

Challenges Facing Graduates Of Engineering and Engineering Related Trades in Practical Skills Acquisition in Universities in North East, Nigeria for Sustainable Livelihood

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ABSTRACT: Scholars and professionals committed to fostering sustainable development have urged a re-examination of the curriculum and the restructuring of research in engineering-focused institutions of higher learning. The focus is on engineering and engineering related trades, more than on the natural and physical sciences or on social science, because the activities that drive the industrial state are generally rooted in engineering. Moreover, engineers are known as ‘problem solvers’ and if economies are becoming unsustainable because of engineering, it is natural to ask whether engineering as an activity and as a profession can be re-directed toward achieving sustainable transformations. This paper addresses the challenges facing Graduates of Engineering and Engineering Related Trades in Practical Skills Acquisition in Universities in North East, Nigeria for Sustainable Livelihood with focus on the effective preparation of students, extent to which teachers’ qualifications and quality of teaching, extent to which challenges affected performances of students and how relevant to the world of work is the training received by students. The study adopted a descriptive survey research design using a questionnaire as the main instrument used for the collection of data. Two similar sets of questionnaires containing a 20 items were designed for the two main groups of respondents, -: the teachers and the students. Another questionnaire was specifically designed for graduates of engineering and engineering related trade graduates from the universities in the study area which were contact at their various addresses after graduation. The instrument was trial tested on 32 respondents

made up of students and teachers selected randomly from Bayero University Kano. These respondents were not part of the actual sample of the study. The internal consistency reliability coefficient of the questionnaire assessed produced a satisfactory value of 0.75 using cronbach alpha formula. The data gathered were organized using descriptive statistical analysis. Percentage and arithmetic mean were used to answer the research questions while the decision point stood at 2.50. The implication was that a mean value ≥ 3.50 was considered as ‘agree’ and values below 3.5 as ‘disagree’. The results revealed among others that: (1) There is generally inadequacy in the provision of instructional materials which leads to focusing more on theoretical teaching leading to trainees lacking proficiency in their chosen fields of specialization. (2) Large class sizes do not match with inadequate supply and provision of training resources and (3) Industrial attachment is not given the deserved priority

I. INTRODUCTION

Throughout the world, and in particular the countries of Sub-Saharan Africa, governments are renewing efforts to promote engineering education and training with the belief that skill formation enhances productivity and sustains competitiveness in the global economy. According to Bhuwanee (2006), in recent years, concerns have been raised by most African countries about the move towards making technical and vocational education training (TVET) complementary to post-basic education. Abban and Quarshie (1996) pointed out that the paradigm shift towards

practical skills training with TVET in Africa is increasingly being reshaped to make it more attractive, efficient and effective. One of the most important features of TVET is its orientation towards the world of work with the curriculum emphasizing the acquisition of employable skills. African Union (2007) report also stressed the current vision of African countries in developing a new strategy is to revitalize TVET in Africa. The expectation is that TVET will promote skills acquisition through competency-based training. If this vision should materialize, it will require proficiency testing for employment in order to promote sustainable livelihoods and responsible citizenship. To achieve this goal of practical skills acquisition, Nigerian government in her strive to produce skilled manpower and quality graduates necessary for executing the nations development plans, goals and strategies that can contribute positively to the overall socio-economic growth of the nation, technical colleges and vocational centres were established as well as Universities that offers engineering and engineering related trades. A number of other institutions like National Directorate of Employment (NDE) and National Open Apprenticeship Scheme (NOAS) are also part of government's effort to produce skillful technical personnel. The question is, have all these initiatives yielded the expected result?

Against this background, this paper sought to determine challenges facing graduates of engineering and engineering related trades in practical skills acquisition in Universities in North East, Nigeria for sustainable livelihood

Objectives of the Study

The purpose of this study is to determine the challenges facing graduates of engineering and engineering related trades in practical skills acquisition for sustainable livelihood in North East, Nigeria. Specifically, the study sought to:

1. Determine the challenges facing the effective preparation of students of engineering and engineering related trades in practical skill acquisition for the world of work
2. Determine the extent to which teachers' qualifications and quality of teaching that affect the teaching of practical skills in engineering and engineering related trades
3. Determine the extent to which challenges affected performances of students in engineering and engineering related trade
4. Determine how relevant to the world of work is the training received by students at the Universities in engineering and engineering related trades.

