Perspectives of Nigerian Graduates on Curriculum Reengineering, Acquisition of Emerging Technologies, and Job Creation: A Descriptive Study

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Abstract

Curriculum reengineering, web-based technology acquisition, and job creation among Nigerian tertiary institution graduates were all examined in this research. The researchers used a descriptive survey design following the quantitative research approach. The study included all Nigerian graduates eligible for national service or its exemption who earned their diplomas or degrees between 2016 and 2021. The data was gathered via an online survey titled "Curriculum Re-engineering, Acquisition of Emerging Technologies, and Job Creation Questionnaire (CRAETJCQ). To assemble the data for this study, we used a snowball method. There were 4,874 replies countrywide after four months of data collection; however, only 4,628 responses satisfied the data analysis conditions after screening out irrelevant responses. Results indicated low curriculum reengineering in Nigerian postsecondary institutions. Nigerian graduates had a poor adoption of new web-based technologies but are increasingly using them for word processing, graphics, data science and data analysis. Nevertheless, only a few graduates employed emerging techs for other purposes (such as printing, YouTube video creation, course design and development, software development, digital marketing, online advertising, and consumer outreach). Although 58.30 per cent of graduates reported having not created any job, 41.70 per cent have done so between 2016 and 2021. Of the 1,930 graduates who owned at least one small or medium enterprise, 58.96% had no employees, whereas 41.04% had hired at least one employee between 2016 and 2021. The graduates' job creation index was estimated to be approximately 50% using a new formula. Based on these results, conclusions and recommendations were made.

Keywords: curriculum, employment, entrepreneurship, job creation, reengineering, SMEs

1. Introduction

Curriculum reengineering has to do with redesigning the core educational objectives, learning contents and experiences offered to learners at all levels of education. It can be defined as the efforts made to carefully and systematically analyse existing school curricula, determine areas of strengths and weaknesses in meeting the current needs of society, and phase out aspects deemed obsolete for the introduction of contents that best reflect the needs of the community. The objective is to analyse the existing curriculum, discover efficient learning experiences, and then optimise them to eliminate those that do not offer meaningful value or contributions (Owan et al., 2021b). The integration of modern technology, correctly created learning materials, references, and media resources are part of the reengineering process of educational curriculum (Sprawls, 2021). Therefore, students, instructors and institutions benefit from reengineered curriculum programs, courses and individual learning units. Nevertheless, the

reengineering of the school curriculum is the primary duty of stakeholders such as the government (at all levels), school leaders, teachers and students, drawing content from current literature, societal needs, learners, and technological dynamics.

In Nigeria, the lesson contents and learning experiences offered to learners, arising from the previous or existing school curriculum at all levels of education, have been criticised by scholars. Due to societal advancement (occasioned by the pervasive development in science, information and communication technology), the quality of products supplied to society from higher education institutions in Nigeria is often a mismatch for most workplace demands (Owan et al., 2022a; 2022b). Consequently, there seem to be many deficiencies among Nigerian graduates, leading to the high rate of unemployment often reported in the literature (Ekaette et al., 2019; Innocent, 2014; Nyong, 2013; Odigwe et al., 2018). For instance, during the fourth quarter (Q4) of 2020, the number of unemployed Nigerians was reported to have increased to 23.19 million as a result of job losses caused by the onset of the COVID-19 pandemic and its stifling effect on companies (National Bureau of Statistics [NBS], 2021). According to NBS (2021), unemployment in Nigeria grew from 14% (in 2017) to 23.1% (in 2018), closed at 27.1% (in 2020) and currently sits at 33.3%. In fact, nearly 10,000 Nigerian PhD holders are unemployed (Ekeruche, 2019).

Admittedly, the primary mandate of any government is to provide employment opportunities to the teeming youth population of working age. However, no government can employ the entire nation's youths, especially with a high rate of population expansion, as in Nigeria. Therefore, youths are expected to seek new pathways to creating jobs for themselves and, where possible, employing others. Even so, meeting these job creation expectations seems to be a hallucination than a reality, owing to the skill gap/deficiencies among most graduates. For instance, it has been stated that not many Nigerian graduates can employ themselves or create jobs for others (Owan et al., 2022a). As a result, they tend to rely solely on the government for employment opportunities. Where the government cannot meet these expectations, some begin to engage in one form of crime or the other.

Nevertheless, massive youth unemployment, underemployment, uncontrollable social tensions, and probably the loss of a generation through high crime rate and incarceration have created an enormous problem for society (Livingstone, 2018; Magwaza, 2019; Twambo & Mbetwa, 2017). Today, Nigeria ranks second behind Afghanistan in the global terrorism index due to the ill activities of youths. On the contrary, highly skilled Nigerian graduates have also been leveraging their competencies to create employment opportunities. In line with this, Ajakaye (2019) pointed out that although faced with fewer government positions and private-sector openings, many university graduates are self-employed via handicrafts, consumer goods selling, agribusiness and networking. Some also render services to liberate themselves from poverty and boost their income (Akah et al., 2022). However, considering the developments in technology, many other opportunities abound for both young and old to tap into the blessings, wealth and abundance of the Internet and other emerging technologies (Owan & Ekpenyong, 2022). Job creation chances have also increased with the emergence of new technologies and online content creation (Owan et al., 2021b).

