Assessment of the Status of Implementation of Technical and Vocational Education and Training (TVET) and Local Technologies for Sustainable Development

BY

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Abstract

This study was, designed to assess the status of implementation of technical and vocational education and training (TVET) and local technologies for sustainable development. Four research questions were formulated to guide the study. The design of the study was the descriptive survey and observational technique. The study was conducted in Niger State of Nigeria. The population of the study consisted of 2471 respondents made up of 607 local industries that registered with commercial industries, 1800 graduates of technical education from years 2008-2013 and 64 training development officers of industry. A total sample size of 823 respondents made up of 202 local industries; 600 graduates of technical education and 21 training development officers of local technologies were selected using one-third of the population through proportionate stratified random sampling technique. The instrument for data collection was a 47 item questionnaire and observational schedule. The questionnaire was subjected to face validation by three experts and the internal consistency reliability estimate of 0.98 was established using Cronbach Alpha technique. Research questions were answered using mean and standard deviation. The major findings of the study revealed among others that the training personnel of local technologies possessed the required skills for training with a cluster mean (X) of 3.97. The technical education possessed to some extent the required theoretical knowledge ($X=4.19$), practical skills ($X=4.25$) and affective work skills ($X=3.97$). Better funding of local technologies by the Federal government and regular curricular revision to ensure relevance with respect to the needs of the industries and society are some of the recommendations made to make local technologies more effective.

Introduction

Most countries of the world have realized that effective development of TVET and local technologies is one of the best means of achieving economic development and growth. TVET and Local Technology may, therefore, be regarded as an integral part of national development because adequate supply of local technologies is both a pre-condition for and a prima test of the feasibility of a country's national development (Akerele 2010). Armstrong (2009) noted that, the goals of development are the maximum possible utilization of human beings in productive activities and the fullest possible development of skills, knowledge, and capacities of the labour force. In his view, such other goals as economic growth, higher levels of living and equitable distribution of wealth would be the likely consequences of the pursuit of the earlier goals. The TVET and local technology play a vital role in economic and national planning. Udoji (2005), in his report to the government stressed that, the major constraint to Nigeria's economic development was not just the availability of the financial and other capital inputs, but more importantly the adequacy of trained manpower in various occupations.

According to Wikipedia (2005), TVET and local technologies development is concerned with providing learning and development opportunities, making training interventions and planning conducting training on technologies. It is essentially a strategic process, which is concerned with meeting both business and individual needs. Bernardin (2003) stated that TVET and local technologies is the use of training, organizational development, and career development efforts to improve individual, group, and organizational efficiency to mobilize workforce. He further stated that TVET and local technologies helps to: (i) develop the key competencies that allow individuals in organizations to perform current or future jobs, through planned learning activities (ii) Groups within organizations initiate and manage change and (iii) ensure a match between an individual and organizational needs. Damachi (2013) defined local technologies development in

terms of providing the right type of education, training and work motivation. Development, therefore, constitutes the process or procedure by which the capability of a person or a group of persons is rendered effective on an increasing basis for the performance of activities relating to specific objective.

Since independence in 1960, Nigeria has built a large number of educational and training institutions and has also developed mechanisms for TVET and local technologies development in-line with the Ashby Report and the Federal Government policy paper of 1961, a National Manpower Board was established as part of the development planning mechanism of government. Similarly, the National Universities Commission was established. Yet, there are still serious complaints of a yawning manpower gap. The presence of a gap and the need to emphasis local technologies development has also been noted by Anyanwu (2009), who stressed the need for skilled manpower development in the development of Africa economics. It was in realization of the significance and quest for skills development that led to the establishment of the TVET and local technologies. The consideration of the skills possessed by the trainer in TVET and local technologies programmes is very vital. This is even very central in meeting the objective of TVET and local technologies. This goal can only be achieved through competent trainers who have vast knowledge in the practical as well as in theoretical aspects of their trades. It is on this premise that this study sought to assess the status of the implementation of Technical and Vocational Education and Training (TVET) and local technologies for sustainable development.

Research Questions
1. What are the skills that the training personnel of local technologies possessed?
2. What is the theoretical knowledge acquired by graduates technical education?
3. What are the practical skills that graduates technical education acquired?
4. What strategies could be used to improve the effectiveness of local technologies training?

Methodology
The design of the study is the descriptive survey and observational technique. The study was conducted in Niger State. The population for the study was 2471 made up of three groups, namely: 607 apprentice of local industries; 1800 graduates of technical education from years 2008 to 2013; and 64 local technologies training development Officers. The sample of the study was 823 subjects. The instrument was validated by three research experts in the Department of Industrial and Technology Education of Federal University of Technology, Minna.

