of career adaptability, Sartorius cites a 1998 study at the London College of Printing, which analyzed the training needs of the prepress industry. As a result of digitalization and convergence, a skill gap in working with texts and visual images in a digital environment was identified in the cited study. Opportunities such as this, Sartorius argues, must be met by empowering students with digital media skills.

The second issue under enquiry is the extent to which *the content of training of printing technology programmes in meet the labour market needs in the media industry in Nigeria*. As Table 3 shows, visualization, design and software skills are in great demand by employers in the Nigerian media sector. Why is this so? And, why are print production skills the least requested by these employers? As for the increased demand for visualization, design and software skills, this can be discussed in the light of Spalters and Dam (2008),

who note that digital visual literacy is now essential in daily life and workplace tasks. They explain that digital visual literacy, amongst other definitions, refers to the ability to use computers to create effective visual communications". As we live in a world that is visual-driven, this provides job opportunities for graduates of printing technology who can prove their mettle as visual media specialists.

On print production skills ranking the lowest amongst skills required by employees surveyed, this can be attributed to the deskilling that has taken root in the printing industry in the wake of digitalization. Lewis (1997) submits that rising automation has made the craft aspect of printing to take a retreat, citing a number of studies to support the erosion of craft in various sections of the traditional print production chain. These studies, Lewis (1997) affirms, indicate the possible elimination of many printing jobs in the future. This study argues that reducing the coverage of traditional printing process content in contemporary printing technology programmes will allow for increasing the coverage of visual communication and IT-related skills. Guaranteeing the employability of printing graduates is not about looking proudly at the craft taught in the far past, but looking right into the future by empowering graduates with skills that attract jobs and assure career adaptation. This way, graduates will not be limited to jobs in the mainstream printing industry but will be open to opportunities in the vast creative industry. As Table 4 shows, most of the surveyed employers require broad qualifications, not necessarily fine arts and graphic arts certifications, for job roles in visual media and communication.

Lastly, the absolute absence of personal attributes skills in both ND and HND printing technology programmes is striking and worrisome. Otherwise known as soft skills, personal attributes skills are concerned with managing personal relationships and behavioural issues in the workplace, and evidence suggests they are a core aspect of competency. Pang *et al.* (2018) argue that attention must be given to teaching soft skills in higher education because employers place a high premium on these skills.

Limitations and Implications for Future Research

As stated earlier, the job advert data analysed in this study was collected between January and April 2018. These data offer an important baseline for understanding early skill demands over time as Nigeria's printing industry adopts high-technology printing. However, numerous changes have emerged

in recent times with the advance of Artificial Intelligence (AI) in cross-media production. Consequently, the findings may not adequately capture the most recent skill requirements in the Nigerian context. Thus, future research that builds on this baseline is suggested in the form of a longitudinal or repeated cross-sectional analysis of more recent job adverts and curriculum updates. Such a study will help to assess shifts in skill priorities over time.

Conclusion

The adoption of digital technologies in the printing industry presents both threats and opportunities. On the brighter side, there is the possibility of leveraging on digitalization to open up job opportunities for graduates of printing technology in Nigeria. This requires re-jigging the curriculum of training from a traditional craft-based approach to a dynamic digital visual media-driven approach. Training printing students beyond the terrains of print media production processes should not be perceived as a slight on the printing education system, but a way of enhancing the competence and employability of graduates. This, by extension, will assure human security in Nigeria. Changes to jobs will be a constant feature in our society as technologies disrupt the workplace. The higher education sector in Nigeria must respond with training programmes that are adaptable enough to capture the range of competencies that are attractive to employers in the current dispensation.

To enhance the employability of printing technology graduates in Nigeria, the following suggestions are offered. One, the addition of a basic course in information and communication technology at the ND level to acquaint students with the contemporary digital media industry. Advanced topics in digital publishing should be taught for at least two semesters at the HND level. Two, at the HND level, the number of courses in visual media requires an increase. The following courses are suggested: Introduction to visual media and communication, Photography, and Information web design. Lastly, the introduction of a course in social psychology and human development" to inculcate personal attribute skills in printing technology students. This is particularly vital at the HND level.

Reference

Abd Latif, N., & Mohammed Ali, N. A. (2025). Addressing skilled labour shortages in Malaysia's printing industry: insights from industry

experts. *GADING (Online) Journal for the Social Sciences*, *28*(2), 1-14.

Afolabi, A. (2009). Technology: A blessing or a threat to Nigerian printers. *Printing News*, *15*(77), 22-37.

Al-Rodhan, N. (2015). Global Trends and Their Impact on Space. In *Yearbook on Space Policy 2012/2013: Space in a Changing World* (pp. 193-198). Vienna: Springer Vienna.

