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Inclusive Skills in Electrical Electronic Technology for Sustainable Workforce in Knowledge-Based Economy in Rivers State

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Abstract: *The study investigated into the relevance of inclusive skills in electrical electronic technology for sustainable workforce in knowledge-based economy in rivers state. Two purposes, research questions and hypotheses guided the study. The study adopted survey research design. The study was carried out in the 2 state owned tertiary institutions. The population of this study consists of 24 respondents. This includes: 18 lecturers, and 6 technologist in electrical electronics technology. The instrument was a structured questionnaire. The instrument was structured on a 5-point Likert scale response of Strongly Agree (SA)=5, Agree (A)=4, Undecided (U)=3, Disagree (D)=2 and Strongly Disagree (SD)=1 respectively. Cronbach Alpha technique, the reliability coefficient (r) was found to be 0.89. Specifically, the research questions were analyzed using mean values. Any mean value of 3.00 and above was accepted while any with mean below 3.00 was rejected. The hypotheses were tested at 0.05 level of significance using t-test statistical tool. The findings of the study showed that inclusive skills and knowledge-based economy can afford students additional skills that will provide employment opportunity and national growth. The findings further showed that the items on features of knowledge-based economy needed for sustainable industrial growths in Rivers State are vital. The following recommendations were made:(1) Tertiary institutions in Rivers State should synergise with industries to provide inclusive skills and (2) Tertiary institutions in Rivers State imbibe on knowledge-based economy for self-sustainable employment.*

Keywords: Inclusive skills, Knowledge-based economy, Sustainable workforce, electrical/electronic technology

Introduction

The field of electrical electronic technology is the brain of all national development in the world as it affects different facets of disciplines. Electrical and electronics technologies are often at the forefront in other fields of modern technologies. Electrical electronic technology (EET) skills are developed from early conscientious creative thinking, craft, training, practice, skill acquisition, and institutional based-learning. Techdigitalweb (2021), defined electrical electronic technology as the application of scientific principles and theories in the production, design, testing, and installation, use of tools, control, and service of electronic and electrical parts, systems, and equipment. The foregoing definition suggest basic knowledge to be acquired in the study of electrical electronic discipline. Electrical electronic technology discipline allows you to develop many technical skills in installation and upgrading of electrical equipment, energy transfer through

wiring, energy production, commercial and residential wiring projects, safety regulations, and many more. These are basic prerequisite in industrial and residential sectors to operate as no machine can function without electrical power. Essentially, electrical technology is the study of equipment, systems, technology, and machines that can produce electricity that is why it is such a crucial field across many industries. Electrical electronic technological skills are the ability to apply knowledge and skills of the discipline, ability to identify and solve technological problems, ability to conduct experiments, ability to carry out standard tests and to analyse the results, ability to identify and use technical manual (Aharon, & Shai, 2020). These enormous expectations in electrical electronic professions, has further demanded different career paths of inclusive skills to meet up modern technologies in industries.

Inclusive skills in electrical electronic technology provides better opportunity for gainful employment in industries and to be self-reliant. ILO (2012), stated that skills, knowledge and innovation are driving forces of economic growth and social development in any country of the world. Therefore, the above topic could be recapped as all-embracing or all-encompassing skills in electrical electronic technology for sustainable workforce in knowledge-based economy**.** These all-embracing skills among others are creative thinking, circuit analysis, instrumentation, electrical electronic maintenance and repairs, Interpersonal Communication, organizational skill, trouble shooting, problem solving, innovative thinking, mathematics, physics, testing, Matlab, Auto card. These life-long skills are often acquired after a formal institutional-based learning. International Labour Organisation and World Trade Organization (ILO & WTO), (2017), pointed out that, these skills and capabilities are increasingly necessary in industrial workplaces in any case. This need has especially strong implications for TVET and university-level institutions to be taught, which can provide industrial employment with learning opportunities that are not strictly job related, and for workers' organizations, that can inform and motivate their members, coordinate the provision of training, both can collaborate and negotiate with employers to broaden the focus of workplace training and facilitate access to employability skills and continuing education.

