Journal of Nigerian Association of Teachers of Technology
JONATT (June, 2016) 11 (2), 1-9
ISSN: 1118-4558 (Print)

Techniques for improving the teaching and learning of technical and vocational education in tertiary institutions towards industrial development in Nigeria

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Abstract

This paper has in dealing with the concept of teaching and learning technical vocational education and training (TVET) institutions, highlighted the recent findings in learning research and successful practices in what has been established as an 'experiential programme'. The problems of inadequate infrastructure, machines, tools and equipment, coupled with complaints of poor teaching and learning in TVET tertiary institutions are noted. It then examined these problems in the context of the nature of TVET and learning research and concluded that since TVET is a learning-by-doing, the poor teaching and learning of TVET in Nigeria are but consequences of the inadequacy of the teaching-learning environment and inadequate curriculum. To address problems of lack of synergy between industries and TVET institutions, inadequacy of industries to supply required machines, tools, equipment and materials for TVET, poor teaching and learning, and the need for TVET institutions to train for a self-sustainable industrial development.

Keywords: Technical Education, Teacher Education, Sustainability, Industrial Development

Introduction

From learning research, Brown (1998) has indicated that learning styles and creation of effective learning environments are of emerging significance due to changing nature of work that requires higher-order thinking. Learning style has been defined by him as the way people come to understand and remember information. Lucas, Spencer and Claxton (2012) have listed established vocational learning methods as follows: Learning by watching; Learning by imitation; Learning by practicing trial and error; Learning through feedback; Learning through conversation; Learning by teaching and helping; Learning by real-world problem-solving; Learning through inquiry; Learning by listening, transcribing and remembering; Learning by drafting and sketching; Learning on the fly; Learning by being coached; Learning by competing; Learning through virtual environments and Learning through games (p.104). Toth (2012) emphasised that more important than teaching by any particular combination of learning methods, forms and means called strategy by is the engagement of the learners. Elsewhere, for better understanding, the students of TVET have been advised by Faraday, Overton and Cooper (2011) to engage in

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deep and not surface learning when the intention of the learners is to extract meaning and produces active learning processes that involve relating ideas and looking for patterns and principles. This approach also involves monitoring the development of one's own understanding and adapting learning accordingly. Coffield, Moseley, Hall and Ecclestone (2004), conversely opined that, "if learners conceptualize learning in terms of memorization of facts and their intention is just to meet course requirements they are likely to adopt a surface approach" (p. 106). This implies when the intention of the learners is to cope with the task, the learning process is restricted because the course is viewed as unrelated bits of information which at best leads to routine memorization. In line with the deep learning intention is the advice that Bostrom (2013) has opined that students must be able to absorb more advanced levels of theoretical knowledge during training and master meta-learning. Meta-learning, otherwise called self-regulated learning strategy has been referred to by Toth (2012) as

> "the highest level of learning strategy is the self-regulated learning strategy, when the student, surmounting his own cognition and affective characteristics, processes the material by choosing the learning methods and means most suited to the requirement. The teacher's direct guidance in this cannot apparently be dispensed with in the beginning' (p. 201).

It is this kind of TVET graduates that are required for a knowledge based, technologically fast changing global economy that Nigeria has to be competitive in. Acquisition of Meta-learning ability is similar to suggestion of Hattie (2009) "that the students should be engaged to the point that they become their own teachers (p. 59). To be able to teach students of TVET successfully, the teacher should keep their learning styles in mind against the background of the purpose of the teaching. In line with the wise saying that all successful efforts are usually goal directed, Lucas (2014) suggested a guideline to assist the TVET teacher in his/her job performance as shown in Fig. 1.

