Work-Based Skills Need for Employability of Mechanical Engineering Students of Polytechnics in Rivers State

ONYIJE, Theophilus
Department of Automobile Technology,
Federal College of Education (Technical) Omoku, Rivers State

SAUE, Baritule Prince
Department of Technical Education,
Ignatius Ajuru University of Education Port Harcourt, Rivers State

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Abstract

The study determined the work-based skills need for employment of mechanical engineering student of polytechnics in Rivers State. Specifically, the study sought to determine mechanical engineering and generic skill needs for employment of polytechnic students in Rivers State. Two research questions were posed and two null hypotheses were formulated to guide the study at 5% level of significance. Descriptive survey research design was adopted for the study. The population of the study consisted of all the thirty-two (32) respondents (twenty-one (21) lecturers and eleven (11) technologists) of mechanical engineering lecturers and technologists in Rivers State owned polytechnics in Rivers State which are Ken Saro Wiwa Polytechnic Bori and Captain Elechi Amadi Polytechnic Rumuola Port Harcourt Rivers State. No sample was taken since the population of the study was of manageable size. The instrument for data collection was a researcher's designed questionnaire which comprised 20-items and was designed on a 5- point likert scale of Strongly Agree (SA), Agree, (A), Undecided (U), Disagree (D) and Strongly Disagree (SD) having ordinal values of 5,4,3,2 and 1 respectively. Three experts validated the instrument while Cronbach Alpha method was used to determine the reliability of the instrument which yielded a coefficient of 0.87 after a test-retest which lasted for 15 days. Mean and standard deviation was used to answer the research question while t-test was used to test the hypotheses. The criterions mean score was taking at 3.50. That means, "reject" the null hypotheses where t-cal value was equal or greater then table value, but otherwise, "accept" the null hypotheses. The findings revealed that mechanical engineering skills and generic skills such as identified below are needed for employment of mechanical engineering students of polytechnic in Rivers State. The study therefore recommended that government should provide adequate mechanical engineering training facilities for the acquisition of mechanical engineering skills in polytechnics in Rivers State.

Keywords: *Work-Based Skills, Mechanical Engineering, Polytechnics and Employability*

Introduction

Education has been generally acknowledged as the key that unlocks the gate to the social, economic, political and technological development of any society. Education is the basic force for the socio-economic and political transformation of society. However, education is regarded as the process of transmission, preservation and improvement of the culture of a people. It is a process through which human beings become morally good members of their society. Education helps individual to realize their potentials and thereby improving society. According to Ocho in Offorma (2016), apart from the inculcation of values, the other purposes of education include acquisition of knowledge, understanding and physical skills. A good and functional educational system targets buoyant economic, political, moral, spiritual and healthy development of a nation, Offorma (2016) describe education as something more than schooling, she added that people are schooled to accept a society but that they are educated to create or recreate one. Education can therefore be explained as becoming critically aware of one's reality in a manner that ends with reflective action upon it. This enables an individual to understand his world well enough to deal with it effectively. Polytechnic education in Nigeria is recognized as part of tertiary institutions whose aim is to provide middle-level manpower to man the various sectors of Nigeria economy (Ikelegbe and Odede, 2012).

Polytechnic education, which is part of technical education programme in tertiaryeducation Level leads to the acquisition of practical and applied skills as well as fundamental scientific knowledge. To Ukpai (2008), polytechnic education is aimed at evolving an educational system based on work and training. Polytechnic educate future leaders and develop the middle-level technical capacities that underpin economic growth and development (Ekundayo and Ajayi, 2009) and stressing further that, the main purpose and relevance of polytechnic education in Nigeria is the provision of much needed manpower to accelerate the socio-economic development of the nation, making it an instrument of social change and economic development. The polytechnic programmes are designed as two tier programme of studies, namely; the National Diploma (ND) and the Higher National Diploma (HND) with one year period of industrial experience which is a pre-requisite for entry into the Higher National Diploma programmes.