By definition, emerging technologies are those that are still in their infancy (Boon & Moors, 2008). An analyst's definition of an emerging technology differs depending on the product's new and predicted socio-economic effect. Therefore, the meaning of emerging technology varies depending on the outcome (Rotolo et al., 2015). However, emerging technology is, hereby defined, operationally as any technological innovation that is relatively new but with promising potential to shape man's behaviour and experience. New technologies present opportunities for learning and problem-solving, among other valuable purposes. Nevertheless, relevant skills must be acquired to utilise emerging technologies effectively (to maximise their benefits). Therefore, to utilise emerging technologies, graduates must first learn how to use and optimise them.

Along these lines, this study determined the extent to which reengineering of school curricula has been implemented in Nigerian postsecondary institutions. The study also estimated the extent of graduates' acquisition of emerging technologies. Lastly, it quantified the extent of graduates' job creation after leaving tertiary institutions. In the context of this study, we defined job creation as the average of the quotient of the total number of Small and Medium Enterprises (NSMEs) owned by graduates plus the total number of individuals employed (NIE) by the initiatives of graduates as a per cent of the total number of graduates studied. This is expressed mathematically as:

$$JC_I = \left(\frac{\frac{Number\ of\ SMEs\ owned\ by\ graduates\ (NSMEs)}{Number\ of\ graduates\ studied\ (n)} + \frac{Number\ of\ individuals\ employed\ (NIE)}{Number\ of\ graduates\ studied\ (n)}}{2} \right) \times \frac{100}{1} \quad (1)$$

Which can be rewritten in shortened form as:

$$JC_I = \left(\frac{\frac{NSMEs}{n} + \frac{NIE}{n}}{2} \right) \text{ x } \frac{100}{1} \tag{2}$$

But:

$$NSME_I = \frac{Total\ number\ of\ SMEs\ owned}{Total\ number\ of\ respondents\ (graduates)} \text{ x } \frac{100}{1} \tag{3}$$

and

$$NIE_I = \frac{Total\ number\ of\ individuals\ employed}{a\ total\ number\ of\ respondents\ (graduates)} \text{ x } \frac{100}{1} \tag{4}$$

Where:

JC_I = Job creation index

$NSMEs_I$ = indicator of the total number of SMEs

NIE_I = indicator of the total number of individuals

1.1 Curriculum Reengineering

Nowadays, constraints on problem-solving are less technical, more sociological and more human, necessitating reengineering techniques. These adjustments need a rethinking of the curriculum and supporting active learning while encouraging students to take risks and be more innovative. There are several ways to achieve the necessary paradigm change, including e-learning and starting personal businesses (Imran & Malik, 2017; Songkram, 2015; Victor-Ishikaku & Opuru, 2020). However, Odigwe et al. (2018) found that the duration of training offered to higher education students was too short to acquire the needed vocational skills from school entrepreneurship programmes. This is evidence that speaks volume about the quality of the existing school curriculum. Besides, it was also proven in the cited study that the length of vocational training impacted the employment productivity of graduates in baking and computing businesses. This implies that reengineering the school curriculum by expanding the duration of vocational training promotes job performance and could lead to job creation.

An associated research report by Masuga (2012) advocates reengineering the school curriculum, arguing that it is here that the foundation is established for subsequent success. According to the findings, the primary school curriculum should be rewritten to better prepare students for later life employment and self-sufficiency via effective teaching throughout their formative years. This makes it expedient to rejig the curriculum by reengineering its designs to suit the current educational needs and technological realities. The research of Anaeto and Asoegwu (2012) revealed that the current education system could not provide graduates with opportunities to set up their jobs, making them solely dependent on white-collar jobs as a means to an end. Therefore, schools must steer educational activities to suit society's needs by providing trained teachers and other educational materials to meet the new academic requirements.

Another discovery was made by Oseni (2017) that entrepreneurship education is exclusively available at postsecondary institutions in Nigeria's current educational system. However, taking entrepreneurial training in higher education in Nigeria would have little or no impact on the country's attempts to reduce unemployment. This could be due to the short duration of the training (Odigwe et al., 2018) or the quality of instruction offered to university students. This could explain why entrepreneurship training programmes have yielded little or no change in the business initiatives set up by graduates (Oseni, 2017), who still wallow in the streets searching for white-collar jobs (Owan et al., 2021b). As a result, Oseni argued that entrepreneurship education should be included in Nigeria's educational system to alleviate unemployment.

Despite these revelations, the cited studies provided no information about how jobs have been created through the universities' entrepreneurship programmes, which could have enabled analysts to determine the degree of success of the current entrepreneurship curriculum for reengineering. The present study bridged this gap by extending the scope of the cited studies to investigate how graduates have created jobs, owing to the entrepreneurial training received in school. This will be useful to curriculum planners as it may enable them to understand grey areas and give them places of focus.

1.2 Acquisition of Emerging Technologies

The acquisition of emerging technologies is defined in the present study as how Nigerian graduates make practical

use of several cutting-edge technologies for several purposes. Procuring emerging technologies could promote job creation if graduates can deploy them for business-oriented or profitable purposes. For the most part, electronic gadgets (sensing devices and software) are the most often used methods for incorporating new technologies into school curricula (Krajcik & Mun, 2014). Research shows that various new technologies are being utilised to help students learn and teach science (Akah et al., 2022; Owan & Ekpenyong, 2022). Virtual laboratories, dynamic visualisation tools and computational thinking are examples of this, in addition to mobile devices and pedagogic robots, gaming, and technology-mediated play (Oliveira et al., 2019; Potkonjak et al., 2016; Ukpabio et al., 2020).

