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ASSESSMENT OF THE IMPLEMENTATION OF STUDENTS INDUSTRIAL TRAINING PRACTICES IN ENGINEERING AND TECHNOLOGY EDUCATION PROGRAMMES IN THE UNIVERSITIES IN NORTHERN NIGERIA

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Abstract

The study was designed to investigate the implementation of Students industrial Training practices in Engineering and Technology Education Programmes in the Universities in Northern Nigeria. Specifically the study assessed and seeks ways to enhance the implementation of industrial practices through Students Work Experience Programme (SWEP) and Student's Industrial Work Experience Scheme (SIWES) in Engineering and Technology Education Programmes in the Universities in Northern Nigeria. A 32-items questionnaire was used to collect data from 91 Lecturers, 47 Technical staff, 35 Industrial Personnel and 371 500Level students. Mean statistics, standard deviation and Analysis of Variance (ANOVA) were used in the analysis. The findings revealed that there is no a structured curriculum for SWEP; institutions don't secure places of attachment for students; students are not well supervised during the SIWES and employers didn't pay students monthly allowance as and when due. Recommendations made in line with the findings among others are: the Universities should ensure adequate placement of students in industries; employers should pay students monthly allowance as and when due; SWEP should be monitored by coordinators to ensure good participation of students and there should be adequate supervision of students during SIWES.

Introduction

The future of any nation does not only depend on the abundance of material resources which a nation possesses but also on specialized knowledge, skills, competence and abilities possessed by its populace which can be harnessed to utilize its natural material resources. Human resources constitute the ultimate for the wealth of a nation irrespective of the need for capital, income and material resources. Capital and material resources can only be relevant to societies needs when they are adequately developed and managed by human beings (Abdullahi, 1999). Abdullahi further said to achieve national development; we need the right caliber of people who are well skilled. Human resources development means a process by which people are educated and trained to develop their capabilities for gainful employment and further enhancement of job performance and productivity. One of the institutions for the provision of needed manpower to accelerate growth and development of the economy is the university. The courses offered at these Universities include Engineering and Technology Education programme. Engineering and

Technology Education programme is the key to economic and societal development of any nation because it cannot be divorced from any aspect of present day human activities (Kofoworola, 2003).

The Students in Engineering and Technology Education have access to industrial practices through SWEP and SIWES. Kofoworola (2003) noted that, in Nigeria, engineering students gain exposure to professional engineering practice through the SWEP and SIWES. These programmes constitute part of the requirements for the award of an engineering and technology education degree. The SWEP programme is usually conducted within the students' local university at the end of the second year and lasts for about four – six weeks. The SIWES is an exposure to industrial practice in industries. It is sad to mention that the universities have not gained the co-operation of industries in the SIWES programme. SWEP and SIWES are programmes which enables students to acquire relevant production skills needed in industry and work situations through exposed to theory and practice. The acquisition of work experience

scheme bridges the gap between theory and practice. Atsumbe (2004) noted that the SIWES is a practical skill development programme designed to expose and prepare students of technology and science to real life work situation and enhance the development of needed skills in industries. Wondi & Dokubo (2009) stated that the growing concern among our industrialists that graduates of our institutions of higher learning, lack adequate practical background studies preparatory for employment in industries, led to the formation of students Industrial Work Experience Scheme (SIWES) by ITF in 1993/1994. ITF has as one of its key functions; (1) to work as co-operative entity with industry and commerce where students in institutions of higher learning can undertake mid-career work experience attachment in industries which are compatible with students area of study. The objectives of SIWES as outlined by Industrial Training Fund (ITF) (1994) includes:-

1. to provide student with an opportunity to apply his knowledge in a real work situation thereby bridging the gap between college work and actual practice;
2. to access the interest of the students in and suitability for the occupation he has chosen;
3. to expose students to work method not taught in institution and provide access to production equipment not normally available in the college environment;
4. to make the transition from school to the world of work easier and to enhance student contacts for later job placements;
5. to enhance industry's satisfaction with diplomats of the institutions; and
6. to enlist and strengthen employers involvement in industrial activities and in the entire educational process of preparing the students for employment in industry.

Dicker (1985) observed that liaison between industry and school has been found useful in several countries. This cordial link has been absent in the Nigerian situation. The problem renders SIWES ineffective, breaching its attendant problems in placement, supervision and assessment of industrial training students. This is partly because the industrial/manufacturing base in Nigeria is very low and also because of the reluctance of industries to allow their facilities to serve as training grounds. One of the factors responsible for the decline in quality of product of tertiary institutions in Nigeria is the miss-match between tertiary engineering programme and the technological needs of the labour market (Momoh, 2002).