Polytechnic educational system therefore placed premium on practical skills acquisition by students for the technological advancement of the nation. This is seen from the NBTE curriculum which stipulates that 60% of total score in any technical courses should be awarded to practical works while the remaining 40% is for theoretical courses in polytechnics. According to Oni in Owo and Isaac (2020) a polytechnic is an educational system that equips an individual for employment or self-reliance by providing the learner with the necessary skills needed in the agricultural, industrial and commercial sectors leading to the economic advancement of a country. Polytechnic can be described as a non-university, institution of higher learning, saddled with the responsibility of offering different courses in technical subjects, technology, industrial production, agriculture, commerce and communication together with the provision of knowledge and skills associated with the handling of relevant tools and equipment, and to develop students through both theoretical and practical experience (Oluwole & Lateef, 2015). Polytechnic education as described by Graham in Attamah and Dauda (2017) is a segment of the general education that prepares individuals for occupational fields and for effective participation in the world of work,

lifelong learning for responsible citizenship preparation, sustainable development promotion, a best method of facilitating poverty alleviation and enable individual to develop technical and entrepreneurial skills and attitudes.

Mechanical engineering skills are the skills needed by those in this profession to effectively and productively perform their job duties. These skills include both hard and soft skills, or skills that are learned in school, training, or on-the-job as well as skills that come innately to individuals. Because mechanical engineers work in a variety of industries, including the automotive and manufacturing industries, these professionals often need a broader skill set than other types of engineers.

Generic skills refer to lifelong skills students need to learn that apply to broad aspects of life, and are not specific to a certain class or subject. Therefore, the acquisitions of these skills no doubt will enhance equip students with the needed skills hence, enhance their employability.

Employability is the relative capacity of an individual to achieve meaningful employment given the interaction of personal circumstances and the labour market (Canadian Labour Force Development Board 2005 as cited in Saue, 2020). While employability Skill is a set of achievement, skills, understanding and personal attributes that makes graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy" (Knight & Yorke, 2014). Employability skills are those necessary abilities that are essential for securing, maintaining, and performing efficiently on the job. These are the abilities or skills, approaches and activities that allow employees to relate to with their colleagues and managers to be able to come up with critical decisions. Unlike technical skills, employability skills are generic in nature rather than for specific jobs and therefore cuts across different types of industries, job levels and business sizes, from the new level employees to the most senior positions (Robinson & Garton 2008 as cited in Saue, 2020).

Employability skills is a series of attributes, skills and knowledge to the workforce to make sure that they have the ability to be effective in the workplace that they are interest of their own, industry and economy to be wider. Employability skills also guide to get a job that has the skills professionally qualified so that explicitly increase the attractiveness to be recruited (Cavanagh, et al 2009). It indicates that employability skills include all the possibilities for someone to be successful in a variety of jobs in the market situation and looking at a person's capability to develop. Therefore, the employability skills are considered as a basic of their fundamental because it will provide mastery of technological change.

Statement of Problem

Polytechnic education is aimed at equipping students with requisite knowledge and skills in various disciplines including mechanical engineering through the integration of theoretical and practical courses. However, these objectives have been defeated by several setbacks in the educational sector ranging from poor instructional strategy, dilapidated buildings, lack of tools, equipments and materials, under-staffing etc, thereby causing high level of insecurity, joblessness among others. Furthermore, this has also cause serious economic downturn resulted in poverty and unemployment among others whereas, socio-political issues include increase in crime rates such as cultism, kidnapping, armed robbery, smoking, rape, prostitution, human trafficking among others. All these have immerged due to lack of technical and generic skills to salvage the teaming graduates from the impact of

unemployment and roaming the streets of Nigeria. In light of the above, the present is sought to determine the work-based skill needs of mechanical engineering students of polytechnics in Rivers State.