It is argued by Chege and Wang (2020) that technological advancements have a favourable effect on the development of small enterprises and the creation of jobs in the sector. Small businesses that effectively utilise information technology significantly impact their competitiveness and ability to access global markets. The cited research is relevant to the present study because it connects the utilisation of innovation to promoting small businesses. However, we are yet to fully understand the degree to which graduates are acquiring emerging technologies to create jobs and possibly employ others. Attuluri and Yarimoglu (2020) researched how developing technologies would affect future job opportunities and their perceived advantages to close this gap. The study found significant influence of new technologies on the workforce.

During the Covid-19 pandemic, a recent study by Aslam et al. (2021) discovered that the majority of respondents (29.4%) learnt using WhatsApp, 29.4% through online classes, 28% through email, 5.3 per cent through a learning management system (LMS), and 7.6% through other means (such as zoom application, department website and blogs). Not even one respondent mentioned using YouTube as a source of educational content, and no one mentioned using any local networks. During the COVID-19 lockout, a substantial disparity was noticed between pupils who improved their IT skills and those who did not. Although the cited study did not link the use of electronic resources to job creation, it gave insights into how students use online technologies to acquire skills. These skills, if acquired, could translate into a meaningful purpose for self-engagement.

Similarly, Owan et al. (2021a) surveyed 1,977 people from 24 African nations about their use of technological platforms for research dissemination. The results indicated that Google Scholar was a more popular platform for disseminating research findings than ResearchGate (the most popular network according to the results). Also, two out of every three academic papers written by African university faculty may be discovered on the Internet. This result explains the pervasiveness of internet use among Africans, making the cited study related to the present study. Considering that the targeted population of the cited research are academic staff of universities, it has been proven in other studies that younger staff demonstrate higher use of electronic tools (Dei, 2018; Odigwe & Owan, 2020). Therefore, the younger generation of academic staff and students are the top beneficiaries of using electronic gadgets. Thus, they can be expected to use these services and resources for profitable ventures legally.

1.3 Job Creation

The role of creating a job in economic development cannot be underestimated. Job creation, whether in the form of a paid job or starting up a small or large-scale business, is a product of economic growth that must have necessitated job creation in the first place. Thus, Okolie and colleagues (2020) looked at how graduates from Nigeria's higher education institutions use their newly acquired knowledge and abilities to help their economy grow. An interview and focus group discussion with 50 participants revealed that industry involvement in designing high-quality higher education learning and activities is vital for students' knowledge and skill development to create jobs. Nigerian Higher Education stands to profit if suitable measures are implemented, even though the referenced study's results do not offer definite methods to ensure such participation. The current study builds on Okolie and her colleagues' study and further explores the extent of job creation by graduates of Nigerian tertiary institutions.

Similarly, Oyefesobi et al. (2018) found that entrepreneurship instruction at the university had no significant impact on job creation in the community. According to results from the same source, learning entrepreneurial skills has increased one's likelihood of finding work, creating jobs and going into business. Using latent class analysis, a recent study by Owan et al. (2022c) found a significant difference in how graduates created jobs based on their behavioural use of ICT. Similarly, Nwabufo and Ezeani (2020) highlighted methods for small-scale business growth that postsecondary institution graduates in Kwara State need. Despite this evidence, the referenced research did not disclose the degree to which graduates of higher institutions have generated employment, a gap that the current study addressed. Regarding entrepreneurial aspirations, Faloye and Olatunji (2018) discovered that participants' risk-taking ability and the influence of mentors, friends, and family were the two most important predictors. Furthermore, the cited research found that entrepreneurship education has a favourable and substantial impact on the intentions of new graduates to start a company.

Contrary to the result of Faloye and Olatunji, Okoye (2016) proved that fear of failure does not affect one's desire to start a business; however, the study revealed that entrepreneurial self-efficacy is a strong predictor of entrepreneurial passion. This implies that graduates with a high fear of failure were likewise shown to have no lower significant entrepreneurial ambition than those with a low fear of failure. To clarify, Owan et al. (2021b) assessed the linkages between curriculum restructuring and job creation using the adoption of internet applications as the mediating factor. Results showed essential links between curriculum restructuring and job creation, the adoption of internet applications and job creation, and curriculum restructuring and the adoption of emerging internet applications. Despite the contrasting and mixed findings, none of the cited studies has revealed how graduates have created jobs. Thus, it is worrisome that foundational information is yet to be provided to enable further studies, a gap the present study addresses.

1.4 Research Questions

1. What is the present state of curriculum reengineering in Nigerian postsecondary institutions?

2. How widely and for what reasons are graduates of Nigerian higher institutions acquiring different emerging technologies?

3. To what extent have graduates of Nigerian tertiary institutions created jobs after completing their tertiary education between 2016 and 2021?

2. Method

The quantitative research approach was employed to collect data for this research, which included an in-depth survey. All Nigerian postsecondary graduates who received their diplomas or degrees between 2016 and 2021 and qualified for the national youth service or its exemption were included in the study. Three factors led to the consideration of this particular group. First, this group graduated at the same time that specific curriculum reforms were implemented in Nigerian tertiary institutions. Second, a wide range of highly sophisticated technologies emerged, primarily within software development and machine learning. Third, the Internet has also undergone several revolutions that have replaced or modified many out-of-date systems.