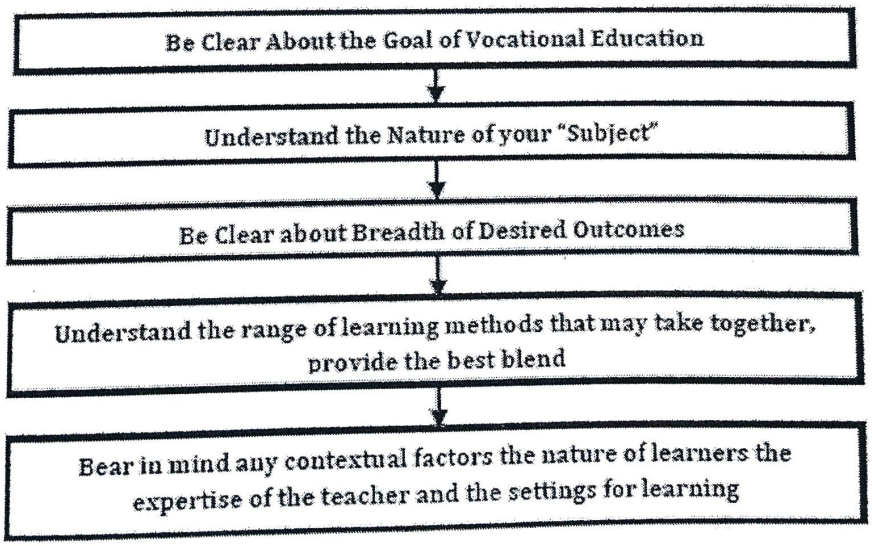

Fig. 1. Line of thinking that guides the teaching of TVET

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Thus, Lucas, Spencer and Claxton (2012) described vocational education as the provision of materials, activities and teaching that is designed to prepare people to function at a specified level, in specific roles in the context of (usually) paid employment. The stage is set the acquisition of cognitive forms of knowledge; second is the development of abilities by it and thirdly is the formation of attitude, self-regulated or Meta-learning. Refinement of the teacher's teaching strategy could be done with reference to the appropriate theory of learning TVET. Based on the Constructivist learning theory, Faraday et at (2011) suggested that Meta-learning should involve the active construction of meaning, knowledge and skills by learners which is dependent on context. Pedagogical strategies of constructivist theory in their explanation include discussion, group work, theoretical and practical problem solving, the sharing of information reflection, presentation of alternative perspectives, modeling, coaching and monitoring. Importantly, they went on that adult learning theories, experiential, problem solving and project based approaches base their learning and teaching practices in constructivist theory.

Current situation of teaching and learning of TVET in tertiary institutions of Nigeria

Technical vocational education and training (TVET) programmes have not been implemented satisfactorily such that TVET has limited impact on employability and national development (Raimi & Akhuemonkhan, 2014). Reasons for this to could include a number of environmental factors such as inadequate funding, lack of expertise, lack of synergy with industry and public perception of TVET. A similar assertion was made by Akhuemonkhan, Raimi and Dada (2014) that the impact of TVET on employability has not been impressive because of ineffective Quality Assurance at all levels. Fadokun (2005) has defined Quality Assurance (QA) as "a critical examination of the objectives, attitudes, procedures and institutional controls systems with a view to ensuring that standards and quality are maintained" (p. 2). At tertiary educational level in particular, Dokubo and Dokubo (2013) have noted insufficient funding lack of TVET facilities, unqualified instructors, employment of poor teaching methods and poor assessment of TVET students' competency. These are in institutions that Ezeani (2014) opined that are for training and skill acquisition for the provision of efficient work force in business, agriculture and industrial sectors. This view of TVET institutions is in accordance with that of Lucas (2014) that vocational education is the provision of materials, activities and teaching that is designed to prepare people to function, at a specified level, in specific roles in the context of usually paid employment. This translates to what Lucas, Spencer and Claxton (2012) call education for work. The lack of synergy with industry and employability of products of TVET institutions in industry is particularly worrisome as Nigeria aspires to further industrialization, defined by investpedia.com as process in which a society or country (or world) transforms itself from a primary agricultural society to one based on the manufacturing of goods and services. It explained that Individual manual labor is often replaced by mechanized mass production and craftsmen are replaced by assembly lines.