Purpose of the Study

The purpose of the study was to find out the work-based skill needs for employment of mechanical engineering students of polytechnics in Rivers State. Specifically, the study sought to determine the;

1. Mechanical engineering skills needs for employability of mechanical engineering students of polytechnics in Rivers State
2. Generic skills need for employability of mechanical engineering students of polytechnics in Rivers State

Research Questions

The following two research questions guided the study

1. What are the mechanical engineering skills need for employability of mechanical engineering students of polytechnics in Rivers State?
2. What is the generic skills need for employability of mechanical engineering students of polytechnics in Rivers State?

Hypotheses

Two (2) null hypotheses were formulated to guide the study at 5% level of significant.

1. There is no significant difference between the mean and standard deviation scores of lecturers and technologists on mechanical engineering skill needs for employability of mechanical engineering students of polytechnics in Rivers State
2. There is no significant difference between the mean and standard deviation scores of lecturers and technologists on generic skills mechanical engineering skill needs for employability of mechanical engineering students of polytechnics in Rivers State.

Methodology

Research Design: The study adopted a descriptive survey research design.

Population of the Study: The population of the study consisted of all the thirty-two (32) respondents (twenty-one (21) lecturers and eleven (11) technologists) of mechanical engineering lecturers and technologists in Rivers State owned polytechnics in Rivers State which are Ken Saro Wiwa Polytechnic Bori and Captain Elechi Amadi Polytechnic Rumuola Port Harcourt Rivers State.

Sample and Sampling Techniques: Only Ken Saro Wiwa Polytechnic Bori offered mechanical engineering, hence, no sampling was taken since the population was manageable of size.

Instrument: The instrument for data collection was a researcher's designed questionnaire which comprised 32-items. The instrument titled "*Work-Based Skill Needs for Employability of Mechanical Engineering Students of Polytechnics in Rivers State"* was designed on a 5-point likert scale of Strongly Agree (SA), Agree, (A), Undecided (U), Disagree (D) and Strongly Disagree (SD) having ordinal values of 5,4,3,2 and 1 respectively.

Validity of Instrument: Two (2) experts; one (1) drawn from Department of Technical Education (Mechanical Technology Option), Ignatius Ajuru University of Education Port Harcourt Rivers State and one (1) from Mechanical Engineering Department, Ken Saro Wiwa Polytechnic Bori validated the instrument.

Reliability of the Instrument: Cronbach Alpha method was used to determine the reliability of the instrument which yielded a coefficient of 0.73 after a test-retest which lasted for 13 days.

Data Analysis: Data collected for the purpose of this study was analyzed using mean and standard deviation and an inferential statistic of t-test was used to test the null hypotheses at 5% level of significant. To answer the research question, it was noted that any mean scores less than 3.50 was referred to as disagree whereas mean scores equal or greater than 3.5 is referred to agree. Furthermore, it was decided that "reject" the null hypotheses where t-calculated value was equal or greater then table t-table, but otherwise, "accept" the null hypotheses.

Results

Research Question 1: What is the mechanical engineering skill needs for employability of students of polytechnics in Rivers State?

Table 1
Mean and Standard Deviation of lecturers and technologists on mechanical engineering skill needs for employability of students of polytechnics in Rivers State

		Lecturers N=21			Technologists N=11		
S/N	**ITEMS**	$\bar{X}_1$	SD_1	**Remark**	$\bar{X}_2$	SD_2	**Remark**
1	Foundry skill	4.05	1.02	Agree	4.08	0.95	Agree
2	Computer aided manufacturing skill	4.65	0.57	Agree	4.40	0.81	Agree
3	Computer aided design skill	3.76	0.92	Agree	3.65	0.98	Agree
4	Mechanical instrumentation skill	3.94	0.85	Agree	3.79	1.09	Agree
5	Welding and fabrication skill	3.65	0.98	Agree	3.78	1.12	Agree
6	Refrigeration and air-conditioning skill	4.05	1.2	Agree	3.94	0.89	Agree
7	Machining skills	4.20	0.83	Agree	4.19	0.97	Agree
8	Plant services and maintenance skill	4.10	1.04	Agree	4.35	0.73	Agree
9	Automobile technology skills	4.19	0.97	Agree	4.25	0.85	Agree
10	Safety and management skills	4.04	0.95	Agree	3.80	0.98	Agree
	Average Mean	**4.06**	**0.93**	**Agree**	**4.03**	**0.88**	**Agree**