The questionnaire for this study was distributed to respondents in Niger states from which the sample of the study was drawn. Five research assistants assisted the researchers in the administration and collection of the questionnaire. A total of 799 duly completed questionnaires out of 823 copies were returned. The questionnaire was analyzed by computing the mean and standard deviation of each item on the five-point Likert-type scale. Each mean of an item was interpreted in relation to the real limit of the codes of the scale used for data analysis. All the computations for this study including the Cronbach Alpha (?) for establishing the reliability coefficient of the instrument were carried out using the statistical package for the social sciences (SPSS) from computer software.

Research Question 1
What are the skills that the training personnel of local technologies possessed?
Table 1: Means and Standard Deviations on the Skills Possessed by Training Personnel of Local Technologies (N = 597)

S/N	Items	X	X	X	SD	Remarks
1	Competency in the skills they teach	4.42	4.86	4.44	0.94	Agree
2	Ability to develop courses of study satisfactorily	4.14	4.48	4.16	0.86	Agree
3	Ability to plan budget for tools, materials and equipment	4.20	4.19	4.20	0.94	Agree
4	Ability to select and arrange tools, machines and equipment in accordance with the best learning conditions	4.23	4.48	4.24	0.89	Agree
5	Ability to provide and assign the materials of trade for efficient conditions	4.25	4.14	4.25	0.83	Agree
6	Possess the teaching qualification enough to impart the knowledge on the trainees.	3.48	3.43	3.48	1.48	Undecided
7	Ability to instruct trainees on skills and technical information making use of good instructional methods and resources	4.25	4.43	4.26	0.84	Agree
8	Ability to know when trainees do not understand aspects of their lessons and carefully give explanation and clarification	4.21	4.57	4.23	0.89	Agree
9	Ability to give credits to trainees initiatives	2.55	3.71	2.59	1.49	Undecided
10	Ability to treat all trainees equally (impartial)	4.40	4.62	4.41	0.87	Agree
11	Ability to give tests that are related to what they teach	4.24	4.86	4.26	0.90	Agree
12	Ability to look ahead and apply new idea to suit own situation	4.14	4.43	4.15	0.88	Agree
13	Ability to stimulate trainees to original thinking	4.36	4.76	4.37	1.02	Agree
14	Ability to guide and counsel trainees	2.52	3.14	2.55	1.45	Undecided

Key:
X_1 = Mean for Technical Education, X_2 = Training Development Officers of Local Technologies, X_3 = Grand Mean for Technical Education and training development officers of Local Technologies, SD = Standard Deviations

Table 1 shows that both the technical education and training development officers of local technologies accepted items 1, 2, 3, 4, 5, 7, 8, 10, 11, 12, and 13 with mean ratings between 4.15 and 4.44 as being the skills possessed by training personnel of local technologies. The two groups of respondents however, were undecided on items 6, 9 and 14 with mean ratings between 2.55 and 3.48 as being the skills possessed by training personnel of local technologies .

Research Question 2
What is the theoretical knowledge acquired by technical education?

Table 2: Means and Standard Deviations on the Theoretical Knowledge Acquired by Technical Education (N = 778)

S/N	Items	X	X	X	SD	Remarks
15	Ability to recall data or information	4.20	4.10	4.17	0.77	Highly acquired
16	Ability to understand the meaning, translation, interpretation of instructions and problems	4.24	4.19	4.23	0.81	Highly acquired
17	Ability to use a concept in a new situation	4.30	3.93	4.20	0.84	Highly acquired
18	Ability to separate material or concepts into component parts (distinguishing between facts and inferences)	4.31	3.95	4.21	0.83	Highly acquired
19	Ability to build structure or pattern from diverse elements	4.19	4.07	4.16	0.79	Highly acquired
20	Ability to make judgements about the value of ideas or materials	4.22	4.08	4.18	0.85	Highly acquired
21	Ability to recognize specific facts or procedural patterns.	4.30	4.04	4.23	0.77	Highly acquired

KEY:

X_1 = Mean for Technical Education, X_2 = Mean for Local Industries X_G = Grand Mean for Technical Education and Local Industries,   SD = Standard Deviation

Table 2 shows that both the technical education and local industries accepted items 15 to 21 as being the theoretical knowledge that are highly acquired by Technical Education with mean ratings between 4.16 and 4.23.

Research Question 3

What are the practical skills that technical education acquired?