There has been inadequate situation concerning the teachers of TVET institutions. In addition to the shortages and poor teaching noted by Ayonmike, Okwelle and Okeke (2015 has described teacher provision for TVET as inadequate in quality and quantity. The exact teaching method used in the absence of facilities, have been found to be demonstration and lectures (Idris, Rajjudin, Abdul Latib, Bin Uddin, Bin Saud & Bin Buntat, 2012). This, note was also similar to earlier findings by Odu (2011) and Egun (2009) that teaching methods devoid of students'-hands-on-experience were in use. The situation has been so unsatisfactory that Obadara and Luke (2014) have, in view of the training efficacy of indigenous occupational system, recommended the restructuring of apprenticeship system of vocational training in indigenous occupations and integrating them into formal economy as a means of curbing unemployment. This is how bad the situation of TVET is despite the Federal Government's commitment to use vocational education to create employment and eradicate poverty which is also in accordance with the recommendations of United Nations Educational, Scientific and Cultural Organistion and International Labour Organisations (2002). Federal Republic of Nigeria (2004) stated that TVET is "a means of preparing for occupations fields and for effective participation in the world of work" (Section 7, sub-sections 40b) and "a method of facilitating poverty alleviation" (Section 7, sub-sections 40e). Addressing the issue of TVET instructional delivery to remedy the situation seem to be best done from a position of strength in terms of global best practices in TVET. Global best practices in TVET would first and foremost involve the provision of what Landes (1988) have said constitute readiness for industrial activities in these institutions. They are facilities with appropriate machines, equipment and tools, materials to work on or with and of course inanimate power source, electricity to drive the machines, equipment and tools. This is why recommendation for their provision is recurrent in the literature of TVET in Nigeria (Dokubo & Dokubo, 2013). With the proper study environment in place the place of the students' learning and teachers' teaching become the foci of improvement of TVET.

Techniques for improving teaching and learning of TVET towards industrial development

Literatures have stressed the need to have industries to supply needed machines, equipment, tools and raw materials the necessity to have synergy between institutions and industry to draw up appropriate curriculum and collaborate as may be needed and the importance of effective teachers in TVET, techniques for improving teaching and learning of TVET towards industrial development involve putting appropriate socio-economic conditions for it in place. Lucas (2014, p. 9) identified four distinct, interrelated and interconnected activities as:

(a) The building of appropriate TVET teaching and learning environment.
(b) The invigoration of industrial establishments.
(c) Review of TVET curriculum by tertiary institutions involved in the programme and
(d) Retraining of TVET Teachers and implementation of TVET Programme on sound theories of teaching and learning.

Building appropriate TVET teaching and learning environment

Several studies as reported in Lucas (2014) have established incontrovertibly that TVET involve the so called 'experiential learning', that is 'learning by doing'. This is why apprenticeship has been successful over the years and it this is why one would normally not qualify to take apprenticeship if he/she were not adequately set up and practicing his/her trade. Similarly, Obadara and Luke (2014) recommended a restructured indigenous apprentice system to the South Western Nigeria and integration of same into the mainstream vocational training and national economy. Hence, TVET institutions should be fully built up with adequate provision of machines, tools and equipment. Raji (2015) advocated for the use of solar power or some other source of electricity most suited to the location of each TVET institution should be provided. The required investment for the above change of situation in TVET institutions to diversify the ownership and finding structures of TVET fully independent ownership of TVET institution may be promoted just like fully independent ownership of primary, secondary and tertiary institutions in Nigeria.

The need to invigorate Nigeria's industrial establishments

Vocational education being designed to prepare people to function at a specific level in specific roles, in the context of (usually) paid employment and the activities are by machines driven by inanimate power which must to be available from within the country. It therefore necessary for the Federal Government to go into Public Private Partnership (PPP) with original designers of uncompleted companies for supply of raw materials and machines (Federal Republic of Nigeria, 2014). Furthermore, local production of machines, tools and equipment on license from such technical partners, for TVET Institutions and industries should be arranged. This will bring down the cost of their acquisition and make spare parts readily available and cheap too. The invigoration of Nigeria's industrial establishment is most vital for sustainable industrial development of Nigeria and TVET contribution for its progress. This is in line with the assertion of Raji (2015) that TVET is imperative but not all in all for achieving Nigeria's industrial revolution plan. The workers if properly educated, would be TVET individuals with relevant skill and knowledge for social, economical and technological innovation processes for societal progress and prosperity. This is in accordance with the observation of Ezeani (2014) that this is a global recognition of the role of TVET graduates. This is the kind of TVET institutions that Nigeria needs now and in the future.