These are part of skills that provide sustainable workforce in knowledge-based economy and to be taught in Universities and Polytechnics in Rivers state. Employers are not only demanding of technical skills listed above, but there are needs for an additional set of qualifications in inclusive skills (Martin, Maytham, Case & Fraser, 2005). Inclusive skills could be said to be interpersonal and social qualifications that permit the individual to function well in society. It is appropriate to assign these skills to emotional intelligence and, contrary to technical qualifications, inclusive skills can be implemented in a broad context and are not limited to a particular type of activity (Redish, & Smith, 2008). Recognising the necessity of inclusive skills, Accreditation Board for Engineering and Technology *(*ABET) has updated the accreditation criteria for engineering and technology programs, so as to accommodate inclusive skills alongside technical skills (ABET, 2018). Furthermore, educational institutions, such as Purdue University (US), University College London (UK) and Shantou University (China) have also started incorporating inclusive skills in their curriculum (Redish, & Smith, 2008). The inclusion of technical skills and inclusive skills in their curriculum is to bridge the gap between university training and industry requirements. The training given by higher institutions and industries, present sustainable workforce aftermath to the society. When human resources are used in a sustainable way, the economy grows and employees are not only able to perform in-role or requisite job demands, but provides sustainable workforce, being creative and sustainable innovation in the society.

Sustainable workforce is felt where conducive atmosphere is created for worker's well fair for their day to day leaving. Bob (2017), explained sustainable workforce as one where the work environment is caring and supports employee wellbeing. This suggest that employees should not be seen as primary resources that can be deployed to serve employers' economic solely and at their own detriment. Their skills, talent, and energies are not to be overused or overly depleted. Hence, employing organizations who seek to foster overall workforce sustainability must approach work–life balance broadly (Ellen, Monique & Pamela, 2013).To achieve sustainable workforce, employees are not to be faced with excessive workload nor with a relentless pace of work for weeks or years continually. When the time of crisis, such as natural disasters, sickness, maternity etc., employees should be given time to recover or seek the extra resources they need to be able to perform in the future maximally (Bob, 2017). If employees well-being are placed in proper perspectives knowledge-based economy will strive.

Sustainable knowledge-based economy are not attained in a vacuum where well-being of workers are dragged in to mud. Sustainable knowledge-based economy are not attained in an environment where employment outfit are not created. The Organization for Economic Co-operation and Development (OECD) in George (2003) considered a knowledge-based economy as 'an economy in which the production, distribution, and use of knowledge is the main driver of growth, wealth creation and employment across all industries. Sustainable knowledge-based economy are not realized in a state or country where industries are not built. Accelerating technological advances and globalization knowledge will become a strategic asset where Rivers State Government and industries synergized in developing manpower. Manpower development, Information and Communication Technology, knowledge and learning skills, innovation and entrepreneurship, business organization, workable policies and regulations can place Rivers State on the fast track to global economy advancement. The Economic and Social Council (2000) defined a knowledge and information society' as a society endowed with the ability, capacity and skills to generate and capture new knowledge and to access, absorb and use effectively information, data and knowledge with the support of information and communication technology.

Knowledge-based economy projects positive social inter-relationship that enhances business performance, greater cohesion among different organizational sectors. There are enforced commitment of common purpose, resilience at individual responsibility, knowledge sharing, and collaborative capacity between employers and employees that lead to knowledge-based economy. Knowledge-based economy has created demand on Technological change in skilled labor and spurring an upgrading skills across economies. The emergence of a knowledge-based economy has spawned alertness between employers and employees that its sustainability will galvanized rapid economy growth in Rivers State.

Knowledge based economy is that, which follows new globalized economic that takes in to consideration the importance of talent and education. Better qualities of education in any place directly depends on quality of teachers, lecturers, technologist, environment and infrastructures available. Osaro and Wokekoro, (2018) observed that, the major factors responsible of poor condition of public schools in Rivers State include vandalism, neglect, lack of maintenance, lack of security, inadequate government intervention and inadequate funds allocated to schools for maintenance works.

Innovation and entrepreneurship are new global driving forces for growth that are to be imbibed in a nation for the sustainable workforce. Aleanor and Amakodi (2019), revealed that shortage of qualified lectures, inadequate facilities, inadequate teaching techniques, poor funding and lack of government support hinders the effective implementation of entrepreneurship education in tertiary institutions in Rivers State.