Research Questions

The research following research questions were asked that guided the study:

1. What are the challenges facing the effective preparation of students of engineering and engineering related trades in practical skill acquisition for the world of work?
2. To what extent do the teachers' qualifications and quality of teaching affect the teaching of practical skills in engineering and engineering related work trades?
3. How far have these challenges affected performances of students in engineering and engineering related work trade?
4. How relevant to the world of work was the training received at the Universities in engineering and engineering related trades

II. STATEMENT OF THE PROBLEM

Despite the various interventions by the government to ensure graduates of engineering and engineering related trades are well equipped with the requisite practical skills for the job market and the campaign about the benefits of engineering education, it seems not to yielding much needed result. This is because most engineering and engineering related trades graduates have not been able to enter into employment in their respective fields of training due to lack of employability skills. The poor transition from school to work by the youth has made the society at large to lose confidence on these graduates. This trend of affairs may suggest that training programmes offered by the institutions of learning probably fail to develop the skills required for employment. Therefore, the main problem of this study is the poor transition from school to work by graduates of engineering and engineering related trades as a result of poor practical skills acquisition.

III. METHODOLOGY

The study adopted a survey research design in carrying out the investigation. The study was carried out in North east, Nigeria. There are twelve Universities in the Northeast. Purposive sampling technique was used to select only Universities that offer engineering and engineering related courses only. The sampled Universities are, University of Maiduguri, Modibbo Adama University of Technology, Yola, Abubakar Tafawa Balewa University of Technology, Bauchi and Federal University Wukari. 150 respondents were randomly selected from each University from the school of engineering and technology education respectively

where applicable. This brings the sample size to a total of 600.

A questionnaire was the main instrument used for the collection of data for the study. Two similar sets of questionnaires containing a 20 items were designed for the two main groups of respondents, -: the teachers and the students. Another questionnaire was specifically designed for graduates of engineering and engineering relates trade graduates from the universities in the study area which were contact at their various addresses after graduation. The graduates were contacted with the assistance of the University's administration where individual student records were kept. A total of 83 graduates were reached. The questionnaire included closed-ended items and a used a 5-point Likert scale. The instrument was trial tested on 32 respondents made up of students and teachers selected randomly from Bayero University Kano. These respondents were not part of the actual sample of the study. The internal

consistency reliability coefficient of the questionnaire assessed produced a satisfactory value of 0.75 using cronbach alpha formula.

The data gathered were organized using descriptive statistical analysis. Percentage and arithmetic mean were used to answer the research questions while the decision point stood at 2.50. The implication was that a mean value ≥ 3.50 was considered as 'agree' and values below 3.5 as 'disagree'.

IV. RESULTS AND DISCUSSION

The results were presented in line with the research questions

Research Question 1:

What are the challenges facing the effective preparation of engineering students for the world of work? Table 1 answers this research question.

Table 1: Responses on the Challenges Facing the Effective Preparation of Technical Students for the World of Work

| S/N | Item Statement | Mean | Remark |
|-----|---|------|--------|
| 1 | Little attention is given to industrial attachment | 4.50 | Agree |
| 2 | There is inadequate provision of training material | 3.90 | Agree |
| 3 | The class size has negative effect on effective practical teaching | 3.80 | Agree |
| 4 | There is inadequate provision of basic workshop tools and equipment | 3.75 | Agree |
| 5 | Parents contribute to the purchase of additional training materials | 3.70 | Agree |

Table 1 respondents' decisions show some of the challenges actually facing the effective preparation of engineering students for the world of work. These responses indicate agreement that training materials, basic tools and equipment supplied to both teachers and students were inadequate. These educational resources, when inadequately supplied, could give room to teachers focusing more on theoretical teaching and hence are likely to contribute to students' not being proficient in practical skills acquisition. In addition, the question of class size, it was realized that the large class sizes do not match with the supply and provision of training resources. This does not allow the instructor to attract and retain the attention of all students during demonstration lessons which, according to the new curricula, is using a competency-based teaching approach. Generally, there was a short supply of training materials and basic tools by the institutes. Since engineering

courses mostly rely on materials and tools for training, their short supply would negatively affect practical skills acquisition.

The nature of industrial attachment programme in the universities is of grave concern, and the study collaborates the observation by Roeske (2003) that, notwithstanding the important role industrial attachment plays in instilling into trainees the practical skills, know-how and understanding necessary for employment in a particular occupation or trade, many formal training have shown little or no interest in encouraging engineering trainees to undertake such attachments. If this situation continues, trainees are likely to enter into the labor-market with little or no practical learning experiences which are relevant to the world of work or are a foundation to sustainable livelihood.

Research Question2

To what extent do the teachers' qualifications and quality of teaching affected the teaching of practical skills?

