

DR. FUNSO FALADE

ENHANCING PROFESSIONALISM IN ENGINEERING THROUGH STUDENT WORK EXPERIENCE PROGRAMME (S.W.E.P.)

and gaimoood out astarb AJIBOYE, J.S. and OLA KAMIYO

Mechanical Engineering Department University of Lagos, Lagos, Nigeria.

2. STUDENT WORK EXPERIENCE PROCRAMME SWERT TO 2.0ATED 34.0.5. Student Work Experience Programme (SWEP) is an intensive engineering training programme designed to equip engineering students with the basic gractical knowledge and orientation aveded to produce self-dependent and skillful engineers. This programme will equip student engineers with necessary skills in general engineering practice through instructions in the use of hand and power tools for material cutting with the programme with

ABSTRACT

With the increasing preference for Polytechnic graduates in the engineering industries due to the practical nature of their training and the failure of the Workshop Practice courses to give the needed basic technical knowledge, a programme tagged SWEP (Student Work Experience Programme) is proposed to take care of the deficiency. SWEP will enables student to develop skills in general engineering through instructions in operation of hand and power tools for wood and metal cutting and fabrication. Experienced technologists would instruct the undergraduate engineering students in various departments on the proper use of tools and machines. From experience, students that went through this programme have proved to be more efficient, competent and prone to self-reliance in handling tools for wood and metal cutting and fabrication. This programme, coupled with the SIWES, will produce the needed professionalism in the young engineers.

1. INTRODUCTION

The need for university engineering graduates that are well equipped with requisite expertise and knowledge to put to use the skills of engineering profession and proficient in the use of tools (both hand and machine) of trade cannot be overemphasized. These must be engineering graduates who have gone through engineering training right from the lecture rooms, workshops, laboratories and industry itself. An engineer who has imbibed the necessary quest and prowess for entrepreneurship in the setting up of small-scale industrial and engineering enterprises will accelerate the pace of industrial development. But for such engineer to come with such aptitude and for his expectations to be met, the trainer must be able to initiate instructional programmes which would help the students to benefit more.

The need for self – motivated and self – reliant engineering graduates is imperative as the number of the unemployed graduate engineers is swelling daily. Unfortunately, the traditional universities were not developed to cope with this new trend of awareness in

technology as the bedrock to self – reliance. The training in most of the universities has laid undue emphasis on theoretical aspect thereby making engineering very abstract and uninteresting to a potentially practical engineer.

The negative consequence of this is that engineering graduates are becoming bankers, auditors and insurance agents among others. In many secondary schools, alternative to practical is the order of the day. At the university level, the number of students crowding a very few instructional material/tools has made their training more of alternative to practical. What sort of engineers will this alternative training produce? Of course, alternative to engineers! For a rescue, this paper proffers a practical-oriented programme tagged: Student Work Experience Programme (SWEP) as the urgent solution to the problem.

2. STUDENT WORK EXPERIENCE PROGRAMME (SWEP)

Student Work Experience Programme (SWEP) is an intensive engineering training programme designed to equip engineering students with the basic practical knowledge and orientation needed to produce self-dependent and skillful engineers. This programme will equip student engineers with necessary skills in general engineering practice through instructions in the use of hand and power tools for material cutting and fabrication.

Considering the social features of the economy of most African countries and the quest for high emolument job, the following principles underlie the programme being proposed:

- (i) Self reliance
- (ii) Elaborate training before full employment would be unnecessary.
- (iii) Ability to work with minimum supervision.

A balanced training of engineering students requires a careful allocation and sequencing of time to both theoretical and practical aspects. In this proposed programme, students will spend a total of nine weeks. Most of them will spend more time in their parent department's sections. This will enable them to have an insight into the goings on in other departments within the faculty. The idea of student majoring in mechanical engineering and therefore, almost or completely ignorant of some basic practical rudiments in electrical and electronics, civil, chemical and even the closest department, materials and metallurgical engineering, is absurd. The training offered by the SWEP will be all encompassing. The programme is to take place during the long vacation period at the end of the second year. It is hoped that necessary terminologies of various departments would have been taught before this time in the existing syllabus. The SWEP programme in time duration for each department is as shown in Table 1.