Re-inventing businesses and industries in the face of global competition is a hall-mark that galvanize knowledge-based economy that all well-meaning government like Rivers state can embark on for effective development of the state. Emi (2016), reiterated the need to re-inventing Port Harcourt as a shipping hub through which relevant stakeholders of the shipping industry will give adequate attention to Port Harcourt seaports to ensure that they are brought back to their original status as a bustling shipping hub as envisioned by the founding fathers. Knowledge-based economy cuts across life-long learning that gives the opportunity to stay employed under a conducive fiscal, regulatory framework that encourages innovation and competition. Kedare (2013), defined lifelong learning as the continuous building of skills and knowledge throughout the life of an individual. Lifelong learning is the drive to never stop growing in knowledge, far after school, even after a lengthy career giving opportunity to increase self-motivation, creating new goals and drives, greater self-confidence, learning practical skills, learning for the sake of enjoyment, sharpening your mind, and contributing to existing interests in the society.

Globalization in industries has made it possible for inclusive skills in electrical electronic technology to create sustainable workforce for knowledge-based economy. The workforce sustainability are realized through re-inventing industries, provision of employment outfit, adequate funding of education, provision of training infrastructure and lifelong learning. Graduates of technology education such as electrical/electronic option are expected to create jobs for themselves in order to earn a living based on the relevant skills acquired from the programme. However, most technology education programmes in the country presently lack what it takes to secure paid employment or becoming self-reliant due to poor acquisition of inclusive skills in electrical/electronic technology. Technology education students seem to be ignorant of the inclusive skills needed for sustainable workforce in knowledge-based economy. It is a well-known fact that one major way of solving a problem is to identify relevant inclusive skills needed for sustainable work force in knowledge based economy which could be developed from technology education program. This development informed the researchers' curiosity to carry out the study on inclusive skills in electrical/electronic technology for sustainable workforce in knowledge based economy in Rivers state. .

Purpose of the Study

This study specifically sought to:

1. Identify needed inclusive skills in electrical electronic technology being taught in Rivers State tertiary institutions.
2. Determine features of knowledge-based economy needed for sustainable industrial growths in Rivers State.

Research Question

1 What are the needed inclusive skills and electrical electronic technology being taught in Rivers State tertiary institutions?

2 What are the features of knowledge-based economy needed for sustainable industrial growth in Rivers State?

Hypotheses

Ho$_1$: There is no significant difference in the mean scores of lecturers and technologists on needed inclusive skills in electrical electronic technology being taught in Rivers State universities.

Ho$_2$: There is no significant difference in the mean scores of lecturers and technologists on the features of knowledge based economy needed for sustainable industrial growth in Rivers State.

Methodology

The study adopted a survey design in which the opinions of the respondents were used based on various issues raised to determine inclusive skills in electrical electronic technology for sustainable workforce in knowledge-based economy in Rivers State. The population of the study was 24 persons which comprised 6 technologist and 18 lecturers from Rivers State University and Ignatius Ajuru University of education all in Port Harcourt, Rivers State. 25- Item questions were used to elicit opinion from respondents on five (5) points response alternative of strongly agree (SA), agree (A), undecided (UD), disagree (D) and strongly disagree (SD). These were assigned scores as follows: SA=5, A=4, U=3, D-2 and SD=1. The instrument was constructed and developed by the researcher based on the intensive literature review and research questions for the study. The reliability of the instrument was established using the test-retest method. The reliability coefficient was found to be 0.89. Specifically, the research questions were analyzed using mean values. Any mean value of 3.00 and above was accepted while any with mean below 3.00 was rejected. The hypotheses were tested at 0.05 level of significance using t-test statistical tool. The hypothesis was regarded accepted where the t-test value calculated is less than the critical or tabulated t-test value. If the calculated t-test value is greater than the critical t-test value, the null hypothesis is rejected.

Results

Research Question 1: What are the needed inclusive skills and electrical electronic technology being taught in Rivers State tertiary institutions?

