

## IR4.0: The Challenges for Graduate Employability in Nigeria

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### Abstract

This paper considers the emergence of IR4.0 and the effects on graduates from developing countries where education and technology are at a lower ebb. Using Nigeria as a yardstick to measure developing nations, the current rate of unemployment in Nigeria is very high. Research is currently on-going on how to prepare the students for the challenges of 21<sup>st</sup>-Century jobs. The disruptive tendencies of IR4.0 have now compounded the worry of many. The focus of this paper, therefore, is on the extensive review of the impact of technology unemployment on the employability of Nigeria graduates. This is judging from the fact that there has been a persistence rise in the rate of youth unemployment from 11.7% in 2014 to 36.5 in 2018. The paper dwelt on how developing countries can respond and react to emerging Technology unemployment. This attempt is based on the review of the existing literature on IR4.0 with the aim of identifying consensus among authors. This helps to classify and identify the most frequently mentioned constructs as an essential ingredient of IR4.0 that is basic for adoption in Nigeria. Broadly, the study revealed that the constructs of technical and non-technical skills are important components of IR4.0. The study recommended a holistic review of the Nigerian educational curriculum in the preparation of students for the challenges posed by IR4.0.

**Keywords:** IR4.0, Challenges, Graduates, Employability, Developing, Nations

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### Introduction

Recognizing the fact that the period between January 1, 2001, and December 31, 2100, is the period called 21<sup>st</sup>-century, the challenges of technology changes by the industrial players within the period has made the curriculum of most institution of higher learning obsolete and their certifications almost worthless (Du Plessis, 2016). Just as is happening in most nations of the world, Radda (2017) noted that only one out of one hundred Nigerian graduates are employable. The scenario is becoming more worrisome now since most of these nations depend solely on the discoveries and advances made by the developed world. They are a ready-market for finished goods and a dumping yard for finished goods. Thus, little or no mechanisms are in place to mitigate the effects of new technologies on the environment and the workforce (Onyeike & Onyeagbako, 2018).

The coming of the robotic automation will no doubt accelerate technological unemployment. The emerging technologies have the potential to eliminate more jobs than it will create (Peters, 2017). Technology is advancing in geometric progression with artificial intelligence, robotics, 3D-printing and other innovations that have the disruptive potential will soon arrive the mainstream thereby displacing many workers and making the job markets impenetrable by untrained graduates (MacCarthy, 2014).

Technological unemployment is an inevitable impending problem that will create greater inequalities and an increasing gap between the employers and the employees. Many experts have been proposing refusal of innovations, provision of welfare and public employment schemes and the introduction of the basic minimum wage as mitigating factor (Schwab, 2016). Others have proposed granting of subsidies to small business and self-employed as a solution to the impending job catastrophic losses. All these are tentative and palliative measures that

would not solve the problem that would emanate if a solid pragmatic measure is not put in place. Consequently, the role of education is called to play here. Efforts should be strengthened in the search for an appropriate and adequate methodological approach to avoiding the menace of human adventures that is capable of rendering other humans redundant and useless in the world of work for inanimate objects like we now hear of a driverless taxi in Singapore and flying taxi in Dubai. The disruptive changes to business models will have a profound impact on the employment landscape over the coming years if decisive pragmatic steps are not taken (World Economic Forum, 2016).

The world's economy is growing at a very fast rate. This is consequent upon the several advances and development in educational research conducted by researchers. This led to the dynamism in productivity since the last century, the competition among nations of the world has been so high either to outwit one another or not to be left behind in the human advances. A few countries like America, Japan, UK, Germany France, and China are leading the pack of nations in the forefront. While some like Ukraine and Armenia occupies the middle class trying hard to catch up and even surpass the feet already recorded. The others are at the bottom of the ladder as consuming nations. They are the developing countries providing a ready market for the products of the first-class world (Gray, 2016).

This has been the bane of most of the developing countries as it seems practically impossible to compete with the West, Europe, and a few Asian worlds. This again has placed a toll on their development and made them to be classified as 3<sup>rd</sup> –world countries, or non-aligned nations. Educationally, economically, and technologically, they are backward. Corruption was the order of the day. All these have left them at the mercy of the advances made by the emerging and developed nations (Okoye & Arimonu, 2016).