The researchers employed the virtual snowball method to get an unintentional sample of responses since the population standard deviation was unknown (Uakarn, 2021). "Curriculum Reengineering, Acquisition of Emerging Technologies, and Job Creation Questionnaire (CRAETJCQ)" was used to gather data. The researchers used Google Forms to create the instrument and divided it into five parts (see https://forms.gle/76geZ6wiqdNJdH6P9). Detailed information on the study's purpose, participants, projected completion time, and informed consent was provided in Section 1. In Section 2, biodata like sex, age, marital status and information on the NYSC service of the respondents were collected. Curriculum reengineering was assessed using 13 four-point Likert scale type items in Section 3. Response options varied from "Strongly Agree" to "Strongly Disagree". Sample items for curriculum reengineering include: My school still offers training that does not meet my educational needs despite the innovations in my profession. Most of my colleagues still visit out-of-school training centres to acquire practical skills to supplement the theoretical knowledge received from the university.

The first portion of section 4 consisted of a rating scale allowing respondents to score how much they embraced 16 emerging technologies for different reasons. The response options ranged from zero (no acquisition) to four (very great acquisition). Section 4's second half included a 16-item checklist for respondents to mark off what they do with the new technologies identified in the first part of section 4. For self-employed graduates, the instrument's Section 5 measured how many small and medium-sized businesses (SMEs) they own, their current employment status and the number of employees.

Even though the researchers built the instrument, it was tested for validity by a team of six professionals (three of Economics of Education; three of Research, Measurement and Evaluation). After a trial test on 30 final-year students at a public institution, the Cronbach alpha technique was used to establish the reliability of sections 3 and 4. The 30 final-year students were chosen for the trial test since they had already finished university studies. New technology acquisitions and reengineering of existing curricula yielded reliability estimates of .83 and .91, respectively. Due to the nature of the items, reliability was not performed for job creation.

The researchers used a snowball strategy to gather data for this investigation. The researchers began collecting data by sending the questionnaire link to graduates who fit the selection criteria through email, WhatsApp, Facebook, and Telegram groups. Those that satisfied the inclusion requirements were encouraged to spread the word and encourage their friends, family, and neighbours to do the same. They were also encouraged to notify their targeted peers about

the survey and encourage them to spread the link to others too. The link to the survey was sent out one at a time. Section 2 introduced a moderating factor (graduation year) to eliminate bias and guarantee that only responders who fit the inclusion criteria were included. The internet survey garnered 4,874 responses nationwide after over four months of launch and expansion. We cleaned, processed and re-coded the collected data to exclude 246 replies from individuals who did not fit the participation conditions. As a result, 4,628 replies were considered valid for data analytic purposes. Mean, standard deviation, frequency counts and simple percentages were used in this study to answer its research questions.

3. Results

3.1 Research Question 1

What is the present state of curriculum reengineering in Nigerian postsecondary institutions? Table 1's results indicate relatively poor curricular reengineering in Nigerian tertiary institutions. The grand average of 1.57 falls short of the 2.50 criterion average. The criterion mean for curricular engineering practice indicators was 2.50, and none of the indicators scored higher than that. Thus, curriculum reengineering at Nigerian tertiary institutions could be said to be much lower than the estimated baseline average in general and across particular indicators.

Table 1. Frequency Distribution Showing the Mean Rating and Standard Deviation of Respondents on The Extent Of Curriculum Reengineering Practices in Nigerian Tertiary Institutions

SN	Items	SA [%]	A [%]	D [%]	SD [%]	Extent $(\bar{X} \pm S)$
1	The school offers training that does not meet the educational needs of learners despite innovations in the profession	3085 [66.7]	584 [12.6]	475 [10.3]	484 [10.5]	1.65 ± 1.03
2	Learning experiences offered during entrepreneurship classes are more practical than theory	467 [10.1]	475 [10.3]	569 [12.3]	3117 [67.4]	1.63 ± 1.02
3	Lecturers are teaching using standard instructional materials that make lessons clearer	435 [9.5]	502 [10.8]	560 [12.1]	3131 [67.7]	1.62 ± 1.01
4	The time allocated for students' practical training is too short for the grasp of needed information that can qualify them as experts	3080 [66.6]	569 [12.3]	479 [10.4]	500 [10.8]	1.65 ± 1.04
5	Students still visit out-of-school training centres to acquire more practical skills to supplement the theoretical knowledge received from the university.	3109 [67.2]	569 [12.3]	496 [10.7]	454 [9.8]	1.63 ± 1.02
6	The teaching-learning situation is more focused on examination than on skill proficiency	3123 [67.5]	582 [12.6]	435 [9.4]	488 [10.5]	1.63 ± 1.03
7	No extensive availability of digital technologies to promote access to educational materials	3104 [67.1]	570 [12.3]	483 [10.4]	471 [10.2]	1.64 ± 1.03
8	Simulations are often used to make learning experiential for a long-lasting skill acquisition	451 [9.7]	487 [10.5]	560 [12.1]	3130 [67.6]	1.62 ± 1.02
9	No implementation of learning activities that are based on globally established/universally accepted principles	3142 [67.9]	561 [12.1]	468 [10.1]	457 [9.90]	1.62 ± 1.02
10	Lesson contents offered are not compatible with contemporary lifestyles/realities	3103 [67.0]	605 [13.1]	452 [9.80]	468 [10.1]	1.63 ± 1.02
11	Students are still unable to demonstrate/perform tasks required in the practice of their profession	3134 [67.7]	573 [12.4]	500 [10.8]	421 [9.1]	1.61 ± 1.00
12	Enriched learning experiences that bring students into closer involvement with the physical universe are offered	187 [4.0]	198 [4.3]	174 [3.8]	4069 [87.9]	1.24 ± 0.72
13	The quality of individual learning units provides significant value to the learners	163 [3.5]	220 [4.8]	190 [4.1]	4055 [87.6]	1.24 ± 0.70
	Curriculum reengineering (Average)	____	____	____	____	1.57 ± 0.97

