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Strategies for Enhancing Students Effective Participation in Mechanical Technology Education Programmes in Tertiary Institutions for Economic Recovery in Rivers State

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Abstract

This study focused on strategies for enhancing students effective participation in mechanical technology education programmes in tertiary institutions for economic recovery in Rivers State, specifically, the study investigated practical skills areas that need enhancement for effective students participation in mechanical technology education programmes in tertiary institutions in Rivers State, and strategies for enhancing human resource competence in mechanical technology education programmes for effective students participation in mechanical technology education programmes for economic recovery in Rivers State. Two research questions and hypotheses were answered and tested at .05 level of significance. A descriptive survey design guided the study. The population of the study comprised 36 mechanical education lecturers and 64 year three students in the three tertiary institutions in Rivers State that offer mechanical technology education. The population was manageable, therefore, no sampling technique was used for

the study. Self-made survey questionnaire served as the instrument. The instrument was validated by two experts. The reliability of the instrument was established using Cronbach Alpha reliability coefficient which yielded a coefficient of 89. Mean and Standard Deviation were used to answer the research questions while z-test statistical tool was used to test the hypotheses. The study found among others that practical skills like machine tool operational, maintenance, welding, fabrication, auto body repair, material selection and handling skills are areas that needs enhancement. It was recommended among others that the government and tertiary institutions management through TETFUND should make provision for practical skill training and retraining for all mechanical technology education lecturers in the programme for effective participation and skill acquisition of students for economic recovery in Rivers State.

Keywords: Participation, Mechanical Technology Education, Economic Recovery

Introduction

Every educational programme desires to see that her students are able to assimilate the knowledge imparted to them so that they will excel in their academic work and also be meaningfully useful to themselves and the society in which they find themselves. Institutions differ from each other but most of them have the common objective of making sure that they do all they can to enable them achieve their mission and vision. In order to be an active learner in higher education, each student expects to be treated as an adult learner who has some right over the learning ambience in the form of asking questions and clearing of doubts. That is, students expect to have ownership over the learning session (Pond & Rehan, in Idris & Rajuddin, 2016) [8]. Moreover, students also want their instructor to be cooperative and humorous who would teach clearly, usually use relevant examples and manipulate the equipment and tools within the workshop so that the course material being taught becomes easy to comprehend, which I think is increasingly being required in mechanical technology education classrooms all the time.

Mechanical technology education is a field of study in tertiary education that is having complete bearing with metal welding/forming and or servicing/repairs of machines or machine related equipment and appliances. The occupations in this category comprises of agricultural implement and equipment mechanic work, motor vehicle mechanics work, auto body repair and spray painting, auto electrical work, auto body building, auto parts merchandising, air-conditioning and refrigeration mechanics work, foundry, instruments mechanics work and marine engineering (Peter, Abiodun & Jonathan in Audu, Umar,

atsumbe, Ma'aji, & Adedokun, 2020) [6]. Basically, mechanical technology education comprises automobile and metal work technology education programmes. The former deals with the acquisition of automobile related skills for repair and production of automobile and its parts while the later deals with the acquisition of relevant skills for machining, manufacturing processes, welding and fabrication of metal, among others. However, in some tertiary institutions, these programmes are operated independently from each other, whereby automobile technology is regarded as a course of study while metal work technology is regarded as another course of study. On the other hand, some institutions collapse the two into one programme, known as mechanical technology education. Meanwhile, mechanical technology education gives adequate training and education to youths and adults and enables them to acquire skills necessary for success in a chosen career. Thus, mechanical technology education is skills centered (Ochogba & Amaechi, 2018). Virtually every occupation has its own skills and methods of getting the skills. According to Ogundele in Amadi, Ordu, and Ochogba (2022) [4], the act of getting a skill could be described as acquisition. Hence, skill acquisition is the process of getting a skill from a more experience person, an organization or any other means such that the trainee would be able to practice the skill after the acquisition process. This is done through teaching, training, retraining, practical experience and on-the-job training (Uzoka & Bayode, 2015) [10]. It is through some of these processes that mechanical technology education equips students with necessary skills.

