

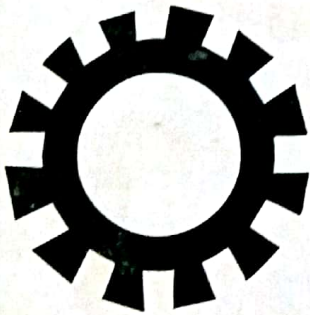
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Industrial Personnel Assessment of Psychomotor Skills Needs of Electrical and Electronics Engineering Students of Polytechnics in Niger State

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Abstract

This paper presents the industrial personnel assessment on the psychomotor skill needs of electrical and electronics engineering students of polytechnics in Niger state. The study focused on the psychomotor skills required by electrical and electronics engineering students in the areas of: electrical power system and machines, electronics, communication and control. Three research questions and one null hypothesis were formulated and tested to guide the study. A 56 items questionnaire was developed and used to collect data from the respondents consisting 105 engineers and 195 technologists from all electrical and electronics industries and it's related in Niger state. Data collected were analyzed using frequency count, mean, standard deviation and t-test statistics. The null hypothesis was tested at 0.05 level of significance base on 298 degree of freedom. The findings revealed that the acquisition of psychomotor skills in maintenance of electrical power equipments should be obtained from school. Therefore, it is recommended among others that, student should be taught to enable them acquired the basic skills of domestic wiring, and television receivers troubleshooting before graduation for gainful employment.

Keywords: electrical and electronics, psychomotor skill, student, assessment, polytechnics

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Introduction

Engineering education programmes are very essential for the economic, social and industrial development of any nation. Engineering uses forces and laws of nature to convert raw materials into goods and services. Engineering education programmes are the main source of skilled labour for the industries. Thus, the level and relevance of the skills acquired in the educational institutions are directly related to the evolution of the industrial sector of the economy. The industrial sector means the totality of the physical systems, human and material resources for the production of goods and services, which, through trade and commerce, satisfy the life-sustaining esteem and aesthetic needs of the society.

Electrical power is the basic need for the economic development of any country, the process of modernization, increase in productivity in industry and agriculture and the improvement in the standard of living of the people basically depend upon the adequate supply of electrical energy. Electrical power system, require routine maintenance for it to perform optimally. To get this done, there is the need for trained electrical and electronics engineering technicians/technologists. Eric (2005) defined an electrical engineer as a

person who is trained to work with electricity and its related applications. The personnel is also capable of maintaining the generating system through the use of the knowledge gained and the experiences acquired during training.

An electrical engineering technologist is trained to have acquired skills both in theory and practice at least in one of the areas of electrical and electronic engineering.

Basically, the polytechnic education is aimed at providing three domains of instructional objectives to its students. These according to Ezewu (1984) include; the cognitive domain, affective domain and the psychomotor domain.

Psychomotor skill can be defined as that relating to bodily movement triggered by mental activity, especially voluntary muscle action. It is concerned with practical skills and manual dexterity notice in writing, laboratory and physical skills and so on. Okobiah and Nwagu (1995), indicate that skill is the ability to perform expertly well arising from the repetitive process in which the skill holders engage in their jobs. This idea is in agreement with Okorie and Ezeji (1988) on the possession of a skill. They said that, to possess a skill is to demonstrate the habit

of acting, thinking or behaving in a specific activity which has become so natural through repetitive or practice that it has become automatic. Psychomotor skill is hierarchically classified into six levels as follow: reflex movement; basic fundamental movements; perceptual abilities; physical abilities; skilled movements and non-discursive communication. Technical skill is one of the skills necessary for an individual to succeed in job.

Prominent among the major problems facing Nigeria today is the level of half – baked graduates of engineers from schools who continue to parade about for job in industries for which they are not qualified for (Eric, 2005). Dikko (1980) rightly observed that employers even prefer workers with skilled training to those with theoretical training from polytechnics. The failure of school (polytechnics) and other engineering institution to impart appropriate skills, knowledge and attitude readily for gainful or self employment of graduates has resulted to high rate of unemployment among graduates in the society. Mogaji (1998) agreed to the fact that the high incidence of unemployment among graduate engineers are as a result of inability of polytechnic institution to equip them with appropriate entry – level employment skill. However, there seems to be a mix-match between the activities of these students in question and that of the industries in the field of work. So there is need for collaboration between industries and the polytechnics so as to bridge that gap that seems to exist between them. It is within this analytical context that an assessment of industrial personnel on psychomotor skills need of electrical and electronics engineering students of polytechnics in Niger State is been carried out.

Research questions

The study provides answers to the following questions.

- What psychomotor skills are required by electrical and electronics engineering

students in the area of electrical power and machines?

- What psychomotor skills are required by electrical and electronics engineering students in the area of electronics?
- What psychomotor skills are required by electrical and electronics engineering students in the area of communication and control?

Hypothesis

The null hypothesis was tested at point 0.05 level of significance.