Olaitan, Nwachukwu, Igbo, Onyemachi and Ekong; (1999) outlined some of the educational values which are the outcomes of work experience are as follows:

- ✓ learners acquire social and vocational desirable habits of work which are essential to any successful occupation;
- ✓ work experience helps the learner to find the occupation most suited to his or her interest and capacities;
- ✓ learners develop desirable attitudes and learn to adjust to activities involving work and towards their employer and colleagues which could bring social adjustment and job satisfaction;
- ✓ it helps learners to get permanent employment in a satisfactory job after graduation;
- ✓ lecturers or supervisors are in touch with the situation of workers in the community, and thus be in a position to relate their instruction to them and to the out of school activities of their student;
- ✓ some learners gain needed self-respect and confidence through acquiring specific skills needed in the occupation;
- ✓ desirable traits of character are developed.

Atsumbe (2004) observed that SIWES programme which was designed to familiarize trainers with the world of work and give them required skills necessary for employment or self-employment, is fast degenerating into mere formality. Mbata (1990) claimed that the programme has fallen short of expectation as a result of poor co-ordination between industry and training institutions. Olaitan (1992) further lamented that the programme has seriously suffered from inadequate supervision of students by the institutions and industrial personnel which has led to the failure of the programme to backup training of students with relevant job experience.

The Engineering and Technology Education programme in the Universities in Nigeria if well implemented should produce high level graduates grounded in the key generic skills, who on the basis of the high-quality education received would provide the needed catalyst for the nation's technological, socio-political and economic development (Kofoworola, 2003). But today, the quality of engineering graduates from Nigerian Universities has been a major subject of concern for most industries in Nigeria. Most industries complain that good number of graduates produces every year from universities and polytechnics lack necessary job-site skills required by the industry, this stem from inadequate skill requirement for most cutting edge technology, low practical knowledge and

confidence. The large number of graduates from various engineering faculties of universities/polytechnics has failed to impact positively on the growth of industries for economic emancipation and industrialization; only a significant percentage of graduates from these various institutions are annually employed. Most Nigerian engineering graduates are subjected to several re-training programmes (Kati, Taira & Minna, 2007). This may be an indication that the industrial training programmes are not adequately implemented; hence the need to assess the implementation level of industrial practices in Engineering and Technology Education Programmes in the Universities in Northern Nigeria.

Research Questions

1. How are SWEP implemented in Engineering and Technology Education Programmes in the Universities in Northern Nigeria?
2. How are SIWES implemented in Engineering and Technology Education Programmes in the Universities Northern Nigeria?
3. What are ways of enhancing the implementation of SWEP and SIWES in Engineering and Technology Education Programmes in the Universities in Northern Nigeria?

Hypothesis

The following hypothesis was formulated and tested at .05 level of significance.

Ho₁. There is no significant difference in the mean responses of industrial personnel, lecturers and students on ways of implementing SWEP and SIWES in Engineering and Technology Education Programmes in the Universities in Northern Nigeria, (P < .05)

Methodology

A survey research design was adopted for this study. The study covered all the universities in Northern Nigeria (North East, North West and North Central geo-political zones) where engineering and technology education is being offered as a programme and has graduated students in the last five years. The target population for this study was made up of industrial personnel, lecturers, technical staff and 500 Level students. Stratified random sampling was used to sample two universities from each of the three geo-political zones in Northern Nigeria, making a total of six universities. Stratified sampling technique was also used to select 35 industrial personnel, 91 lecturers, 47 technical staff and 371 students, making the total of 544 sampled.

The data collected was analyzed using mean and analysis of variance (ANOVA). To determine the acceptance, the resulting mean scores was interpreted relative to the concept of the real lower and upper limits of numbers 1-4 as used on the rating scale adopted for the study. The decision point between the upper limit of 3 and lower limit of 2 being 2.49 and 2.50 respectively, this mean that items with mean values of 2.50 and above were considered as agreed while items with values of 2.49 and below were considered as disagreed. For testing hypotheses, f-critical value of 2.42 was chosen at .05 level of significant. Any value equal or less was considered not significant and above was considered significant.

Research Question 1

How is SWEP implemented in Engineering and Technology Education programme in the Universities in Northern Nigeria?