It is interesting to note that for most of the institutions, when it comes to utilization of the various new machines, equipment, and tools for teaching and learning they find it puzzle because most staff (lecturers and non-lecturers) lack the practical skills to manipulate these machines, equipment and tools, it is an indication that the staff need to become familiar and understand how the new machines, equipment and tools function, and develop new work strategies. In trying to embed theory into practice, there is the need to plan a good seminar, workshop, on-the-job training and ensure that there are enough participants (Ajie, Osoh, and Thomas, 2022) [3]. It could be argued that that proper utilization of these new machines, and tools have the potential to enhance students effective participation in mechanical technology education programmes, and in order to adequately support students in their academic participation, the staff need to understand how this could help or hinder a student's. It is vital that staff make good use of the facilities and equipment in their working practices as a requirement of the job. Kirkup and Kirkwood in Essel, Riverson and Saah (2015) [7] contend that the extent to which the staff of institutions embrace new technologies and their attitudes to its adoption vary according to their context and circumstances. The implication here is that even though some staff members are already familiar with the use of some online tools for supporting students and are very excited to experiment, other staff members find the choice of tools bewildering and intimidating.

Okwelle, Idibia, & Ajie (2022) [9] lamented that the quality and pattern of training in TVET schools of which mechanical technology education is part and parcel of, is too poor with much emphasis on academics and certification at the expense of skills acquisition and proficiency. Lack of adequate instructor training, outdated training equipment,

and inadequate teaching aids are a number of the problems that lead to the poor effective participation of students in the programme. High quality skills training in our tertiary institutions needs qualified/skilled teachers and workshop instructors, adequate and right workshop equipment, machineries, tools, adequate provision of instructional resources, and practice by the students. Skilled Teachers and workshop instructors are very paramount for effective teaching and learning especially in these programmes. The teachers teaching in mechanical technology education programmes at tertiary level must have the right skills to impart to the learners in order for them to participate effectively and acquire the right skills for gainful employment and for economic recovery, the workshop instructors must also impart practical skills to the learners in the workshop (Audu, Musta'amal, Kamin, Saud & Inti 2014) [5]. Both the teachers and workshop instructors should equip the mechanical technology education students with necessary theoretical knowledge and practical skills that will enable them secure paid employment, be able to set up their workshops and be self-employed and even employ others which in turn will definitely enhance quick economic recovery.

Economic recovery in precise can be describe as results from investment in the generation of new ideas through technology, innovation and the creation of new goods and services, the transfer of knowledge and the development of viable infrastructure. Examples of economic recovery include the creation of infrastructure, not just roads and bridges, but also digital and communications infrastructure, and the creation of knowledge through education, technology and training, which can be utilized by businesses to create new goods and services. Investment in research and development and support for entrepreneurship and innovation make a significant contribution to economic recovery, as they identify new opportunities and then bring them to market to realize value, which will in turn lead to increased productivity within an economy. (Feldman *et al*, in Adamu & Yusuf, 2019) [1]. Mechanical technology education programmes, countries can raise their productivity and enhance other economic variables. By having a well-equipped laboratory, workshops, resource materials, qualified and skilled oriented staff, countries are better able to get goods and services to market and move her youths to jobs. Economic recovery is a goal of Nigeria nation and all states.it is against the backdrop that this research is focused on strategies for enhancing students' effective participation in mechanical technology education programmes in tertiary institution for economic recovery in Rivers state.

Statement of the Problem

The Nigeria government in 2017 posited that "majority of Nigerians remain under the burden of poverty, inequality and unemployment", despite the high growth recorded in the economy between 2011 and 2015. They further argued that "general economic performance was seriously undermined by deplorable infrastructure, corruption, mismanagement of public finances and lack of technical/production skill from our youths" (Adekunle, & Alokpa, 2018) [2]. Skills and knowledge are the engines of economic recovery, growth and social development of any nation, and mechanical technology education programme is among the programmes that holds the key to training the skilled and entrepreneurial workforce needed for the changing technological workforce

and for economic recovery in our Nation. The existing technical skills gap between the students of mechanical technology education and the industry has become a major concern by parents, business leaders and educators in Nigeria. Employers have continually expressed their concern over the present graduates of mechanical technology education programmes for their short of relevant skills required for employment. Therefore, the technical teachers who are responsible for the training and preparation of these students for effective skills acquisition have great challenges in the cause of delivering their duties. It is against this, that the study is aimed at, strategies for enhancing students' effective participation in mechanical technology education programmes in tertiary institutions for economic recovery in Rivers State,

Purpose of the State

Study examined strategies for enhancing students effective participation in mechanical technology education programmes in tertiary institutions for economic recovery in Rivers State, Specifically the study:

1. Investigated practical skills areas that need enhancement for effective students participation in mechanical technology education programmes for economic recovery in Rivers State,
2. Ascertain strategies for enhancing human resource competence in mechanical technology education programmes for effective students participation in mechanical technology education programmes in tertiary institutions for economic recovery in Rivers State.

Research Questions

The following research questions guided the study.