HO₁: There is no significance difference between the mean responses of electrical and electronics engineers and technologists on psychomotor skills require by electrical and electronics engineering students in the area of electrical power and machines.

Methodology

The research design that was used in carrying out this study is the descriptive survey method, where questionnaires are used to determine opinions of respondents on the issue under investigation. The survey design was considered suitable since the study will seek information from a sample that was drawn from a population using questionnaire. The study was carried out in all the Electrical and Electronic related industries in Niger state. The target population for this study was made up of 225 Engineers and 410 Technologists working in the various industries. A total number of six (6) industries were sampled using strata sampling, two (2) from each senatorial zone. Strata sampling methods were used to sampled Engineers and Technologists, giving the total of three hundred (300) personnel. A total number of 300 questionnaires were administered to the respondents by the researchers and research assistant in the six selected Electrical and Electronics related industry and 277 were collected given 92% returns. The analysis of data for research questions and hypotheses were accomplished using frequency counts, mean, standard deviation and t-test. Mean was used to determine the degree of acceptance and rejection in research questions, while t-test

was used to test the hypotheses of two groups of respondents.

Research question 1

What are the psychomotor skills need of electrical and electronics engineering students in the area of electrical power and machines?

Table1: Mean Responses of Engineers and Technologists on Psychomotor Skills Need of Electrical and Electronics Engineering Students in the Area of Electrical Power and Machinery. N₁=105 N₂=195

SN	ITEMS	\bar{X}_1	\bar{X}_2	\bar{X}_t	Remark
1	Winding of Electrical motor	3.54	3.58	3.56	Agreed
2	Installation of electrical power generator	3.23	3.08	3.16	Agreed
3	Selection of cable types and sizes used in various wiring system	3.08	3.75	3.42	Agreed
4	Skills in wiring of houses(conduit& surface)	3.38	3.58	3.48	Agreed
5	Installation of transformers	3.23	3.42	3.33	Agreed
6	Troubleshooting of electrical panels	3.31	3.42	3.37	Agreed
7	Maintenance of electrical power equipment	3.46	3.42	3.44	Agreed
8	Test of continuity and insulation resistance	3.46	3.33	3.40	Agreed
9	The use of appropriate tools for work	3.77	3.67	3.72	Agreed
10	The use of Avometer (multimeters) for electrical measurement	3.31	3.50	3.41	Agreed
11	Design of electrical machines	2.85	3.50	3.18	Agreed
12	Construction of electrical machines	3.15	3.50	3.16	Agreed
13	Skills in Industrial wiring/installation	3.46	3.17	3.32	Agreed
14	Knowledge of power generation, transmission and distribution	3.62	3.42	3.52	Agreed
15	Interpretation of electrical symbols and its area of application	3.77	3.58	3.68	Agreed
16	Designing of transformers	3.08	3.67	3.38	Agreed
17	Drafting of power supply system	3.38	3.58	3.48	Agreed
18	Construction of transformers	3.08	3.50	3.29	Agreed
19	Drafting of domestic wiring	3.31	2.92	3.12	Agreed
20	Interpretation of drawing/diagrams	3.62	3.58	3.60	Agreed
21	Maintenance of high tension and low tension lines	3.23	3.33	3.28	Agreed
22	Construction of switch gear	3.62	3.33	3.48	Agreed
23	Installation of electric energy meter	3.31	3.33	3.32	Agreed

Key N₁=Number of Engineers; N₂ =Number of technologists; \bar{X}_1 =Mean of Engineers; \bar{X}_2 = Mean of Technologists; \bar{X}_t = Average Mean of Engineer and Technologists The data presented in table 1 revealed that respondents agreed with all the items with mean score ranging between 3.12 to 3.72, as skills needed by Electrical and Electronics Engineering students in the area of Electrical power and machinery.

Research question 2. What are the psychomotor skills need of electrical and

electronics engineering students in the area of electronics?

Table 2: Mean Responses of Engineers and Technologists on Psychomotor Skills Need of Electrical and Electronics Engineering Students in the Area of Electronics. N₁=105; N₂=195

S/N	ITEMS	\bar{X}_1	\bar{X}_2	\bar{X}_t	Remark
1	Development of integrated circuit	3.23	3.75	3.49	Agreed
2	Electronic design and drafting	3.31	3.58	3.45	Agreed
3	Fault tracing repair of electronic devices	3.23	3.67	3.45	Agreed
4	Troubleshooting in television receivers	3.54	3.58	3.56	Agreed
5	Creation of radio wave for transmission and propagation	3.46	3.50	3.48	Agreed
6	Installation of cable network for transmitting and receiving signals	3.15	3.58	3.42	Agreed
7	Measurement in electronics devices	3.31	3.17	3.24	Agreed
8	Matching of antenna to transmitter	3.31	3.67	3.49	Agreed
9	Construction of sensors and transducer	3.38	3.25	3.44	Agreed
10	Installation of public address system	3.38	3.58	3.48	Agreed
11	Coding of electronic data for transmission	3.31	3.58	3.45	Agreed
12	Tools handling and area of application	3.23	3.50	3.28	Agreed
13	Construction of amplifier circuit	3.54	3.58	3.56	Agreed
14	Testing of electronic devices	3.15	3.50	3.33	Agreed
15	Ability to use oscilloscope for testing	3.23	3.42	3.33	Agreed
16	Maintenance of television transmitter	3.62	3.33	3.48	Agreed
17	Installation of radio transmitter	3.69	3.23	3.47	Agreed
18	Maintenance of radio transmitter	3.22	3.25	3.24	Agreed
19	Design of electronic software	3.31	3.75	3.53	Agreed