186

Department	Number of weeks in each department					
nd _e opy _{gini} acetylene welding strik en skipni ²	Mechanical	Elect. / Elect.	Civil	Chemica 1	Met. & Mat.	
Mechanical Engineering	4	2	1	1	1	
Electrical/Electronics Engr.	2	4	1	1	1	
Civil Engineering	1	1	4	1	1	
Chemical Engineering	2	2	2	2 0	hist	
Metallurgical & Materials	parts 2	slid2mon	2	ipubduni ibu olomi2	3	

Table 1: SWEP Programme in time duration and low sea

3. THE DETAILS OF THE S.W.E.P.

A General Aleas of Exposure	Α	General	Areas	of	Exposure
-----------------------------	---	---------	-------	----	----------

- A1: Safety
 - Codes and practices
 - Fires and electric shocks
 - First Aid

A2: Organization of Workshop/ Laboratory

Furnace types, operation and co

Mechanical Engineering Department

B1: Fitting Section

B

- Introduction to the section
- Files and filling
- Cutting: saws and sawing
- Cutting: chisels and chiselling
- Scrapers and scraping
- Rivets and riveting
- Screws and screw cutting by hand

B2: Machining Section

- Parts of a lathe and processes (introduction)
- Cutting between centers
- ◆ Setting up work piece in a 4 jaw chuck
- Turning, facing, boring, parting off, tape turning, knurling
- Drills and drilling, reaming
- ✤ Gears and gear cutting

B3: Welding Section and a summary of SEWS

- Introduction to the section and its equipment
- Practical demonstration on use of arc and oxy acetylene welding equipment
- Striking and maintaining the arc
- Safety precautions on metal arc and oxy acetylene welding
- Practical work for individual student

B4: Thermofluids Section

- Introduction to automobile parts
- Simple vehicle maintenance
- Lubrication of mechanical parts (greasing, etc)

C. Metallurgical and Material Engineering

C1: Material Preparation Section

 Macro/Micro Examination [mounting of specimens, grinding, polishing, etching, etc.]

C2: Foundry Section

- Moulding and casting of ferrous and non ferrous materials
- Pattern and mould making
- □ Furnace types, operation and control (introduction)
- □ Annealing, tempering, etc.
- Casting process demonstration
- Practical work on casting of simple parts

C3: Material Testing Section

- Destructive tests
- Non destructive tests

D. Electrical/Electronics Engineering Department

D1: Electrical Machines Section

- ✓ Introduction to types of electrical machines
- ✓ Simple connections to start a machine
- ✓ Electrical ratings
- ✓ Short-circuiting
- ✓ Simple machine repairs and coupling
- Introduction to house wiring system
- ✓ Maintenance of simple electrical equipment

D2: Computer Engineering Section

- Parts of a computer system \checkmark
- Setting up a computer system \checkmark
- Simple maintenance of computer system

Electronics Section D3:

Ε

- Identification of electronic parts (IC, battery, capacitors, etc) \checkmark
- Maintenance of simple electronic equipment e.g. Electric iron and meters

Communications/GSM Section D4:

- Identification of communication gadgets \checkmark
- ✓ Introduction to GSM technology
- ✓ Simple maintenance of mobile phone handset

Civil Engineering Department				
Ch	In Engineering Department		B1 - 4	
E1:	Concrete Laboratory			
	• Types of sand and cem	ent grades		
	 Simple concrete mixing 	D1, D2		
	• Types of reinforcement	and reinfo	rced concrete	
	 Structural test of concrete 	ete		

E2: Public Health Section

- E3: Woodwork Section and bala bloods and provide a MIR of Ladorationable and the Introduction to the section and the tools 🔍 This can be
 - Cutting: saws and sawing ded another state bus notice delice deposition of •
- Planer and Planing generate to avoid usery executives to arrang gninal flux and share to a security and the security and the security areas and the security and the security areas areas and the security areas a han variationer and
 - Joining (Nailing, Gumming, etc) regord 231WI2 to attrabute to numbered
 - Practical work for individual students' privated bluow almobute some

E4: **Soil Testing Section**

- Simple land surveying
- Types of soil and differences of texture support to assiA language. A
- I. Introduction to General Administrative Organization start lios
- Practical work for students

F Chemical Engineering Department

F1: Material Handling Section

- Handling materials
- Handling hazardous chemicals
- F2: Simple Separation Techniques

The suggested programme for each department is as given in Table 2.