Ajufo, B. I. (2013). Challenges of youth unemployment in Nigeria; Effective career guidance as panacea. *African Research Review*, 7(1); 307-321. Doi:10.4314/afrrev.v7il.2l

Bandgar, S., & Meshram, M. (2024). A pilot analysis on the impact of digitalization in printing technology on employable opportunities in Pune. *ShodhKosh: Journal of Visual and Performing Arts*. https://doi.org/10.29121/shodhkosh.v5.i2.2024.5427.

Bernhard, J., & Russmann, U. (2024). Blurring boundaries: a longitudinal analysis of skills required in journalism, PR, and marketing job ads. *Journalism & Mass Communication Quarterly*, *101*(3), 612-636.

Bughin, J., Manyika, J. & Catlin, T. (2019). Twenty-five years of digitization: Ten insights into how to play it right. Retrieved from https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/twenty-five-years-of-digitization-ten-insights-into-how-to-play-it-right

Brewer, Laura (2013). *Enhancing youth employment: What? Why? And How? Guide to core work skills*. Geneva: International Labour Organization.

Campa, R. (2018). Technological unemployment: A brief history of an idea. *Orbis Idearum, 6*(2), 57–79. https://www.orbisidearum.net/pdf/issue_10_article_61.pdf

Carvalho, L., & Di Guilmi, C. (2020). Technological unemployment and income inequality: a stock- flow consistent agent-based approach. *Journal of Evolutionary Economics*, *30*(1), 39-73.

Faiola, Anthony (1999). The graphic communication curriculum for the next millennium. *Journal of Technology Studies*, 25(2); 47-50. Retrieved from…… https://files.eric.ed.gov/fulltext/EJ610856.pdf

Fakhrunnisa, N. & Munadi, S. (2019). Relevance of multimedia expertise competency in vocational schools toward the needs of business/industrial world. *Journal of Educational Science and Technology*, 5(1); 58-66. Doi: 10.26858/est.v5il.6923

Hooley, T. (2019). Career guidance and the changing world of work; Contesting responsibilities notions of the future. *Education and Technological Unemployment*; 175-191.

Doi: 10.1007/978-981-13-6225-5-12.

Ibietan, J., Abasilim, U. & Ebhohimen, D. (2016). The Nigeria state, security and Boko Haram (2010-2015): An evaluation. Acta Univerittas Danubus 8(2); 103-116. Retrieved from http://journals.univ-danubius.ro/index.php/administratio/article/view/3982/3875

Institute for International Cooperation (2006). *Poverty reduction and human security*. Tokyo: Japan International Cooperation Agency.

Ismail, S. & Mohammed, D.S. (2015). Employability skills in TVET curriculum in Nigeria Federal universities of technology. *Procedia – Social and Behavioral Sciences,* 204; 73-80. Doi: 10.1016/j.sbspro.2015.08.111.

Kapeliushnikov, Rostislav (2019). The phantom of technological unemployment. *Russian Journal of Economics*, 5; 88-116. Doi:10.32609/j.ruje.5.35507.

Khaouja, I., Kassou, I., & Ghogho, M. (2021). A survey on skill identification from online job ads. *IEEE Access*, *9*, 118134-118153.

Krippendorff, K. (2018). *Content analysis: An introduction to its methodology*. Sage publications.

Latif, N. A., & Ali, N. A. M. (2025). Addressing skilled labour shortages in Malaysia's printing industry: Insights from industry experts. *GADING Journal for the Social Sciences*, *28 (2),* 1-14. https://doi.org/10.24191/gading.v28i2.558

Levenson, H. (2014). Preparing the NextGen of graphic arts; Re-educating the industry. *Output Links*. Retrieved from https://ppiassociation.org/Assets/Files/Preparing_the_NextGen_of_Graphic_Ar.pdf

Lewis, Theodore (1997). Impact of technology on work and jobs in the printing industry. *Journal of Industrial Teacher Education*, 34(2), 7-28. Retrieved from https://scholar.lib.vt.edu/ejournals/JITE/v34n2/Lewis.html

Liang, J., Zhang, Z., Wang, H., Zhang, W., & Mo, L. (2023). Graphic technology in the digital age: Fostering creative talents for the future of printing. In *54th IC Annual Conference Proceedings* (pp. 105-112).

Makatora, A. V., Makatora, D. A., & Kubanov, R. A. (2023). Using ICT in printing: Economic transformation, evolution and prospects. *Business Inform, 12*, 106-113. https://doi.org/10.32983/2222-4459-2023-12-106-113

Manyika, M., Chai, M., Miremadi, M., Bughin, J., George, K.,Willmott, R., & Dewhurst, M., (2017). A future that works: Automation, employment and productivity. Mckinsey Global Institute Report. Retrieved from https://www.mckinsey.com/~/media/mckinsey/featured%20insights/Digital%20Disruption/Harnessing%20automation%20for%20a%20future%20that%20works/MGI-A-future-that-works-Executive-summary.ashx

Martins, P., Pereira, N., Lima, A., Garcia, A., Mendes-Filipe, C., Polícia, R., Correia, V., & Lanceros-Mendez, S. (2023). Advances in Printing and Electronics: From Engagement to Commitment. *Advanced Functional Materials*, 33. ..... https://doi.org/10.1002/adfm.202213744.