Table 3

Means and Standard Deviations on the Practical Skills Acquired by Technical Education (N = 778)

S/N	Items	X_1	X_2	X_G	SD	Remarks
22	Ability to work safely without injuring self, others and the equipment	4.30	4.18	4.26	0.73	Highly acquired
23	Ability to work for long hours	4.24	4.16	4.22	0.82	Highly acquired
24	Ability to use hand and machine tool for work correctly	4.22	4.08	4.18	0.85	Highly acquired
25	Ability to work with machine tools related to the area of specialization	4.48	4.32	4.44	0.72	Highly acquired
26	Competency in using blue print drawings in doing work in the area of specialization	4.28	4.02	4.21	0.81	Highly acquired
27	Ability to produce free hand sketched drawing needed for work in the area of specialization	4.29	4.33	4.30	0.71	Highly acquired
28	Competency in producing blue print working drawing needed for work in the area of specialization	4.29	3.99	4.21	0.83	Highly acquired
29	Ability to produce, assemble, maintain and service machines	4.32	3.95	4.22	0.80	Highly acquired

Key:

X_1 = Mean for Technical Education, X_2 = Mean for Local Industries X_G = Grand Mean for Technical Education and Local Industries, ^{2}SD = Standard Deviations

Table 3 shows that both the technical education training and local industries accepted items 22 to 29 as being the practical skills that are highly acquired by technical education with mean ratings between 4.18 and 4.44.

Research Questions 4

What strategies could be used to improve effectiveness of local technologies training?

Table 4

Means and Standard Deviations on the Strategies for Improving the Effectiveness of Local Technologies Training (N = 597)

S/N	Items	X_1	X_2	X_G	SD	Remarks
30	Devoting more time to practical operations in the workshops than theoretical classroom instruction	4.33	4.00	4.31	0.97	Agree
31	Scheduling trainees work in such a way that trainees move from one operation to the next	4.24	4.48	4.25	0.83	Agree
32	Crediting trainees initiatives	4.24	4.19	4.24	0.90	Agree
33	Engaging academically and professionally qualified trainers	4.40	3.86	4.38	0.90	Agree
34	Sending trainers on in-service refresher courses regularly	3.52	4.19	3.55	1.49	Agree
35	Provision of modern facilities, machines, tools and equipment for practical and theoretical instructions	4.22	4.00	4.22	0.94	Agree
36	Effective supervision of trainees practical assignment and projects	4.25	3.67	4.23	0.88	Agree
37	Encouraging trainees to try out practical operations themselves	4.21	4.05	4.20	0.95	Agree
38	Educating trainees on safety rules and precautions at workshops and how to prevent it	4.38	4.19	4.37	0.91	Agree
39	Encouraging manageable ratio of trainers/trainees for effective classroom practical demonstration and instructions	4.25	4.14	4.25	0.88	Agree
40	Encouraging regular curricula revision at the Local Technologies to ensure relevance with respect to the needs of the industries/society	4.55	4.38	4.54	0.75	Strongly agree
41	Entrenching in the programmes, technical skills based on new technologies	4.38	3.62	4.36	0.93	Agree
42	Provision of more training rooms to avoid over-crowding of existing ones	4.25	4.14	4.24	0.84	Agree
43	Better funding of the programmes to enhance maintenance of machines and equipment	4.26	4.10	4.25	0.81	Agree
44	Provision of computers in the libraries to facilitate usage	4.15	4.14	4.15	0.82	Agree
45	Provision of adequate number of books and periodicals in the Local Technologies libraries	4.27	3.62	4.24	0.84	Agree
46	Ensuring that the existing facilities in Local Technologies are in good condition	4.24	3.62	4.22	0.92	Agree
47	Frequent evaluation of Local Technologies Training	4.55	4.29	4.54	0.75	Strongly agree

Key:

$\overset{1}{X}$ = Mean for Technical Education programmes, $\overset{2}{X}$ = Mean for training development officers of Local Technologies, X = Grand Mean for Technical Education and training development officers of Local Technologies, $\overset{\vee}{S}D$ = Standard Deviations

Table 4 shows that both the technical education training and training development officers of local technologies accepted items 30 to 47 with mean ratings between 3.55 and 4.54 as being strategies for improving the effectiveness of local technologies training.

Based on the questionnaire administered to the respondents, it was found that the training personnel of local technologies posses the following skills among others:

1.   Competency in the skills they teach.
2.   Ability to plan budget for tools, materials and equipment.
3.   Ability to select and arrange tools, machines and equipment in accordance with the best learning conditions.

Observation of training development officers by the researcher during normal training session also agreed with the responses of the respondents on the skills possessed by the training Development Officers of local technologies.