Table 1: Respondents Mean Scores on method of Implementation of SWEP in Engineering Technology Education Programmes in the Universities in Northern Nigeria

S/No	ITEM	N ₁ = 91 N ₂ = 47 N ₃ = 371				Remarks
		\bar{X}_1	\bar{X}_2	\bar{X}_3	\bar{X}_t	
1.	There is proper orientation for students.	2.62	2.42	2.14	2.40	Disagreed
2.	Students have access to use equipment and tools personally	2.41	2.30	2.26	2.32	Disagreed
3.	Six weeks for SWEP is well utilized.	2.32	2.11	2.04	2.16	Disagreed
4.	SWEP result is used for final result computation.	1.03	1.21	1.41	1.22	Disagreed
5.	Staff supervise the programme effectively	2.67	2.54	2.49	2.53	Agreed
6.	A student that fails to participate in the programme is asked to repeat the SWEP.	3.46	3.40	2.54	3.13	Agreed
7.	School authority released money as soon as the need arises.	2.41	2.46	2.51	2.46	Disagreed
8.	There is a designed curriculum for SWEP.	2.32	2.14	2.36	2.27	Disagreed
9.	Students are tested after the programme.	2.82	2.76	2.58	2.72	Agreed
10.	Students are trained in areas relevant to their field	2.01	2.23	1.96	2.07	Disagreed
11.	Staff are well motivated during the SWEP.	2.11	2.08	2.51	2.23	Disagreed

N_1, N_2 and N_3 = Number of Lecturers, Technical staff and students respectively

\bar{X}_1 = Mean responses of Lecturers; \bar{X}_2 = Mean responses of technical staffs

\bar{X}_3 = Mean responses of students \bar{X}_t = Mean responses of all respondents

$$\bar{X}_t = \frac{\bar{X}_1 + \bar{X}_2 + \bar{X}_3}{3}$$

The analysis in Table 1 revealed that out of 11 items raised in research question 1, the respondents jointly agreed on 3 items and disagreed with the remaining 8 items as their view on the implementation of SWEP in Engineering and Technology Education programmes in the Universities in Northern Nigeria.

Research Question 2

How is SIWES implemented in Engineering and Technology Education programmes in the Universities in Northern Nigerian universities?

Table 2: Respondents Mean Scores on how SIWES in Engineering and Technology Education Programmes in the Universities in Northern Nigeria is implemented.

S/No	ITEM	$N_1 = 91 \quad N_2 = 35 \quad N_3 = 371$				Remarks
		\bar{X}_1	\bar{X}_2	\bar{X}_3	\bar{X}_t	
12.	Institutions secure places of attachment for students.	2.62	2.42	2.14	2.40	Disagreed
13.	Institutions organized orientation programme for Students	2.41	2.30	2.26	2.32	Disagreed
14.	Institutions assess student's performance	2.62	2.71	2.64	2.67	Disagreed
15.	Employer's control and discipline student.	2.03	2.21	2.41	2.22	Disagreed
16.	Employers attach experienced staff to students for effectively training.	2.67	2.54	2.49	2.53	Agreed
17.	Employers pay students monthly allowance as at when due.	2.06	2.40	2.14	2.20	Disagreed
18.	Employers provide medical care for students.	2.41	2.46	2.51	2.46	Disagreed
19.	Students are regular and punctual at respective places of attachment.	2.32	2.14	2.36	2.27	Disagreed
20.	Students comply with the employers' rules and regulations.	2.82	2.76	2.58	2.72	Agreed
21.	Students keep proper records of training activities.	2.46	2.63	2.96	2.68	Agreed
22.	Institutions supervise students on attachment and sign their log- book, minimum of three visits.	2.11	2.08	2.51	2.23	Disagreed

The analysis in Table 2 revealed that out of 11 items raised in research question 2, the respondents jointly agreed on 3 items and disagreed with the remaining 8 items as their view on how SIWES in Engineering and Technology Education programme in the Universities in Northern Nigeria is implemented.

Research Question 3

What are ways of enhancing the implementation of SWEP and SIWES in Engineering and Technology Education Programmes in the Universities in Northern Nigeria?

Table 3: Respondents Mean Scores on Ways of Enhancing the Implementation of SWEP and SIWES in Engineering and Technology Education Programmes in the Universities in Northern Nigeria.