No doubt, the world is a global village. Countries must work interactively together to benefit their competitive advantages. The challenges of technology changes by the industrial players in 21<sup>st</sup>-Century have made the curriculum of most institution of higher learning obsolete and their certifications almost worthless. Radda (2017) noted that only one out of one hundred Nigerian graduates are employable. The scenario is becoming more worrisome now since most of the developing nations depend solely on the discoveries and advances made by the developed world. They are a ready market for finished goods and a dumping yard of the sort. Thus, little or no mechanisms are in place to mitigate the effects of new technologies on the environment and the workforce. While the issues concerning graduate employability are vigorously being considered by the developing nations, the interruption in IR4.0 has finally crept in. It is on record that most of the developed nations had put in place accreditation bodies for their graduate employability (Mohammed & Ismail, 2016). Thus, the danger posed by IR4.0 is foreseen and minimized. To stop the current rate of youth unemployment in Nigeria, something urgent needed to be done by remodeling the school curriculum to meet the challenges of the current reality. The rate of youth unemployment at 36.5% cannot be allowed to grow further. The skills to navigate technology unemployment can only be implemented at this early stage. This is because IR4.0 has the potential to eliminate more jobs than it will create (Peters, 2017). Technological unemployment is an inevitable impending problem that will create greater inequalities and increase the gap between the employers and the employees (MacCarthy, 2014; Peters, 2017). The banks no longer need many cashiers at the counter because of the availability of Automated Teller Machines. Money can now be deposited without physically visiting the banks. This is one of the disruptive changes that is being envisaged.

Consequently, the role of education is called to play here as the efforts are still on in the search for an appropriate and adequate methodological approach to avoiding the menace of human adventures that is capable of rendering other humans redundant and useless in the world of work for inanimate objects

**Literature review**

**The Unemployment Rate in Nigeria Typical of Developing Nations**

The level of youth unemployment in Nigeria has reached an alarming rate. The situation is made worse because most of the affected youths are graduates. The major reason for this is the absence of the skills for the existing jobs (Amedorme & Fiagbe, 2013; Asaju, 2014; Babatunde Durosini-Etti, 2017; Emmanuel, 2015). This implies the existence of skill-mismatch between the school and the employers. Other factors which have had cumulative effects identified by researcher are corruption, poor funding and dearth of infrastructural facilities in the Higher Institutions (Kautz, Heckman, Diris, Weel, & Borghans, 2014; Kim, Kim, & Lee, 2015; Moses, 2016; Salami, 2013; Vivarelli, 2014; Weligamage, 2009). The major reason advanced for lack of job among the youth of today is their lack of skills for employment. This is essentially the absence of employability skills. Employability skills are the employment skills needed by the youths not only to make them employable but to ensure their sustainability and advancement on the job (Kautz et al., 2014). Figure 1 describes the rate of youth unemployment between 2014 and 2017 in Nigeria.

The data released by the National Bureau of statistics in 2018 indicates that the rate of youth unemployment in Nigeria had been on persistence rise since 2014. Specifically, youth unemployment in rose from 11.7% in 2014 to 36.5 in 2018. And the country has a growing population of over 190 million people with the overall unemployed person at 20927.60 million (National Bureau of Statistics, 2018).

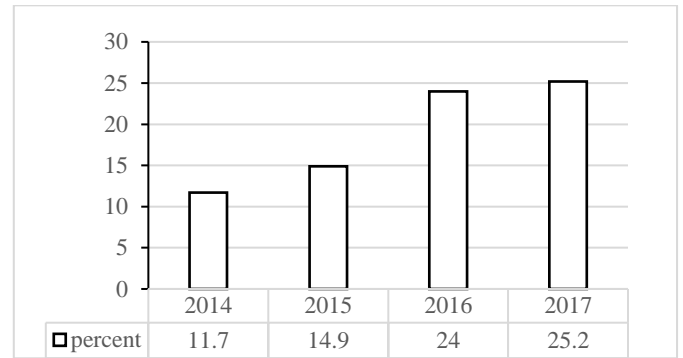


Figure 1: Youth unemployment rate in Nigeria

This is definitely disturbing due to the attendant social menace such as armed banditry, kidnapping for ransom, and a host of other social ills. Therefore, to avoid a more embarrassing and further drift that may occur due to the emergence of IR4.0, there is the urgent need to remodel the school curriculum to meet the requirements of the 21<sup>st</sup>-Century. Employability is concerned with lifelong learning (Dacre Pool & Sewell, 2007). Skills involving lifelong learning inform of employability skills and IR4.0 are strongly needed to cope with the challenges of 21<sup>st</sup>-Century.