Criterion mean = 2.50
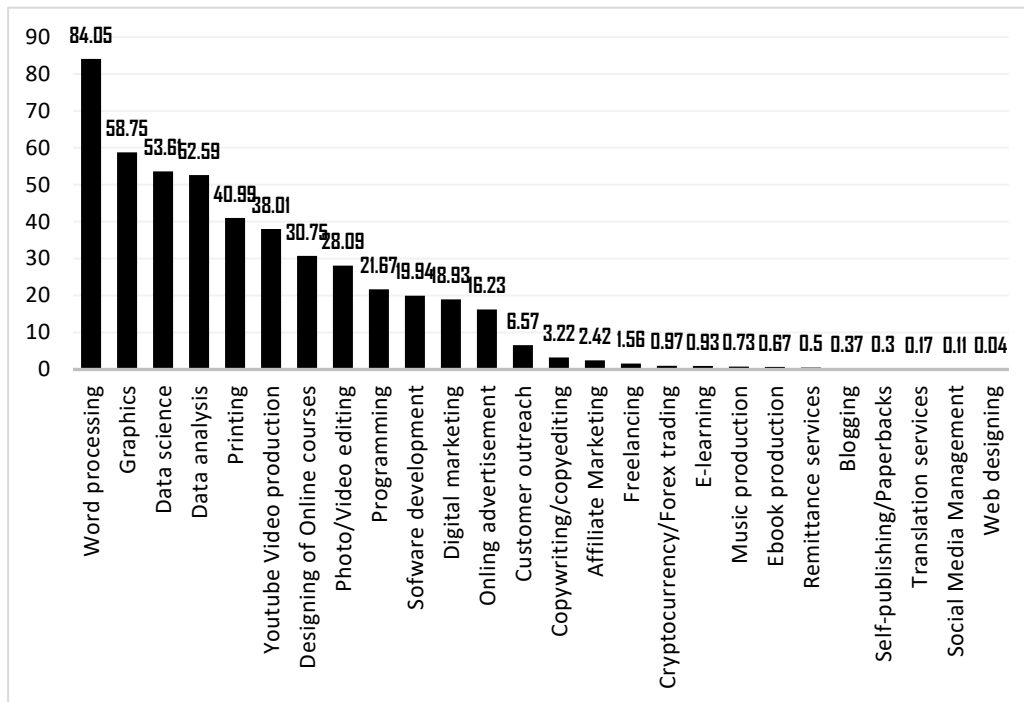
3.2 Research Question 2

How widely and for what reasons are graduates of Nigerian higher institutions acquiring different emerging technologies? Table 2 provides the solution to this query and reveals that Nigerian graduates have a limited acquisition of emerging technologies. In fact, the reported grand mean of 1.45±1.33 is smaller than the criterion mean of 2.00, with a standard deviation of 1.33. In specific terms, graduates of Nigerian tertiary institutions acquired the following emerging technologies to a low extent - massive open online courses (MOOCs), open educational resources (OERs), virtual libraries/laboratories, learning games and simulations, live streaming, artificial intelligence, adaptive learning systems, virtual reality, learning analytics, social media in learning, machine learning algorithms, data science/analytics tools and digital marketing tools. However, they acquired mobile learning, online learning, and video-assisted learning tools to a great extent.

Table 2. Frequency Distribution Showing the Mean Rating And Standard Deviation Of Respondents on the Extent of the Acquisition of Emerging Web-Based Technologies by Graduates of Nigerian Tertiary Institutions