1. What are the practical skills areas that need enhancement for effective students' participation in mechanical technology education programmes for economic in Rivers State?
2. What are the strategies for enhancing human resource competence in mechanical technology education programmes for effective students' participation in mechanical technology education programmes in tertiary institutions for economic recovery in Rivers State?

Hypothesis

The following hypotheses guided the study and was tested at 0.05 level of significance.

Ho₁: There is no significant difference between the mean responses of mechanical technology education lecturers and final year students on the practical skills areas that need enhancement for effective students' participation in

mechanical technology education programmes for economic recovery in Rivers State.

Ho₂: There is no significant difference between the mean responses of mechanical technology education lecturers and final year students on the strategies for enhancing human resource competence in mechanical technology education programmes for effective students' participation in tertiary institutions for economic recovery in Rivers State.

Methodology

The design of the study was a descriptive survey. The study was carried the three tertiary institutions that offer mechanical technology education in Rivers State. These tertiary institutions are Rivers State University Port Harcourt, Ignatius Ajuru University of Education Rumuolomini, Port Harcourt, and Federal College of Education (Technical) Omoku River State in affiliation with University of Nigeria Nsukka. The population of the study comprised of 36 mechanical technology education lecturers and 64 mechanical technology education final year students in the three tertiary institutions in Rivers State. From this population, all the Lecturers and final year students were sampled for the study using purposive random sampling technique. The study adopted a two sectioned survey questionnaire tagged "strategies for enhancing students effective participation in mechanical technology education programmes in tertiary institutions for economic recovery in Rivers State", for the study. The instrument for data was face and content validated by two expert in the department of Vocational and Technology Education in Rivers State University, Port-Harcourt. The instrument was structured in a likert rating scale of strongly agree (SA), agree (A), undecided (U), disagree (D), and strongly disagree (SD). The reliability of the instrument was determined using the Cronbach Alpha Reliability test after administering it to 21 respondents in Niger Delta University, Bayelsa state who were not part of the study, the reliability coefficient achieved was 0.89. The researchers administered the questionnaires to the respondents directly and all the instrument were retrieved. Mean and Standard Deviation were used to answer the research questions while z-test statistical tool was used to test the hypotheses of the instrument. Mean value 3.00 was set as cut off point for mean less than 3.00 was rejected while mean value equal or greater than 3.00 was accepted.

Results and Discussions

Results:

Research Question 1: What are the practical skills areas that need enhancement for effective students' participation in mechanical technology education programmes in tertiary institutions in Rivers State?

Table 1: Mean Responses on the practical skill area that need enhancement

S. No	Systems	Lecturers (n ₁ =36)			Students (n ₂ =64)		
		\bar{x}_1	SD ₁	Decision	\bar{x}_2	SD ₂	Decision
1	Material handling	4.27	.45	Agree	4.01	.86	Agree
2	Machine operation	4.50	.50	Agree	3.77	.90	Agree
3	Auto-body construction/ repair skills	3.97	.73	Agree	3.77	1.17	Agree
4	Auto servicing/Maintenance skills	4.16	.37	Agree	3.57	1.05	Agree
5	Machine/engine diagnostic	4.19	.82	Agree	4.21	.41	Agree
6	Machine tool installation	4.47	.50	Agree	3.92	1.09	Agree
7	Working drawing interpretation	4.47	.59	Agree	3.77	1.26	Agree
8	ICT application	4.08	.96	Agree	4.25	.44	Agree
9	Arc welding, and fabrication	4.38	.49	Agree	4.00	.60	Agree
10	Foundry and forging	4.47	.50	Agree	3.93	.82	Agree
11	Wheel alignment	4.52	.50	Agree	4.27	.44	Agree
12	Oxy-acetylene welding	4.25	.43	Agree	4.21	.54	Agree
	Total	4.31	.57	Agree	3.97	.79	Agree

Source: Field Survey, 2024

Table 1: On the practical skills areas that need enhancement for effective students’ participation in mechanical technology education programmes in tertiary institutions in Rivers State, shows that lecturers and students agreed that all the items posted above are the skill areas that need enhancement so, the lecturers can deliver practical skills effectively as well make room for students’ effective participation in practical skill lesson for economic recovery in Rivers State. This is based on the grand mean score of

4.31 and 3.97 respectively which is above 3.00 that was earlier stated as the acceptable means. Furthermore, the closeness in the standard deviation for the two groups which is .57 and .79 shows homogeneity in their responses.

Research Question 2: What are the strategies for enhancing human resource competence in mechanical technology education programmes for effective students’ participation in tertiary institutions for economic recovery in Rivers State?