**Classification of the World Economy**

There is the need to have a brief look at the world economies so as to identify the inequalities in the world and the possible impacts of IR4.0 on different nations.

The global economies of the word are classified into three based on the level of their technological advancement and gross national income. The theory of modernization defines global inequality based on the level of cultural and technological differences. Whereas, the theory of dependency discusses the global inequalities in relation to the historical exploitation of poor countries by the superpowers. A developed country is a sovereign nation that has a highly developed economy and advanced technology. Countries like the USA, Germany, UK, and Canada are in this category. Countries in the emerging economies include Japan, China, Singapore, and Italy. The yardstick for the measurement is the fast rate at which their economy is growing technologically, politically and stable legal framework (Cotteleer, 2017). At the same time, the developing countries are the third tiers of economies. The economies of these countries are still struggling and still need help from other countries for them to survive. They depend majorly on importation from both developed and emerging nations (Prospects, 2014). Among the countries in this category is Nigeria and countries like Chad, Yemen, Niger Republic and many more. Dumping is the order of the day. Figure 2 shows the classifications and determinant factors of the World’s economies.

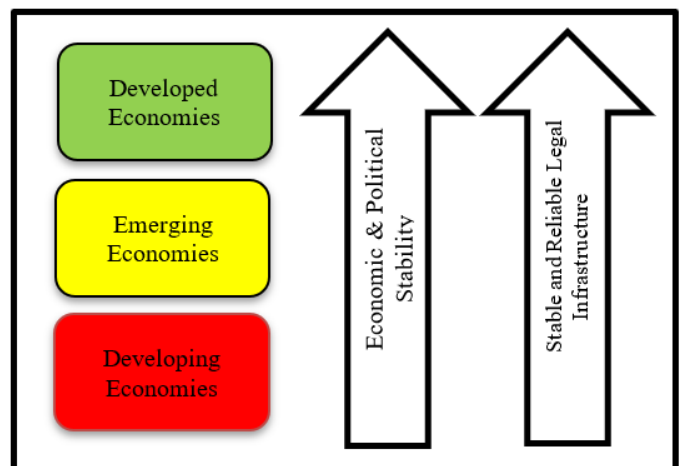


Figure 2: Classification of Economies (Cotteleer, 2017).

**Strategic Embedded IR4.0 Skills and Employability skills for 21<sup>st</sup>-Century Jobs**

While the world is patiently awaiting the full-fledged arrival of Industry4.0, researchers are already brainstorming and getting prepared for its eventual spread. Towards this end, evidence has shown that most of the new skills required to cope with IR4.0 are intricately connected and overlapped with many of the employability skills itemized for 21<sup>st</sup>-century jobs (Nunzio, 2018). The skills for Navigating Technology Unemployment are Critical thinking/ Problem solving, creativity, communication, collaboration, Curiosity, Initiative, Persistence, Adaptability, Leadership Socio-cultural awareness (peters, 2017). Table 1 shows a comparison of IR4.0 skills.

**Table 1:** Comparison of IR4.0

Peters, M.A (2017)	Nick, H.M (2017)	Schwab, K (2016)
Critical thinking	Complex problem solving	Cognitive ability
Problem-solving	Critical thinking	System skills
Creativity	Creativity	Complex skills
Communication	People management	Content skills
Curiosity	Coordinating with others	Process skills
Initiative	Emotional intelligence	Social skills
Persistence	Decision making	Resource management
Adaptability	Service orientation	Technical skills
Leadership	Negotiation	Physical skills
Socio-cultural awareness	Cognitive flexibility	

The World Economic Forum in 2016, listed the top driver of technological change to include: Mobile Internet and cloud computing; Internet of things; Advances in computing and big data[ New energy supplies and technologies; Advanced robotics and autonomous transportation; Artificial intelligence and machine learning; Advanced manufacturing and 3D printing; and, Biotechnology and genomics. Equally, (World Economic Forum, 2016) further classified the skills as shown in table 2.