SN	Web-based technologies	NA [%]	VLA [%]	LA [%]	MA [%]	HA [%]	Extent ($\bar{x} \pm$ SD)
1	Massive open online courses (MOOCs)	1448 [31.3]	798 [17.2]	745 [16.1]	843 [18.2]	794 [17.2]	1.73 ± 1.49
2	Open Educational Resources (OERs)	2154 [46.5]	659 [14.2]	580 [12.5]	597 [12.9]	638 [13.8]	1.33 ± 1.50
3	Virtual libraries/laboratories	2180 [47.1]	624 [13.5]	611 [13.2]	612 [13.2]	601 [13.0]	1.32 ± 1.48
4	Learning games and Simulations	1470 [31.8]	773 [16.7]	811 [17.5]	774 [16.7]	800 [17.3]	1.71 ± 1.49
5	Live streaming	1555 [33.6]	797 [17.2]	735 [15.9]	778 [16.8]	763 [16.5]	1.65 ± 1.49
6	Artificial intelligence	2794 [60.4]	878 [19.0]	954 [20.6]	0 [0.0]	2 [0.0]	0.60 ± 0.81
7	Adaptive learning systems	3957 [85.5]	247 [5.3]	200 [4.3]	102 [2.20]	122 [2.6]	0.31 ± 0.87
8	Virtual reality	2696 [58.3]	588 [12.7]	464 [10.0]	445 [9.6]	435 [9.4]	0.99 ± 1.38
9	Mobile learning	891 [19.3]	950 [20.5]	895 [19.3]	931 [20.1]	961 [20.8]	2.03 ± 1.42
10	Online learning	920 [19.9]	897 [19.4]	968 [20.9]	896 [19.4]	947 [20.5]	2.01 ± 1.42
11	Video-Assisted Learning	929 [20.1]	894 [19.3]	933 [20.2]	977 [21.1]	895 [19.3]	2.00 ± 1.41
12	Learning analytics	2281 [49.3]	813 [17.6]	580 [12.5]	478 [10.3]	476 [10.3]	1.15 ± 1.39
13	Social media in learning	944 [20.4]	896 [19.4]	943 [20.4]	950 [20.5]	895 [19.3]	1.99 ± 1.41
14	Machine learning algorithms	2735 [59.1]	934 [20.2]	364 [7.9]	337 [7.3]	258 [5.6]	0.80 ± 1.19
15	Data science/analytics tools	2991 [64.6]	928 [20.1]	300 [6.5]	249 [5.4]	160 [3.5]	0.63 ± 1.05
16	Digital marketing tools	942 [20.4]	964 [20.8]	911 [19.7]	910 [19.7]	901 [19.5]	1.97 ± 1.41
	Acquisition of emerging web-based technologies (Mean)				____	____	1.45 ± 1.33
	Criterion mean = 2.00						

As shown in Fig. 1., the respondents acquired emerging technologies for word processing (n = 3890, 84.05%), graphics (n = 2719, 58.75%), data science (n = 2481, 53.61%), data analysis (n = 2434, 52.59%), printing (n = 1897, 40.99%), YouTube video production (n = 1759, 38.01%), designing online courses (n = 1423, 30.75%), photo/video editing (n = 1300, 28.09%), programming (n =1003, 21.67%), software development (n = 923, 19.94%) and digital marketing (n =

876, 18.93%). It was also discovered that graduates of tertiary institutions in Nigeria acquired emerging technologies for online advertisement (n = 751, 16.23%), customer outreach (n = 304, 6.57%), copywriting/copyediting (n = 149, 3.22%), affiliate marketing (n = 112, 2.42%), freelancing (n = 72, 1.56%), cryptocurrency/forex trading (n = 45, 0.97%), e-learning (n = 43, 0.93%), and music production (n = 34, 0.73%). Furthermore, it was also indicated in the result of this study that graduates of Nigerian tertiary institutions acquired emerging technologies for other purposes such as e-book production (n = 31, 0.67%), remittance services (n = 23, 0.5%), blogging (n = 17, 0.37%) and self-publishing (n = 14, 0.3%).

Figure 1. Column Chart Showing the Various Activities that Graduates of Nigerian Postsecondary Institutions Acquire Emerging Technologies for

3.3 Research Question 3

To what extent have graduates of Nigerian tertiary institutions created jobs after completing tertiary education between 2016 and 2021? Based on the result in Table 3, it was discovered that out of the 4,628 respondents (graduates) that participated in this study, 2,698 respondents representing 58.30%, indicated that they had not created any job. In contrast, 1,441 respondents representing 31.14%, stated that they had created one job, while 489 respondents representing 10.57% of the participants, indicated they had created two jobs. No graduate indicated to have created more than two businesses in the survey. Thus, the number of respondents (graduates) that had created at least one job between 2016 and 2021 in Nigeria is 1,930 (41.70% of the total respondents).

Regarding the number of people employed by businesses owned by graduates, a follow-up data collection was done on those who had created one or more jobs. The analysis presented in the second section of Table 3 shows that out of the 1930 owners of SMEs, 1,138 (58.96%) have no employees. However, the result indicates that 108 owners of SMEs (5.60%) have one employee. Furthermore, 289 (14.97%), 189 (9.79%), 120 (6.22%), 66 (3.42%), 15 (0.78%), 4 (0.21%) and 1 (0.05%) owners of SMEs indicated that they have employed 2, 3, 4, 5, 6, 7 and 8 people in their initiatives. This implies that 41.04% of the graduates with SMEs have employed at least one person between 2016 and 2021.