Source: Researchers (2022)

Table 1 above shows the responses of the respondents on mechanical engineering skills need for employability of mechanical engineering students of polytechnics in Rivers State. Table 1 revealed the average scores for mean and standard deviation ranging from 4.03 - 4.06 and standard deviation between 0.88 - 0.93 respectively. Based on the result above, the study found that foundry, automobile mechanic, plant service and maintenance, fabrication and welding skill, mechanical instrumentation, computer-aided manufacturing, computer-aided

design and safety and management skills are needed for employability of mechanical engineering students of polytechnics in Rivers State.

Research Question 2: What are the generic skill needs for employability of mechanical engineering students of polytechnics in Rivers State?

Table 2
Mean and Standard Deviation of lecturers and technologists on generic skill needs for employability of mechanical engineering students of polytechnics in Rivers State

		Lecturers N=21			Technologists N=11		
S/N	**ITEMS**	$\bar{X}$	**SD**	**Remark**	$\bar{X}$	**SD**	**Remark**
1	Leadership skill	4.09	0.90	Agree	3.95	0.86	Agree
2	Conflict resolution skill	4.50	0.76	Agree	4.24	0.74	Agree
3	Self-management skill	4.11	1.04	Agree	4.04	0.95	Agree
4	Communication skill	3.79	1.09	Agree	3.65	1.07	Agree
5	Decision-making skill	3.65	0.98	Agree	3.53	1.24	Agree
6	Flexibility skill	3.88	0.81	Agree	4.00	0.90	Agree
7	Strategic planning skill	3.53	1.24	Agree	3.65	1.07	Agree
8	Time-management skill	4.09	0.90	Agree	3.97	0.94	Agree
9	Problem-solving skill	3.94	0.89	Agree	3.82	1.22	Agree
10	Information and Communication Technology skill	4.11	1.04	Agree	4.06	0.81	Agree
	Average Mean	**3.96**	**0.96**	**Agree**	**3. 89**	**0.98**	**Agree**

Source: Researchers (2022)

Table 2 above revealed the responses of the respondents on generic skill needs for employability of mechanical engineering students of polytechnics in Rivers State. Table 2 revealed the average scores for mean and standard deviation which ranges from 3.89 - 3.96 and standard deviation between 0.96 - 0.98 respectively. From the table above, the study found that generic skills such as leadership skills, conflict resolution skills, self-management skills, communication skills, decision-making skills, flexibility skills, strategic planning skills, time-management skills, problem-solving skills and information and communication technology skills are needed for employability of mechanical engineering students of polytechnics in Rivers State

Test of Hypotheses

Hypothesis 1: There is no significant difference between the mean and standard deviation scores of lecturers and technologists on mechanical engineering skills need for employability of mechanical engineering students of polytechnics in Rivers State

.**Table 3**

t-test analysis on mechanical engineering skill needs for employability of mechanical engineering students of polytechnics in Rivers State

Respondents	**N**	$\bar{X}$	**SD**	**df**	**P**	**t-cal**	**t-crit**	**Decision**

Lecturers	21	4.06	0.93					
				30	0.05,	0.106	2.04	**Upheld**
Technologists	11	4.03	0.88					

Source: Researchers (2022)

From table 3 above, it is shown that z-cal value (0.106) is less than the t-crit of (2.04). Since the calculated value of t is less than the table value, the null hypothesis which states "there is no significant difference between the mean responses of lecturers and technologists on mechanical engineering skills need for employability of mechanical engineering students of polytechnics in Rivers State" was upheld. This revealed that the mechanical engineering skills identified in the study are needed for the employability of students of polytechnics in Rivers State.