Table 2: Strategies for enhancing human competence in mechanical technology education

S. No	Items	Lecturers (n=36)			Students (n=64)		
		\bar{x}_1	SD ₁	Decision	\bar{x}_2	SD ₂	Decision
1	Train staff on effective workshop management skills	4.29	.46	Agree	3.56	1.44	Agree
2	On-the-job training on effective machining skills	4.48	.50	Agree	4.20	.59	Agree
3	Training on effective automated skill	4.00	.00	Agree	3.89	1.37	Agree
4	Hands-on experience	4.43	.50	Agree	3.01	1.41	Agree
5	Training on working drawing interpretation	4.48	.50	Agree	4.08	.84	Agree
6	Training on oxy-acetylene welding	4.21	.41	Agree	3.98	.74	Agree
7	Training on machine/engine diagnostic skill	4.29	.46	Agree	3.05	1.52	Agree
8	auto-body construction and repair skill	4.28	.46	Agree	3.67	1.38	Agree
9	Fitting skills	3.70	.74	Agree	3.80	1.25	Agree
10	Argon/arc welding skill	3.56	1.42	Agree	4.42	.50	Agree
11	Scaffolding skill	4.10	.49	Agree	4.21	.41	Agree
12	Training on ICT application	4.37	.50	Agree	3.56	1.42	Agree
	Total	4.18	.53	Agree	3.78	1.07	Agree

Source: Field Survey 2024

Table 2: On the strategies for enhancing human resource competence in mechanical technology education programmes for effective students’ participation in tertiary institutions for economic recovery in Rivers State, shows that lecturers and students agreed that all the items listed above are some of the strategies for enhancing human resource competence in this field for effective delivery and for students participation for economic recovery in Rivers State. This is based on the grand mean score of 4.18 and 3.78 respectively which is above 3.00 that was earlier stated as the acceptable means. Furthermore, the closeness in the standard deviation for the two groups which is .53 and 1.07 shows homogeneity in their responses.

Hypothesis 1: There is no significant difference between the mean responses of mechanical technology education lecturers and final year students on the practical skills areas that need enhancement for effective students’ participation in mechanical technology education programmes for

economic recovery in Rivers State.

Table 3: z-text analysis on the practical skills areas that need enhancement

Category	N	X	SD	DF	z-cal.	z-crit.	Remark
Lecturers	36	4.31	.57				
				98	2.48	1.98	Significance
Students	64	3.97	.79				

Source: field survey 2024

Data in Table 3 above reveal that z-calculated (2.48) is greater than z-critical (1.98) at 0.05 level of significance. Therefore, the null hypothesis was rejected, hence there is a significance difference between the mean responses of mechanical technology education lecturers and final year students on the practical skills areas that need enhancement for effective students’ participation in mechanical technology education programmes for economic recovery in

Rivers State.

Hypothesis 2: There is no significant difference between the mean responses of mechanical technology education lecturers and final year students on the strategies for enhancing human resource competence in mechanical technology education programmes for effective students’ participation in tertiary institutions for economic recovery in Rivers State.

Table 4: z-text analysis on the strategies for enhancing human resource competence

Category	N	X	SD	DF	z-cal.	z-crit.	Remark
Lecturers	36	4.18	.53				
				98	2.50	1.98	Significance
Students	64	3.78	1.07				

Source: Field survey 2024

Data in Table 4 above reveal that z-calculated (2.50) is greater than z-critical (1.98) at 0.05 level of significance. Therefore, the null hypothesis was rejected, hence there is a significance difference between the mean responses of mechanical technology education lecturers and final year students on the strategies for enhancing human resource competence in mechanical technology education programmes for effective students’ participation in tertiary institutions for economic recovery in Rivers State.

Conclusion

The findings deduced that material selection and handling, machine operation, auto body construction and repair skill, machine/engine diagnostic are the practical skill areas in mechanical technology education that needs enhancement. Also, the study deduced that on the job training on effective machining skills, training on effective automated skills, hand-on experience, training on working drawing interpretation, training on oxy-acetylene welding, training on machine/engine diagnostic skill, auto-body construction and repair skills, argon/arc welding skills are strategies for enhancing human resource competence in mechanical technology education programmes for effective students’ participation in tertiary institutions for economic recovery in Rivers State.

Recommendations

The following recommendation are made:

1. Government and tertiary institution management through TETFUND should make provision for practical skill training and retraining for all mechanical technology education lecturers in the programme for effective participation and skill acquisition of students for economic recovery in Rivers State
2. A particular standard should be set and employed to help assess students’ participation, progress, and academic performance in practical activities in mechanical technology education program in tertiary institutions in Rivers State.
3. Lecturers should be educated to develop mechanical technology education lessons in such a way that they will have the maximum participation/potential of all learners.

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