Based on the questionnaire administered to the respondents, it was found that the theoretical knowledge acquired by technical education training includes:

1.   Ability to recall data or information
2.   Ability to understand the meaning, translation, interpretation of instructions and problems
3.   Ability to use a concept in a new situation

Observation of technical education at work by the researcher in the industries also agreed with the responses given by the respondents on the theoretical knowledge acquired by technical education programmes.

Based on the questionnaire administered to the respondents, it was found that the Practical skills acquired by Technical Education include:

1.   Ability to work safely without injury self, others and the equipment.
2.   Ability to work with machine tools related to the area of specialization
3.   Competency in using blue print drawings in doing work in the area of specialization.

However, from the researcher's observation, it was discovered that technical education do not possess ability to work safely without injury self, others and the equipment and they also lacked the skill of maintenance and service of machines.

Based on the questionnaire administered to the respondents, it was found that the Strategies for improving the effectiveness of local technologies training include:

1.   Devoting more time to practical operations in the workshops than theoretical classroom instructions.
2.   Scheduling trainees work in such a way that trainees move from one operation to the next.
3.   Provision of adequate facilities, machines, tools and equipment for practical and theoretical instructions.

Discussion of the Findings

Favorable responses given to the skills of training personnel in local technologies show that the technical education are very appreciative of good quality instructions which is very necessary for the development of skills in all the local technologies training . This finding is also in agreement with the views of Oyedeji (2002) which stipulated that quality instructors is an absolute pre-requisite to gainful learning, especially in a skill developing instructional process. The finding is in line with the views of Olaitan, Nwachukwu, Onyemachi, Igbo and Ekong (2012) who stated that one of the characteristics of effectiveness of training

programme is that the programme should have good quality teachers who are dedicated to their teaching and can go along with the learners in their efforts to learn For this gainful and effective learning to be achieved, the teacher or trainer must possess such skills of training as listed in table 1. The adequacy of some of these training facilities and library services further infer that the objectives of local technologies could easily be attained. However, being a training organization, it is expected that all facets of training and acquisition of various skills should be imparted to enable trainees transfer them to solving problems that could take differing conditions and needs. In the views of Bello (2008), quality laboratory, equipment, facilities and availability of quality library facilities services are quality indicators of effectiveness of training of local technologies .

The study revealed that the technical education highly acquired theoretical knowledge. This is evidenced on the facts that all the respondents agreed on all the seven items dealing with theoretical knowledge presented in table 2 with mean ratings between 4.16 and 4.23 indicating that technical education highly acquired theoretical knowledge expected of them. The finding of this study is in line with the views expressed by Okorie (2010) that all skills are dependent on some form of knowledge and that skill is manifestation of acquired knowledge. It is knowledge that is put into practical activity. The finding of this study is also in agreement with the expression of Bloom (1956) who stated that theoretical knowledge includes the recall or recognition of specific facts, procedural patterns, and concepts that serve in the development of intellectual abilities and skills. It then means that the technical education can:

(i)   Recall data or information such as reciting a policy
(ii)   Understand the meaning, translation, interpretation of instructions and problems such as explaining in one's own words the steps for performing a complex task.
(iii)   Use a concept in a new situation or unprompted use of an abstraction such as applying what was learned in the classroom into novel situations in the work place.
(iv)   Separate material or concepts into component parts so that its organizational structure may be understood. Distinguishing between facts and inferences such as troubleshooting a piece of equipment by using logical deduction; recognizing logical fallacies in reasoning etc.

Conclusion

Based on the results of this study, the following conclusions were made:-

1.   The objectives of local technologies as stated in its enabling decree have been achieved to some reasonable extent.
2.   The training personnel of local technologies possess the required skills for training.
3.   Some of the training facilities, tools and equipment in local technologies are adequate and functional. While some of them are damaged, ill-maintained or obsolete.

The study also identified some limitations in the effectiveness of local technologies training. Furthermore, desirable strategies for improving the effectiveness of local technologies training have been elicited. Conclusively, the TVET has been reasonably effective in local technologies development in Nigeria. Its deficiency in the area of facilities, tools and equipment should be remedied by the government in order to make local technologies more effective.

Recommendations

(i)   Adequate supply of modern machines, tools, equipment and facilities for practical purposes in order to sustain the interest of trainers and trainees. TVET and local technologies should encourage maintenance culture among the trainers and trainees.
(ii)   Government should increase the funding of TVET.
(iii)   There should be frequent evaluation of TVET and local technologies training. This will create room for regular curricula revision at the local technologies to ensure relevance with respect to the needs of the industries/society.

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