Table 3. Frequency Counts and Percentage Distribution of the Number of Smes Owned and Number of Individuals Employed by Respondents of this Study

Job creation indicators	Number of SMEs	Frequency	Per cent
SMEs owned by Nigerian graduates	0	2698	58.30
	1	1441	31.14
	2	489	10.57
	Total	4628	100
Employees working for graduates	0	1138	58.96
	1	108	5.60
	2	289	14.97
	3	189	9.79
	4	120	6.22
	5	66	3.42
	6	15	0.78
	7	4	0.21
	8	1	0.05
	Total	1930	100

However, multiplying the frequencies by the total number of SMEs and the number of employees engaged can give us an idea of the total number of SMEs owned by graduates and the total number of people they have employed. For instance, 1441 * 1 = 1441 SMEs; 489 * 2 = 978 SMEs; Thus, the total number of SMEs owned by the respondents of this study = 1441 + 978 = 2,419 SMEs. Similarly, we can estimate the total number of individuals employed by graduates as follows: 108 * 1 = 108 people; 289 * 2 = 578 people; 189 * 3 = 567 people; 120 * 4 = 480 people; 66 * 5 = 330 people; 15 * 6 = 90 people; 4 * 7 = 28 people; 1*8 = 8 people. Adding all the products gives a total number of 2,189 individuals employed by the respondents of this study. Substituting the total number of SMEs created and the total number of employees into equations 1 or 2 (earlier provided) gives a job creation index of:

$$JC_I = \left(\frac{\frac{2419}{4628} + \frac{2189}{4628}}{2} \right) \times \frac{100}{1} = \left(\frac{0.523 + 0.473}{2} \right) \times \frac{100}{1} = \left(\frac{0.996}{2} \right) \times \frac{100}{1} = 0.498 \times 100 \tag{5}$$

$\therefore JC_I = 49.8\%$.

Alternatively, we can get the same result if we find the average of equations 3 and 4. From equations 3 and 4, we have that:

$$NSME_I = \frac{2419}{4628} \times \frac{100}{1} = 52.27\% \tag{6}$$

and

$$NIE_I = \frac{2189}{4628} \times \frac{100}{1} = 47.30\% \tag{7}$$

Taking the average of the value of $NSME_I$ and NIE_I

$$= \frac{52.27 + 47.30}{2} = 49.8\% \tag{8}$$

This means that the job creation index of the respondents of this study is approximately at 50%.

4. Discussion

This study revealed that curriculum reengineering is minimal in Nigerian higher institutions. This result is not surprising due to the failure of the curriculum to offer training that meets the educational needs of students following innovations in different professions. The curriculum also failed to provide practical learning experiences to students during entrepreneurship classes rather than theory; allocate adequate time for students' practical training to qualify them as experts in their respective fields. Furthermore, the result is also explainable because the reengineering of the tertiary education curriculum is low in terms of reducing examination-focused teaching and learning situations to a more skill-oriented context. Again, using simulations to make learning experiential for long-lasting skill acquisition

and implementing learning activities based on globally established/universally accepted educational principles is low. Lastly, offering lesson content compatible with contemporary lifestyles and current realities is low. The abovementioned discovery supports previous research by Odigwe et al. (2018), which found that university students were not given enough time to acquire the necessary vocational skills for optimum work performance after graduation. It also agrees with Oseni's (2017) findings that entrepreneurship education is selective and limited to higher institutions and entrepreneurial development in the current Nigerian educational system.

According to this study, Nigerian graduates have a widespread lack in the acquisition of emerging technologies. This finding is due to graduates of Nigerian tertiary institutions using emerging web-based technologies like MOOCs, OERS, virtual libraries/laboratories; learning games and simulations; live streaming; AI; Adaptive Learning Systems; Virtual Reality; Learning Analytics; Social Media; Machine Learning Algorithms; Data Science/Analytics; and Digital Marketing Tools to a low degree. Considering that these technologies aim to improve learners' skills, it is surprising that there is a low extent among graduates to acquire such valuable resources. We attribute this result to the low awareness among graduates on some of these resources and perhaps the lack of access to these resources due to financial, knowledge, perception, attitude or other reasons (Owan et al., 2022c). This result corroborates another study (Owan & Ekpenyong, 2022) which found a low extent of students' use of electronic infrastructure in schools.

However, it was proven in the current study that graduates of Nigerian tertiary institutions adopt mobile learning, online learning, and video-assisted learning tools to a great extent. This result may be due to the ability of graduates to run these technologies from devices such as mobile phones, smartphones, and tablets, among others. Having access to the necessary hardware may improve graduates' use of emerging technologies in the future. The results support the study of Aslam et al. (2021), which found that the majority of respondents learnt using WhatsApp, online classes, and email; with a few learning through a learning management system (LMS), other means (such as department website, blogs, zoom applications). The result also offers support to Krajcik and Mun (2014) who submitted that electronic interceptors (sensors and software), dynamic modelling tools, interactive visualisation tools, and integrated e-learning are most commonly integrated into school curriculums to support science teaching and learning.

In descending order of acquisition, the present study discovered that many graduates of Nigerian tertiary institutions acquire emerging technologies for word processing, graphics, data science, and data analysis. The result is quite interesting because word processing appears to be one of the most pervasive aspects of computer applications. Besides, many graduates are more likely to own SMEs in word processing and graphics due to the many printing jobs available, especially for academic and non-academic purposes. Data science and analytics, especially the former, are considered among the hottest job prospects of the 21st century. The great extent of emerging technologies' usage in these areas is not surprising because they are relatively new disciplines. Besides, many universities in Nigeria do not run programmes on data science due to their relatively new status; thus, learning in this area is often internet-based. Therefore, many Nigerian graduates could be repositioning themselves for the future because data science and analytics are considered the jobs for tomorrow. This strengthens the result of Owan et al. (2021a) that while ResearchGate is currently the most widely used platform for distributing research results, those surveyed said they would be more likely to use Google Scholar.