Hypothesis 2: There is no significant difference between the mean and standard deviation scores of lecturers and technologists on generic skills mechanical engineering skill needs for employability of mechanical engineering students of polytechnics in Rivers State.

Table 4

t-test analysis on generic skill needs for employability of mechanical engineering students of polytechnics in Rivers State

Respondents	**N**	$\bar{X}$	**SD**	**df**	**P**	**t-cal**	**t-crit**	**Decision**
Lecturers	21	4.15	0.81					
				30	0.05	0.227	2.04	**Upheld**
Technologists	11	4.03	0.95					

Source: Researchers (2022)

From table 4 above, it is shown that t-cal value (0.227) is less than the t-crit of (2.04). Since the calculated value of t is less than the table value, the null hypothesis which states "there is no significant difference between the mean responses of lecturers and technologists on generic skill needs for employability of mechanical engineering students of polytechnics in Rivers State" was upheld. This indicated that the generic skills itemized in the table above are needed for employability of mechanical engineering students of polytechnics in Rivers State.

Discussion of Findings

Table 1 above shows the responses of mechanical engineering skill needs for employability of mechanical engineering students of polytechnics in Rivers State. Table 1 revealed the average scores for mean and standard deviation ranging from 4.03 - 4.06 and standard deviation between 0.88 - 0.93 respectively. Based on the result above, the study found that foundry, automobile mechanic, plant service and maintenance, fabrication and welding skill, mechanical instrumentation, computer-aided manufacturing, computer-aided design and safety and management skills are needed for employability of mechanical engineering students of polytechnics in Rivers State. Furthermore, from table 3 above, it is shown that t-cal value (0.106) is less than the t-crit of (2.02). Since the calculated value of t is less than the table value, the null hypothesis which states "there is no significant difference between the

mean responses of lecturers and technologists on mechanical engineering skills need for employment of mechanical engineering students of polytechnics in Rivers State" was upheld. This revealed that the mechanical engineering skills identified in the study are needed for the employability of students of polytechnics in Rivers State. This finding in agreement with Karen (2019) whose study noted that developing the right attitude, having right qualifications, sound technical skills and experience, flexibility and openness, sense of initiative and professionalism among others are some of the ways of enhancing your employability in the labour world.

Also, table 2 above revealed the responses of the respondents on generic skill needs for employability of mechanical engineering students of polytechnics in Rivers State. Table 2 revealed the average scores for mean and standard deviation which ranges from 3.89 - 3.96 and standard deviation between 0.96 - 0.98 respectively. From the table above, the study found that generic skills such as leadership skills, conflict resolution skills, self-management skills, communication skills, decision-making skills, flexibility skills, strategic planning skills, time-management skills, problem-solving skills and information and communication technology skills are needed for employment of mechanical engineering students of polytechnics in Rivers State. From table 4 above, it is shown that t-cal value (0.227) is less than the t-crit of (2.02). Since the calculated value of t is less than the table value, the null hypothesis which states "there is no significant difference between the mean responses of lecturers and technologists on generic skill needs for employability of mechanical engineering students of polytechnics in Rivers State" was upheld. This indicated that the generic skills itemized in the table above are needed for employability of mechanical engineering students of polytechnics in Rivers State. This result of this study is supported by Dunne and Rowlins in Owo and Isaac (2020) who submitted that employability skills are sets of skills, knowledge and attributes which enhances the chances of an individual to gain, maintain and excel in employment. Similarly, the finding corroborates with Australian Learning and Teaching Council (2011) who posited that the existence of three categories of employability skills globally known and grouped as core skills, generic skills and personal attributes which enable one to access and progress in an employment.