**Table 2:** IR4.0 skills by World Economic Forum

Ability	Basic Skills	Cross-Functional Skills	
<b>Cognitive abilities</b>	<b>Content skills</b>	<b>Social skills</b>	<b>Resource management skills</b>
<ul style="list-style-type: none"> <li>▪ Flexibility</li> <li>▪ Creativity</li> <li>▪ Logical reasoning</li> <li>▪ Problem sensitivity</li> <li>▪ Mathematical reasoning</li> <li>▪ Visualization</li> </ul>	<ul style="list-style-type: none"> <li>▪ Active learning</li> <li>▪ Oral expression</li> <li>▪ Reading comprehension</li> <li>▪ Written expression</li> <li>▪ ICT literacy</li> </ul>	<ul style="list-style-type: none"> <li>▪ Coordinating with others</li> <li>▪ Emotional intelligence</li> <li>▪ Negotiation</li> <li>▪ Persuasion</li> <li>▪ Service orientation</li> <li>▪ Training &amp; teaching others</li> </ul>	<ul style="list-style-type: none"> <li>▪ Financial resources</li> <li>▪ Material resources</li> <li>▪ People resources</li> <li>▪ Time management</li> </ul>
<b>Physical abilities</b>	<b>Process skills</b>	<b>System skills</b>	<b>Technical skills</b>
<ul style="list-style-type: none"> <li>▪ Physical strength</li> <li>▪ Manual dexterity and precision</li> </ul>	<ul style="list-style-type: none"> <li>▪ Active listening</li> <li>▪ Critical thinking</li> <li>▪ Monitoring self and others</li> </ul>	<ul style="list-style-type: none"> <li>▪ Judgment and decision making</li> <li>▪ System analysis</li> </ul>	<ul style="list-style-type: none"> <li>▪ Maintenance and repair</li> <li>▪ Operation and control</li> <li>▪ Programming</li> <li>▪ Quality control</li> <li>▪ Technology and user experience design</li> <li>▪ Troubleshooting</li> </ul>
		<b>Complex problem-solving</b>	

It is crucial to have an understanding of these technologies and the effects it would have on the economy of developing nations more importantly, on the labour force. Similarly, IR4.0 skills cover an aspect of technology, finance and risk management, employee and competencies, system and process, service and network, strategy and business model (McKenna, 1998).

**Benefits of Industry 4.0**

The benefits of IR4.0 includes enhanced occupational safety as a result of increased automation, better working environment, increased collaboration in the production network made possible by consistent data availability, better protection of the environment, and increased innovative capability (Lim, 2016).

**Methodology**

In order to identify the key components of IR4.0, literature review of journal articles and *World Digest* was carried out. The aim was to find out how they match the employability skills required by graduates for 21<sup>st</sup> Century jobs. This was achieved by conducting a thorough document analysis of the skills prescribed by different authors and researchers.

A peer-reviewed approach was used to search for literature and identifies those that prescribe skills for industry unemployment. The purpose was to identify the similarities in the skills and determine the most commonly cited. Three kinds of literature were identified from different authors with each prescribing varying degree of skills. They are as shown in Table 1. As a result of definition and similarity of purpose, merger and exclusion were introduced to indicate relative similar skills index by authors. Twenty-nine (29) skills were identified by the authors and four (4) was found to be having a similarity of purpose through peer review. Therefore, those skills that are similar in purpose and have their difference in terminology were merged. The skills were then grouped into peers and analyzed using frequency counts and excel packages.

**Results**

In analyzing the review, charts were generated to give the pictorial representation of the results of the study. To arrive at the conclusion, the skills recommended by the authors were tabulated and comparison of purpose and intention were done to determine the frequencies of occurrence of each of the concepts as very important, important and less important. Figure 3 consists of the abridged skills stability index. Fig. 2 specifically shows the relative percentage index level of the skills. The result of the exclusion and abridged skills generated sixteen skills (16). The findings show that only four (4) skills have the highest frequency of three (3) while another four skills (4) equally has a frequency of two (2) each. The number of less important skills is eight (8). This is shown in Figure 4.