On the contrary, it is surprising that low extents were recorded in the use of emerging technologies for printing, YouTube video production, designing of online courses, photo/video editing, programming, software development, digital marketing, online advertisement, customer outreach, copywriting/copyediting, affiliate marketing, freelancing, cryptocurrency/forex trading, e-learning and music production. This may be because most of the areas outlined are grey or not relatively attractive. It may imply that most graduates have already acquired the needed skills, resources, technology and competencies. Furthermore, graduates may no longer find such areas interesting, perhaps due to their perception that many individuals are already operating in them. Again, the low acquisition of emerging technologies for e-book production, remittance services, blogging and self-publishing may be due to either their unawareness of the opportunities in these areas or other constraints such as funds required to start initiatives in these areas. This finding tends to support Aslam et al. (2021), that also revealed that while the majority of respondents learnt using WhatsApp, online classes, and email, very few learnt through a learning management system, YouTube and other means (such as department website, blogs, zoom applications).

This study discovered that 58.30% of the participants had not created any job; however, 31.14% of the respondents had created one job, and 10.57% had created two jobs. Thus, graduates with at least one job creation in Nigeria between 2016 and 2021 constitute 41.70% of the total respondents. This finding corroborates the result of Oyefesobi et al. (2018) that the state of higher education in entrepreneurship has no significant effect on employment generation.

However, the result obtained in the current study is quite fair because it beats the researchers' imagination that Nigerian graduates have done this much in terms of their ownership of SMEs. This result is attributed to the growing awareness among Nigerians that where white-collar jobs are not available, other "side hustles" and ventures can help alleviate poverty. The result may also be attributed to graduates' exposure to entrepreneurial training while in school, during the skill acquisition and entrepreneurship development (SAED) of the NYSC, or elsewhere. This finding supports the observations of Ajakaye (2019) that although university graduates are faced with a shrinking number of government jobs and a struggling economy with fewer private-sector vacancies, many have become their own bosses through handcrafts, trading in consumer goods, agriculture and networking.

In terms of the number of employees, this study discovered that out of 1930 owners of SMEs, 58.96% have no employees. This implies that these graduates are self-employed and are running their businesses solely. Furthermore, 5.60, 14.97, 9.79, 6.22, 3.42, 0.78, 0.21 and 0.05% of the owners of SMEs have 2, 3, 4, 5, 6, 7 and 8 employees in their initiatives. This implies that 41.04% of the total number of graduates with SMEs have employed at least one person between 2016 and 2021. The result is not surprising because most SMEs can be solely managed, especially during the formative stages. Besides, most SMEs are still undergoing growth and expansionary processes and will require time before new workers can be employed. The job creation index of the respondents of this study was, at this time, estimated to be approximately 50%. This generally indicates that the job creation activity of tertiary institutions' graduates in Nigeria is average. However, with more efforts in advocacy, counselling, awareness creation, funding and other forms of support, this index is more likely to rise. However, the finding of Faloye and Olatunji (2018) found that entrepreneurship education, risk-taking capacity, and the impact of family, friends, and mentors were the most important predictors of entrepreneurial aspirations among the participants. This implies that graduates must address these challenges before venturing into any entrepreneurial initiative.

5. Limitations and Research Implications

The current study faces a few limitations. First, the focus on only university and polytechnic graduates that graduated between 2016 and 2021 limits generalisations to other graduates from colleges of education, agriculture and those that graduated earlier. Secondly, by using an electronic data collection tool, there is a high chance that most graduates who met the selection criteria but without internet access are excluded. Thus, the findings may have been different if these limitations (beyond the researchers' control) had been addressed. This further leaves a gap for future studies to cover graduates from 2015 and earlier and those from colleges and monotechnics. Also, future research will address the second limitation by adopting physical and electronic approaches to data collection.

6. Conclusion

This study demonstrates that there is generally a low level of readiness among Nigerian tertiary institutions to boost graduates' practical and entrepreneurial capacities due to the low curriculum reengineering practices. The low acquisition of emerging technologies for various purposes suggests that Nigerian graduates are not making serious efforts to supplement their deficiencies, occasioned by the state of the current curriculum. Although there is a growing effort among Nigerian graduates regarding job creation and the employment of other individuals, there is still room for significant improvements. While it was not proven in the current study whether curriculum reengineering or the acquisition of emerging technologies contributed to job creation, it has provided a framework or blueprint for future studies. The descriptive nature of this study has laid the groundwork for further studies to test for causal linkages among curriculum reengineering, the acquisition of emerging technologies and job creation among higher education graduates. The study can enable postsecondary institutions in Nigeria and other developing nations to tailor their curriculum to meet the changing needs of society. The study has also provided evidence for postsecondary school graduates to spring into action by adopting contemporary technologies for wealth creation and employment opportunities. Following the findings and conclusions of this study, it is recommended that the government, non-governmental organisations and other higher education partners and stakeholders provide state-of-the-art resources to tertiary institutions in Nigeria to promote practical and experiential teaching-learning situations. Curriculum partners should ensure that only lesson contents and learning experiences that meet the present-day demands are offered to students of tertiary institutions. More emphasis should be given to entrepreneurship education (which has already kick-started in many tertiary institutions) by expanding the duration of training. Graduates should tap into the abundance of the Internet by leveraging the benefits of emerging technologies for skill acquisition, utilisation and earnings. Graduates of Nigerian tertiary institutions should set up Small and Medium Enterprises (SMEs) rather than wait on the government for employment.

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