Table 2: Responses to the Extent to Which Teachers' Qualifications and Quality of Teaching Affected the Teaching of Practical Skills

| S/N | Item Statement | Mean | Remark |
|-----|---|------|--------|
| 6 | Teachers develop apathy to workshop practice due to lack of motivation. | 4.57 | Agree |
| 7 | Inadequate practical training given to teachers affect the practical training of students | 4.00 | Agree |
| 8 | Inability to control large class size during practical skills training | 4.00 | Agree |
| 9 | Lack of industrial attachment for teachers affect practical skills training | 3.80 | Agree |
| 10 | Inappropriate teaching methods also affect practical skill training | 3.65 | Agree |

Table 2 shows the respondents' decisions on the challenges actually facing the effective preparation of engineering and technical students for the world of work. The respondents' decisions on all the items are in agreement. The mean of all the items are above the cutoff point of 3.50. If this important ingredient of practical skills is missing in engineering and technical education, it will confirm Miller's (1987) standpoint that engineering and technical education has very little, if any, value to the individual, the community, or to the economy unless the skills that are learnt enable people to get and hold jobs. He suggested that learners must be able and willing to perform services to meet demand in the labour market. The analysis of the teachers' responses confirms that universities institutions do not encourage teachers to embark on industrial training during long vacation holidays. This lack of attachment could deny the teachers access to the technologies relevant to the world of work. The University curricula for engineering and engineering related courses are designed to provide a framework for teaching and learning. This specifies the skills, performances, attitudes, and

values trainees are expected to learn from workshops. If curriculum materials are not provided, there is the likelihood of considerable variation between what the curriculum specifies that students should learn, what teachers teach, and what students actually learn. This situation is likely to cause apathy in the teaching of practical subjects due to the absence of instructional materials and effective instructional strategies, leading to inefficient use of instructional time. As a result, many teachers may not be able to cover the intended curriculum, so will only cover those parts that they expect to be examined. The implication here is that teaching methods in the universities will not be imparting higher-order cognitive skills, such as problem-solving skills rather, the emphasis will be on rote memorization and passive learning will be rewarded.

Research Question 3:

How far have these challenges affected performances of students in their various programs?

Table 3: Responses on the Challenges Affecting the Performances of Students in Their Various Programmes

| S/N | Item Statement | Mean | Remark |
|-----|--|------|----------|
| 11 | Lack of training materials affect students' competency levels | 3.80 | Agree |
| 12 | There is insufficient practical skills training for students | 3.65 | Agree |
| 13 | The practical component in technical curriculum is not effectively used | 3.60 | Agree |
| 14 | Quality of training at school helps students get employment on the job market | 2.90 | Disagree |
| 15 | Students have adequate time to practice requisite skills at school during training | 2.70 | Disagree |

Table 3 reveals the agreement on the efficacy of the training programmes. The basic difference between engineering and technical education training and general academic education is the orientation towards the world of work in specific occupational areas. The efficacy of engineering and technical training system is judged by its graduates' ability to obtain and continue in employment. The availability of instructional materials contributes significantly in motivating teachers to teach practical skills. This is simply

because the hope for success will be higher than the fear of failure. This mean that trainees must be given the possibility of active participation and this can only be assured when training materials are readily available. Therefore, the training in field should move away from measuring success in terms of the number of candidates who pass the final examination to assessing the efficacy of the training programmes in relation to the expectations to the job market.

Research Question 4

How relevant was the training received at the Universities to the world of work?

| Item Statement | Frequency | Percentage |
|--|-----------|------------|
| Working in your area of study | 25 | 30 |
| Working but not in area of my technical field | 19 | 23 |
| Sufficiently challenged by the work environment | 37 | 45 |
| Had to learn more by undertaking on-the-job training | 15 | 18 |
| For a year before their present jobs | | |
| Not employed at all | 39 | 47 |

83 graduates from the Universities responded to the questionnaire relating to the how relevant was the training received at the Universities to the world of work? The Table showed that, only 30% were working in their areas of study while 23% were working but not in their technical fields; however, they were sufficiently challenged by the work environment and had to learn more by undertaking on-the-job training for a year before getting their present jobs.

The implication is that the Universities did not prepare them adequately for the world of work. The remaining 47% said they had no jobs even though they are graduates. They attributed their unemployment to a number of factors including outdated and irrelevance in some parts of the curriculum, non-exposure to entrepreneurship education, practical subjects not well taught due to the absence of laboratory and inadequate practical demonstrations, obsolete equipment and materials in short supply. These shortfalls led to too much theory and little practice.

V. CONCLUSION

The study revealed that lack of resources has led to cuts in the volume of training expected to be provided in Universities. These cuts are a hindrance to a pursuit of the critical objectives of providing training and subsequent job placement of graduates.

The linkage between the Universities and the industries is not strong enough. The

Universities have not been able to access opportunities for industrial attachment for both teachers and students. As a result, the practical skill training is not closely related to the requirements at the world of work. The graduates lacked the requisite skills for the job market, so had few chances of gaining employment. In summary,

1. There is generally inadequacy in the provision of instructional materials which leads to focusing more on theoretical teaching leading to trainees lacking proficiency in their chosen fields of specialization.
2. Large class sizes do not match with inadequate supply and provision of training resources. These inadequacies negatively affect the necessary skills for the world of work.
3. Industrial attachment is not given the deserved priority. This seriously affects training with a resulting mismatch with job market expectations.
4. There are inappropriate teaching methods used for practical teaching.