The data presented in table 2 revealed that the respondents agreed with all the items with mean score ranging between 3.24 - 3.56 respectively, as skills needed by Electrical and Electronics Engineering students in the area of Electronics.

Research question 3

What are the psychomotor skills need of electrical and electronics engineering students in the area of communication and control?

Table 3: Mean Responses of Engineers and Technologists on Psychomotor Skills Need of Electrical and Electronics Engineering Students in the Area of Communication and Control. $N_1=105, N_2=195$.

S/N	ITEMS	\bar{X}_1	\bar{X}_2	\bar{X}_t	Remark
1	Signal processing	3.38	3.42	3.40	Agreed
2	Installation of satellite dish	3.38	3.08	3.23	Agreed
3	Control of electric machines	3.46	3.42	3.44	Agreed
4	Ability in area of networking	3.34	3.75	3.55	Agreed
5	Ability to install very small aperture terminal (VSAT)	3.46	3.25	3.36	Agreed
6	Radio frequency optimization	3.54	3.67	3.61	Agreed
7	Digital signal processing (DSP)	3.38	3.50	3.44	Agreed
8	Switching network	3.31	3.75	3.53	Agreed
9	Microcontroller programming	3.54	3.42	3.48	Agreed
10	Industrial automation system	3.46	3.33	3.65	Agreed
11	Design of robotic device	3.23	3.67	3.45	Agreed
12	Ability in robot configuration	3.23	3.58	3.41	Agreed
13	Application of robot in manufacturing operation	3.15	3.50	3.33	Agreed

The table 3 revealed that respondents agreed with all the items with the mean score ranging between 3.23 - 3.61 respectively, as skills needed by Electrical and Electronics Engineering students in the area of communication and control.

There is no significance difference between the mean responses of electrical and electronic engineers and technologists on the psychomotor skills need of electrical and electronics engineering students in the area of electrical power and machinery.

Hypothesis one

Table 4. t-test Analysis of Engineers and Technologists on Psychomotor Skills Need of Electrical and Electronics Engineering Students in the Area of Electrical Power and Machinery. $N_1=105, N_2=195$

S/N	ITEMS	SD_1	SD_2	t	Remark
1	Winding of Electrical motor	0.49	0.51	-0.20	NS
2	Installation of electrical power generator	0.41	1.04	0.47	NS
3	Selection of cable types and sizes used in various wiring system	0.80	0.44	-2.58	S
4	Skills in wiring of houses(conduit& surface)	0.53	0.51	-1.00	NS
5	Installation of transformers	0.44	0.47	-5.59	S
6	Troubleshooting of electrical panels	0.44	0.47	-0.61	NS
7	Maintenance of electrical power equipment	1.16	0.47	0.59	NS
8	Test of continuity and insulation resistance	0.51	0.64	0.59	NS
9	The use of appropriate tools for work	0.41	0.45	0.50	NS
10	The use of AVO meter (multimeters) for electrical measurement	0.95	0.50	-0.63	NS
11	Design of electrical machines	0.76	0.50	-0.27	NS
12	Construction of electrical machines	0.68	0.65	-4.38	S
13	Skills in Industrial wiring/installation	0.51	0.36	1.72	NS
14	Knowledge of power generation, transmission and distribution	0.46	0.47	1.00	NS
15	Interpretation of electrical symbols and its area of application	0.41	0.51	0.86	NS
16	Designing of transformers	1.13	0.45	-1.69	NS
17	Drafting of power supply system	0.52	0.51	-1.00	NS
18	Construction of transformers	0.60	0.50	-1.91	NS
19	Drafting of domestic wiring	0.59	1.24	0.98	NS
20	Interpretation of drawing/diagrams	0.46	0.51	0.20	NS
21	Maintenance of high tension and low tension lines	1.12	0.49	-0.29	NS
22	Construction of switch gear	0.60	0.76	1.04	NS
23	Installation of electric energy meter	1.06	1.26	-0.04	NS

KEY: N_1 =Number of engineers; N_2 =Number of technologists, SD_1 =Standard deviation of engineers; SD_2 =Standard deviation of technologists, t=t-test; S=Significant; NS=Not significant

3. Practical instructors should ensure that all students participate actively in the practical exercises in the workshop.
4. School authority should ensure that the workshop is up-to-date for effective practical work
5. All necessary practical skills needed in the area of electrical and electronics equipment maintenance should be provided to students before graduation.

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