Merritt, H., & Vilchis-Flores, J. (2024). Exploring the Effects of Digitization on Employment and Wages in the American Printing Industry 2002-2021. *International Journal of Technology*. https://doi.org/10.14716/ijtech.v15i1.5720.

Neuendorf, Kimberly (2017). *The content analysis guidebook* (2ed). London: Sage

Nnorom, N., & Adegbesan, E. (2018, December 20). *Unemployed Nigerians increase by 3.3 m to 20.9 m — NBS. Vanguard.* Retrieved June 9, 2025, from https://www.vanguardngr.com/2018/12/unemployed-nigerians-increase-by-3-3m-to- 20-9m-nbs/#google_vignette

Pang, E., Wong, M., Leung, C.H., Coombes, J. (2018). Competencies for fresh graduates' successful work: Perspectives of employers. *Industry and Higher Education*; 1-11. Doi: 10.1177/0950422218792333

Peters, M.A. (2019). Beyond technological Unemployment: The future of work. *Educational Philosophy and Theory*; 1-7. Doi: 10.1080/00131857.2019.1608625

Peters, M., Jandric, P. & Means, A.J. (2019). Introduction: Technological Unemployment and the future of work. *Education and Technological Unemployment*; 1-2. Doi: 10.1007/978-981- 13-6225-5-1

Peters, M.A. (2016). Technological unemployment: Educating for the fourth industrial revolution. *Educational Philosophy and Theory*, 49(1); 1-6. Doi:10.1080/0013185.2016.1177412

Picard, R. (2011). Mapping digital media: Digitization and media business models. Reference Series No. 5. Open Society Foundation. Retrieved https://www.opensocietyfoundations.org/publications/digitization-media-business-models

Politis, A. (2019). Innovation in Graphic: Print Communication and Its Contribution to Marketing Strategies. *Strategic Innovative Marketing and Tourism*. https://doi.org/10.1007/978-3- 030-12453-3_113.

Rahmat, N. B. (2022). The digital printing technology exploration in commercial printing companies. *Kupas Seni*. https://doi.org/10.37134/kupasseni.vol10.1.4.2022.

Rios, J. A., Ling, G., Pugh, R., Becker, D., & Bacall, A. (2020). Identifying critical 21st-century skills for workplace success: A content analysis of job advertisements. *Educational Researcher*, *49*(2), 80-89.

Saier, M.H. & Trevors, J.T. (2008). Global security in the 21st century. *Water, Air, and Soil Pollution*, 205(51), 45-46. Doi:10.1007/s11270-007-9522-x

Sartorius, Ute (2000). Digitization and graphic communication education: From print production to dynamic image generation. *Journal of Industrial Technology*, 16(2); 1-5. Retrieved from https://pdfs.semanticscholar.org/9151/10d3353dc591a98c977b0318dc7163ee91b2.pdf

Shi, H. (2024). Technological progress and unemployment. *Advances in Economics and Management Research*, *12*(1), 193–197. https://doi.org/10.56028/aemr.12.1.193.2024

Smith, Sarah (2014). Graphic communications trends and their impact on required competencies of personnel. Doctoral thesis at the University of Northern Iowa. Retrieved from https://scholarworks.uni.edu/cgi/viewcontent.cgi?article=1009&context=etd

Somoye, O. A. (2024). The impact of technological innovation on unemployment in Nigeria: An autoregressive distributed lag and frequency domain causality approach. *SN Business & Economics, 4*, 56. https://doi.org/10.1007/s43546-024-00657-y

The Nigerian Economic Summit Group. (2024, November). *Nigeria's unemployment rate bucks a rising streak in 2024Q2*. Nigeria Economic Summit Group. Retrieved June 9, 2025, from https://nesgroup.org/blog/Nigeria%E2%80%99s-unemployment-rate-bucks-a-rising-streak-in-2024Q2

Vieira, A.I., Oliveira, E., Silva, F., Olieveira, M., Goncalves R. ,& Au-Yong-Oliveira, M. (2019) The role of technologies: Creating a new

labour market. *New Knowledge in Information Systems and Technologies*; 176-184. Doi: 10.1007/978-030-16181-1_17

Wallace, W. C. (2023). Global Security. In *The Palgrave Encyclopedia of Global Security Studies* (pp. 639-643). Cham: Springer International Publishing.

World Bank. (2019). *World Development Report 2019: The changing nature of work*. World Bank. https://documents1.worldbank.org/curated/en/816281518818814423/pdf/2019-WDR- Report.pdf

Zhang, Y., Su, F., & Hubschman, B. (2021). A content analysis of job advertisements for digital humanities-related positions in academic libraries. *The Journal of Academic Librarianship*, *47*(1), 102275.