Physical separation techniques

Department	Number of weeks in each department					
	Mechanical	Elect/ Elect.	Civil	Chemica 1	Met. & Mat.	
Mechanical	B1-4	D1, D2	E2	F1	C2	
Electrical/Electronics	B1, B4	D1-4	E3	F1 SI S	C3	
Civil	B1	D1, D2	E1-4	rpes f 7 sand	C3	
Chemical	B1,B4	D1, D2	E2, E3	F1, F2	8 C3	
Metallurgical & Materials	B1, B3	D1, D2	E1, E3	rpes F1 rein set la rutour	C1–3	

Table 2: SWEP Programme on departmental basis

Public Health Section

To strengthen the impact of this SWEP, industry – based courses should be introduced in all the departments. The SIWES programme should also be organised to complement SWEP. SIWES will be meaningful when there is proper coordination and supervision. This can be done through collaboration and interactions between the Universities and industries. Part of the interactions will make industry executives to arrange and ensure proper monitoring and supervision of students on SIWES. Proper record of attendance should also be kept.

Since students would be having their training at various industries, there is ardent need for syllabus/format for their training. The following format is suggested for SIWES for mechanical engineering students as a case study.

A. General Areas of Exposure

1. Introduction to General Administrative Organization

- Organogram
- Discipline
- Functions/Products
- Rules and Regulations
- Routines

2. Organization of Engineering Department

, DISCUSSION

- Functions
 Product lines
- □ la Systems (aller-llee ens the experience) gatherbeing be binow as

Den Quality control of brade blager and notarrague muminima daw

3. Mechanical Operations

Design

- Manufactures II. becogo member 586 source exclosed a magnitude and doll and
 - Fabrication
 - Maintenance should be 1010789 18910 segmentation purpheses and the function
- ersity of florin, llerin, Nigeria.

4. Cooling and Heating Systems

- Pumps, Blowers, Fans, Compressors
- Air conditioning/Refrigeration systems
- Cooling towers
- Boiler house

5. Transport Devices

- Cranes
- Conveyor Belts
- Forklift
- Chutes

6. Mechanical Instrumentation

- Measuring devices
- Pneumatic and hydraulic systems
- Humidity control techniques
- Weighing
- Indicators
- Flame and smoke detectors
- **B** Specific Areas of Exposure
- Casting of ferrous and non-ferrous materials
- Machine shop processes
- Assembly line practices
- Work study method in production management
- Inventory control and stores management
- Data recording and application of computers in industry

4. DISCUSSION

With the level of theoretical training obtained by engineering students, if practical training through SWEP and University – industry interaction and collaboration (SIWES) is taken seriously, universities would be producing engineers that are self-reliant and that could work with minimum supervision. This would lead to production of better engineering graduates that could meet the high demand for technological and industrial development urgently required in the country.

The innovative engineering training programme being practised at the University of Ado-Ekiti, Ekiti State Nigeria, [1] is close to the one being proposed. It sets aside quality time for SWEP and SIWES. The programme is however a modified form of the existing syllabus outlined in the academic programme (1984-1987)[2] of the Faculty of Engineering and Technology at the University of Ilorin, Ilorin, Nigeria.

5. CONCLUSION AND RECOMMENDATIONS

With proper monitoring and supervision of these programmes (SWEP and SIWES) students will definitely be equipped in the needed skills for self-reliance. There would be more employment opportunities and performance in industries would be enhanced.

Personal experience and interaction have shown that students from Universities of Ilorin and Ado-Ekiti that have undergone training close to this modified programme have proved very efficient in handling hand and machine tools while working on their final year projects. Many of them are presently self-employed. Engineering students from other institutions in Africa should follow suit.

REFERENCES

- 1. A. Esan [1997] "An innovative Engineering Training Programme" Nigerian Society of Engineers Technical Transactions, Vol. 30, No.3, pp. 32–39
- 2. Senate Curriculum Committee, University of Ilorin, Ilorin, Kwara State. Academic programmes (undergraduate and sub degree) 1984 1987.

192