S/No	ITEM	N ₁ = 91 N ₂ = 47 N ₃ = 371				Remarks
		\bar{X}_1	\bar{X}_2	\bar{X}_3	\bar{X}_t	
23	Institutions should secure places of attachment for students.	3.62	3.42	3.14	3.39	Agreed
24	Students should have access to use equipment and tools personally	3.41	3.30	3.26	3.32	Agreed
25	Six weeks for SWEP should be well utilized.	3.32	3.11	3.04	3.16	Agreed
26	SWEP and SIWES results should be used for final result computation.	3.03	3.21	3.41	3.22	Agreed
27	Students should be regular and punctual at respective places of attachment.	3.67	3.54	3.49	3.53	Agreed
28	Institutions should supervise students on attachment and sign their log- book, minimum of three visits.	3.46	3.40	2.54	3.13	Agreed
29	Employers should pay students monthly allowance as at when due.	3.41	3.46	3.51	3.46	Agreed
30	Facilities should be made available for SWEP.	3.32	3.14	3.36	3.27	Agreed
31	There should be cordial relationship between	3.32	3.14	3.36	3.27	Agreed
32	Institutions and Industries.	3.54	3.65	3.50	3.56	Agreed
	Institutions should organized orientation for students before the programmes.	3.23	3.17	3.23	3.21	Agreed

The analysis in Table 3 revealed that the respondents jointly agreed to all the items on ways to enhance the implementation of SWEP and SIWES in Engineering and Technology Education programmes in the Universities in Northern Nigeria.

Hypothesis Testing.

One-way Analysis of Variance of the Mean Responses of Respondents on the Implementation of SIWES Engineering and Technology Education Programmes in the Universities in Northern Nigeria.

Source of Variation	Sum of Squares	df	Mean Squares	f-cal	f-critical	Decision
Between groups	1.09	2	0.545			
Within groups	588.12	507	1.16	0.470	3.42	NS*
Total	589.21	509				

* Not Significant

The result of analysis as presented in Table 4 revealed that there is no significant different ($p > .05$) in the mean responses of lecturers, technical staff and students on the implementation of SIWES in Engineering and Technology Education programmes in the Universities in Northern Nigeria. Hence, the null hypothesis was not rejected.

Discussions

The findings on the state of implementation of SWEP and SIWES in Engineering and Technology Education

programmes in the Universities in Northern Nigeria revealed that students are not properly oriented for SWEP; weeks spent are not well utilized; there is no designed curriculum for SWEP; and students and staff are not well motivated. These findings are in line with the work of Kofoworola (2003) and Ojo (2008) which pointed out that the challenges besetting SWEP in universities were: students are not well informed before the commencement of SWEP; weeks spent on SWEP are not well utilized due to unavailability of facilities at the right time; and the students and lecturers are not well motivated

during and after the SWEP. On SIWES, findings revealed that students find it difficult to get placement for industrial training. This is not of surprise because Mbata (1990), Kofoworola (2003), and Atsumbe (2006) observed that placement of the students for the purpose of industrial training has been a problem of effective implementation and realization of SIWES programme. They further lamented on the attitude of both industries and schools that allow students to canvas for placement and some students spend half of the allocated time canvassing for places that would suit their selfish interest rather than their skill development.

Finding revealed that there is poor co-ordination of the programme between industry and training institutions and students are not well supervised. This is in line with the work of Mbata (1990) and Olaitan (1992) which claimed that the programme has fallen short of expectation as a result of poor co-ordination between industry and training institution. They further added that the programme has suffered seriously from inadequate supervision of students which has led to the failure of the programme to back up training of students with relevant job experience. Igboamauchey (1994) lamented that institutions based supervisors indulge in the ugly practice of supervising students through their logbooks after they must have completed the attachment. Igboamauchey affirmed that most of the industries frowned at the fact that schools abandon students on industrial attachment to them without supervision. These make the students to be less interested in the programme thereby turning deaf ears to what they were supposed to acquire. This has forced some industries to handle them with a loose hand.

Conclusion

To achieve national development, we need the right caliber of people. People constitute the human resources that supply the physical labour, technical and professional skills which are critical to effective and efficient planning and implementation of development policies, programmes, projects and daily economic activities. Hence Industrial Practices should be planned and designed to give students opportunities to gain exposure to practical work and acquire on-the-job training towards skill development. The resultant effect of which should be to contend with the high demand for skilled personnel in the world of work as well as resolve the problem of high rate of unemployment in the

society. This can be achieved, if the SWEP and SIWES programmes are properly implemented.

Recommendations

1. The Universities should enter into active partnership with industries and ensure adequate placement of students in industries or related organization. This will minimize rejection of students when seeking for a place of industrial attachment.
2. Employers should pay students monthly allowance as and when due, this will serve as motivation factor and promote their interest in SIWES.
3. There should be adequate supervision of students during SIWES. Supervising the students through their log-book should be discouraged and this can be made possible through adequate funding.
4. SWEP should be monitored by coordinators to ensure good participation of students.
5. There should be adequate provision of facilities during SWEP to ensure skill acquisition.

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