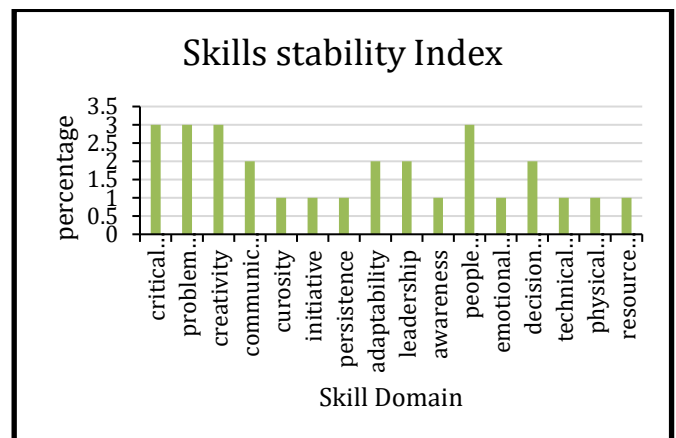


Figure 3: Skills Stability Index



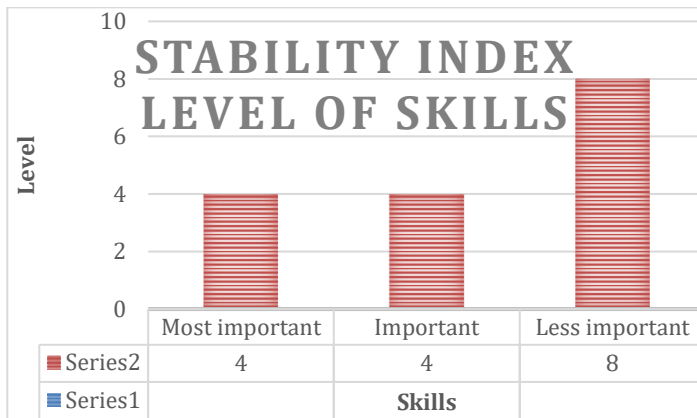


Figure 4: Graphical Index Level

**Discussion**

This study presents an overview of the IR4.0 skills required in Nigeria viz -viz developing countries to ensure that the unemployment situations in those countries do not become more terribly worse. Though most of the identified skills are within the confine of employability skills that are already being looked into, there are emerging skills from IR4.0 that required attention. These include 3D printing, IoT, cloud computing, artificial intelligence, and machine learning. Above all, the study emphasized the disruptive tendencies of IR4.0 that is capable of destabilizing the entire workspace if not well managed. The result of the document analysis also shows similarity to employability skills prescribed by researchers for 21<sup>st</sup>-Century jobs. IR4.0 comprises of hard and soft skills as found in employability skills (Boyatzis, 1982; Spencer, & Spencer, 1993; Legg-Jack, 2014; Edinyang, Odey, Odey, Gimba, 2015; Ismail & Mohammed, 2015; Jackson, 2015).

While it is possible for all countries to practice all the skills, it may not be practical for every discipline and individuals to imbibe all the IR4.0 skills due to its number and complexity. Therefore, we observed that the peculiarity of each discipline is an important feature that should be considered in the implementation of IR4.0. Any framework should give preference to individuals discipline-differences (Jollands, 2015). This will afford each discipline to adopt appropriate teaching methods and techniques peculiar to their educational domain.

This study on IR4.0 skills seems to be new. Although no specific framework is prescribed, the work serves to expand the body of knowledge and create more awareness on Technology Unemployment particularly, among Nigerians and similar developing nations and the academics in those countries.

Equally, the awareness created with the identified models and framework would be beneficial to government and industries in those countries and Nigeria in particular, to get prepared for the impending arrival of IR4.0. The model in this study can also be used for the remodeling of the school curriculum to ensure that the students are adequately prepared for 21<sup>st</sup>-Century jobs.

**Conclusion**

Although the results of this study are not being generalized, we are of the opinion that the study will contribute immensely to the preparation of the developing countries particularly, Nigeria for the final arrival of IR4.0. The model derived for the study will be sufficient to match the students with 21<sup>st</sup>-century jobs. The document analysis has shown that there are a major relationship and semblance in the skills prescribed for IR4.0 and employability skill. Therefore, we are recommending a future study that would develop a single framework/model for both concepts. Similarly, the study must give preference for the peculiarity of disciplines.

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