Table 1. Mean and Standard Deviation on Needed Inclusive Skills in Electrical Electronic Technology to Be Taught In Rivers State Tertiary Institutions

S/no	Needed inclusive skills are:	**STD**	$\bar{X}$	**DEC**
1	Creative thinking	0.903	4.47	A
2	Circuit analysis	0.441	4.67	A
3	Instrumentation	0.334	4.67	A
4	Maintenance and repairs	0.157	4.95	A
5	Interpersonal Communication	0.662	4.72	A
6	Organizational skill	0.350	4.81	A
7	Trouble-shooting	0.000	5.00	A
8	Problem solving	0.157	4.95	A
9	Innovative thinking	0.208	4.89	A
10	Auto card	1.098	4.31	A
11	Matlab,	0.430	4.72	A
12	Testing	0.000	5.00	A
	Grand Mean	**0.395**	**4.763**	**A**

Data in Table 1 showed the mean response of Lecturers and Technologist that ranges from 4.31 to 5.00, and the standard deviations ranges from 0.000 to 0.903. The mean shows that respondents agreed on the items as needed inclusive skills in electrical electronic technology to be taught in

Rivers State tertiary institutions. The standard deviation indicates the homogeneity of the respondents.

Research Question 2: What are the features of knowledge-based economy needed for sustainable industrial growth in Rivers State?

Table 2. Mean and Standard Deviation on Features of Knowledge-Based Economy Needed For Sustainable Industrial Growths in Rivers State

S/no	Features of knowledge-based economy are:	STD	$\bar{X}$	DEC
1	Re-inventing businesses	0.515	4.70	A
2	life-long learning	0.374	4.75	A
3	Innovation	0.000	5.00	A
4	Entrepreneurship	0.000	5.00	A
5	Adequate government intervention	0.393	4.78	A
6	Adequate infrastructure	0.096	4.97	A
7	Adequate educational funding	0.157	4.95	A
8	Adequate employment outfit	0.373	4.83	A
9	Manpower development, ,	0.475	4.70	A
10	Availability of Information and Communication Technology	0.208	4.89	A
11	Re-inventing industries	0.536	4.59	A
12	Functional policies and regulations	0.722	4.42	A
13	Government and Industries synergy	0.524	4.50	A
	Grand mean	**0.336**	**4.78**	**A**

Data in Table 2 showed the mean response of Lecturers and Technologist that ranges from 4.42 to 5.00, and the standard deviations ranges from 0.000 to 0.722. The standard deviation indicates the homogeneity of the respondents. The mean shows that respondents agreed on the items as features of knowledge-based economy needed for sustainable industrial growths in Rivers State.

***Ho*$_{1}$:** There is no significant difference in the mean scores of lecturers and technologists on needed inclusive skills in electrical electronic technology being taught in Rivers State universities.

Table 3: T-Test Analysis on Needed Inclusive Skills in Electrical Electronic Technology to Be Taught In Rivers State Tertiary Institutions

Respondents	**N**	$\bar{X}$	**SD**	**Df**	**p-value**	**t-cal**	**t-critical**	**Decision**
Lecturers	18	4.688	0.503					Agreed
Technologist	6	4.833	0.287	22	0.05	-0.275	2.07	

Table 3 indicated that t-cal at (-0.275) is less than t-critical at (2.07) which showed that te stated null hypothesis was agreed, thus there is no significant difference between the mean responses of Lecturers and Technologist on needed inclusive skills in electrical electronic technology to be taught in Rivers State tertiary institutions**.**

Ho2: There is no significant difference in the mean scores of lecturers and technologists on the features of knowledge based economy needed for sustainable industrial growth in Rivers State.

Table 4: T-Test Analysis on Features of Knowledge-Based Economy Needed for Sustainable Industrial Growths in Rivers State

Respondents	N	$\bar{x}$	SD	Df	p-value	t-cal	t-critical	Decision
Lecturers	18	4.74	0.451					Agreed
Technologist	6	4.78	0.277	22	0.05	-0.258	2.07	

Table 4 showed that t-cal at (-0.258) is less than t-critical at (2.07) which indicated that the stated null hypothesis was agreed, proving there is no significant difference between the mean responses of Lecturers and Technologist on features of knowledge-based economy needed for sustainable industrial growths in Rivers State.

Discussion of Findings

The findings of the study showed that the items on needed inclusive skills in electrical electronic technology to be taught in Rivers State tertiary institutions are necessary in creating employment. This is in tandem with (Sunday, Nor & Adibah, 2019) who stated that there is a skill mismatch between Colleges of Education in Nigeria and the labour market, and therefore, the students lack the skills for 21st-Century jobs. The findings further showed that the items on features of knowledge-based economy needed for sustainable industrial growths in Rivers State are vital. The findings is in accordance with (Ljerka, & Dario, 2011), who pointed out that, the change towards a knowledge-based economy is happening on a global scale, a transformation is taking place in all advanced industrialized economies and many developing economies are also aspiring to reach this target. Therefore, Knowledge-based economies require some critical requisites to become real and efficient economies.