Conclusion

Polytechnics have great potentials for launching Nigeria into her techno-economic dreamland. They have the potentials for producing nationally relevant and globally competitive manpower. Polytechnics also have the potentials for producing all cadres of manpower ranging from craftsmen and technologists to engineers and scientists especially in their mandate areas. In line with the findings of the study, the researchers concluded that mechanical engineering students of polytechnics will sustain their livelihood by developing and acquiring relevant work-based skills such as foundry, automobile mechanic, plant service and maintenance, fabrication and welding skill, mechanical instrumentation, computer-aided manufacturing, computer-aided design and safety and management skills and generic skills which include leadership skills, conflict resolution skills, self-management skills, communication skills, decision-making skills, flexibility skills, strategic planning skills, time-management skills, problem-solving skills amongst others.

Recommendations

Based on the findings of the study, the following recommendations were reached

1) Government should provide adequate mechanical engineering training facilities for the acquisition of work-based skills in polytechnics for effective skill training of students.
2) Practical work should be prioritized for effective training of the trainers in polytechnics in Rivers State.
3) Students should be encouraged to attend seminars/conferences/workshops where they could acquire and improve their generic skills to fit in the world-of-works.

References

Attamah, C. E. & Dauda, D. I. (2017). Employers' perception of the applied skills of nce graduates of electrical-electronic technology in Nigerian public and private organizations. *IOSR Journal of Research & Method in Education (IOSR-JRME) IOSR Journal of Research & Method in Education (IOSR-JRME), 7*(6), 12-23

Australian Learning and Teaching Council (2011). "*Graduate employability indicators: Introduction and User Guide", Canberra* Ltd

Cavanagh, M. Burston, A. Southcombe, F. & Bartram, T. (2015). "Contributing to a graduate-centred understanding of work readiness: An exploratory study of Australian undergraduate students' perceptions of their employability," *Int. J. Manag. Educ., 13*(3), 278–288.

Ekundayo, H. T. & Ajayi, I. A. (2009). *Towards effective management of university education in Nigeria*. www.google.com.

Graham, D. L. (2003). Employer perception of the preparation of Agricultural and extension education graduates. *Journal of Southern Agricultural Education Research, 51*(1), 89-101.

Ikelegbe, S. & Odede, J. O. (2012). Challenges in implementing the reformed office technology and management curriculum in polytechnics in Nigeria. *Association of Business education of Nigeria Book of Readings, 2*(1), 221-226.

Karen, Y. (2019). Career development: enhancing your employability. An article published in student e-magazine".

Knight, P. & Yorke, M. (2014). *Learning curriculum and employability in higher education*. Routledge Falmer

National Board for Technical Education (2013). "*Curriculum and course specifications for higher national diploma programme in electrical engineering*", Nigeria: UNESCO-Nigeria Project.

Nweke, J. N. (2017). *Material resource management for effective teaching of electrical/electronic technology in Colleges of Education (Technical*). [Unpublished doctoral dissertation]. University of Nigeria Nsukka.

Offorma, G. O. (2016). *The purpose of teacher education in Nigeria. Teacher Education in Nigeria* Book of Reading (ed) by U.M.O. Ivowi, in honour of Prof. Mrs. Victoria Adaobi Obasi. Imo State University, Owerri, Imo State

Oluwole, S. & Lateef, O. (2015). "*Resource allocation in higher education: A case study of selected polytechnics in Nigeria*" International Proceedings of Economics Development and Research 83, 1-11

Owo, O.T. & Isaac, U.C.N (2020). Assessment of the employability skills of polytechnic electrical/electronic engineering graduates for employment in oil/gas industry in Niger-Delta, Nigeria. *International Journal of Engineering Applied Sciences and Technology*, 5(3), 142-150

Saue, B. P. (2020). *Assessment of mechanical engineering craft practice skill needs for graduates employability in technical colleges in Rivers State* [Unpublished master's dissertation]. Ignatius Ajuru University of Education Port Harcourt, Rivers State

Ukpai, U. I. (2008, October 6 - 10). *Implementation issues in Polytechnics in Nigeria: Problems and prospects* [Paper presentation]. 7th International Annul conference of the National Association for Research Development, FCT College of Education Zuba, Abuja.