Conclusion

The study has x-rayed needed inclusive skills as vital area to be incorporated in electrical electronic technology to be taught in tertiary institutions in Rivers. It is a sustainable means for self-employment and development. The study also noted that knowledge-based economy is a fast lane for national growth. Globally, knowledge-based economy has adopted innovation, and industrialization and has transformed the shift in proportion of national income and therefore tertiary institutions are pillars where this opportunity can be provided.

Recommendations

The success of this study has given a limelight on ways how inclusive skills and knowledge-based economy could be realized. On these note therefore, the following recommendations are given:

1 Tertiary institutions in Rivers state should diversify to embrace inclusive skills in course of learning.
2 Tertiary institutions in Rivers State should synergise with industries to provide inclusive skills
3 Tertiary institutions in Rivers State imbibe on knowledge-based economy for self-sustainable employment.

References

ABET (2018). Criteria for Accrediting Engineering Programs. *Accreditation Board for Engineering and Technology.* ABET415 North Charles St.Baltimore, MD 21201

Aharon, G. & Shai, M. (2020). Importance of technical and soft skills: electronics students' and teachers' perspectives. *WIETE Global Journal of Engineering Education,* 22, (1).

Amadi, E. A & Amakodi, S. E. (2019). Factors Influencing the Implementation of Entrepreneurship Education in Tertiary Institutions in Rivers State. *International Journal of Innovative Social & Science Education Research* 7(2):22-36, SEAHI PUBLICATIONS.

Bob, M. (2017). What Is Workforce Sustainability? *www.jozito.com*

Economic and Social Council (ESC) (2000) *Development and International Cooperation in the Twenty-First Century: The role of information technology in the context of a knowledge-based global economy, Report of the Secretary-General,* New York.

Emi, M. (2016). Re-inventing Port Harcourt as a shipping hub. *Business day newspaper*.

George, O. (2003). Preparing Singapore's construction industry for the knowledge-based economy: practices, procedures and performance. *Construction Management and Economics Preparing Singapore's construction industry*. 21, 113–125

Igberadja, S. A. (2014). Challenges of implementing technical vocational education and training in Nigeria Universities. *Global Advance Research Journal of Education research and Review*, 3 (5), 98-101

International Labour Office (ILO) (2004). Conclusions of the Tripartite Meeting on Youth Employment: The way forward, Tripartite Meeting on Youth Employment: The way forward, Geneva.

International Labour Office (ILO) (2012).*TVET reform: design an inclusive skills development program / International Labour Organization,* ILO Country Office for Bangladesh. - Dhaka: ILO, 2012

International Labour Organization and World Trade Organization (ILO & WTO) (2017). *Investing in skills for inclusive trade.* International Labour Office 4 route des Morillons CH-1211 Geneva 22 Switzerland

Kedare, S. K. (2013). Lifelong learning: National Seminar on Innovations in Education for Knowledge Society. *An international peer reviewed Scholarly Research Journal for interdisciplinary Studies www.srjis.com*

Ljerka, C. & Dario, M. (2011). Knowledge-based economy: a requirement of a *paper presented at 3rd International Scientific Conference "Knowledge and Business Challenges of Globalisation,* Celle, Slovenia

Martin, R., Maytham, B., Case, J. & Fraser, D. (2005) Engineering graduates' perceptions of how well they were prepared for work in industry. *European Journal of Engineering Education,* 30, (2): 167-180.

Osaro, N. G. & Wokekoro, E. (2018). Conditions of Public Secondary Schools in Rivers State, Nigeria, *African Real Estate Society* (AfRES) 147.

Redish, E.F. & Smith, K.A. (2008). Looking beyond content: skill development for engineers. *Journal of Engineering Education. 97, (3): 295-307.*

Sunday, R. O., Nor, B. A. F. & Adibah, A. L. (2019) Soft Skills Needed by Electrical Technology Students for 21st Century Jobs. *International Journal of Entrepreneurial Research* (IJER) 2(3):14-21

Techdigitalweb (2021).The basics of electronic technology: definition, skills, Career. *www.techdigitalweb.com*