Collaboration between industry and tertiary institutions for review of TVET curriculum

There is need for each tertiary institution involved in TVET to collaborate with appropriate industrial sector to review TVET curriculum of the programme it offers or intent to offer. This is to address the problem of lack of synergy between industry and TVET found by Raimi and Akhuemonkhan (2014) and the consequent unemployability of TVET graduates

found by Akhuemonkhan et al (2014). It will also refocus the programme to Federal Government intentions to use Technical and vocational education as a means of preparing for occupational fields and effective participation in the world of work (Federal Republic of Nigeria, 2004). This will in effect assist in the production of TVET graduates who will be needed, can function well in their places of responsibility and contribute to technological progress and prosperity of the nation. In addition to the requirements of the industries, the revised curriculum should provide enough of theory and practice as parts of the same thing - learning, in which Kilbrink (2013) was of the view that theory is 'knowledge about' and practice is 'knowledge in'. In other words, theory has implies 'knowing that' and practice 'knowing how'.

Bostrom (2013) recommended that students must be able to absorb more advance levels of theoretical knowledge during training. Such knowledge would be useful in providing answer to the third of the Tripod branches of knowledge - why in addition to what and how provided by the TVET teacher. In addition, it starts up and points the students into deep learning which Faraday et al (2011) have recommended for better understanding. It obviously forms a sound basis for the acquisition of self-regulated learning strategy called Meta Learning (Bostrom). Knowing why, as the foundation for true knowledge, gives happiness to the learner, contentment with oneself and feeling of being powerful. Knowledge, at this point, generates the momentum for more knowledge, continuing to the point that the accumulated art of learning becomes an enabler to achieving Meta Learning in studies, work habit and research. Ultimately, the meta learner acquires are known as wider skills, competencies, dispositions, capabilities or habits of mind that are required by workers of the technologically fast changing and knowledge-driven work of the 21st century (Lucas, 2014). Thus, knowing why, is synonymous with deep learning, provides understanding beyond surface level and imparts the informed capacity to add or subtract the variables/ingredients, rearrange or modify parts for an informed and progressive investigation. Thus, a functional relationship exists between science, technology and innovation. Accordingly, it often begins with science, with innovation being an outgrowth of (beyond average) in-depth, precise and exceptional understanding of the technology in question. Thus, the revised TVET, curriculum should be loaded with enough examinable theoretical knowledge. This is to point the students to and facilitate the graduation of each of them into being an employer or employee that is innovative and inventive due to knowing thoroughly what he/she is into.

Retraining TVET teachers

Retraining TVET teachers for satisfactory job performance is necessary to address the problem of inadequate number of qualified instructors and facilitators in the system. Ezenwa (2015) stressed the need for retraining as significantly necessary because the quality of teacher job performance has been so low. Ezenwa added that their exposure to existent inappropriate TVET teaching and learning environment is enough reason why they

should be retrained with a revised curriculum in mind, and in the envisaged proper TVET teaching and learning environment. Some provision is needed for quality assurance of the TVET system. This will enable a good monitoring at all times to prevent things going wrong. Furthermore, the input of the students as to their teachers' job performance as obtainable in some American universities as in appendix A would be most appropriate. This is because no supervisor can see and assess the teacher from the students' perspective. Vocational Technical Teachers (VTT) job performance evaluation scale could be administered to students of each course at the end of a semester to know how well each Technical Teacher has done with each course he/she taught.

Conclusion

The poor teaching and learning of TVET are consequences of the inadequate teaching and learning environment of TVET as a learning by doing programme; the unemployability of TVET graduates is as a result of a curriculum that is irrelevant to the needs of industry; and the universities have shied away from TVET because of the impossibility of running credible TVET programme in the prevailing socio-economic circumstances. This point of view would contribute to objective observation, assessment promotion, and discipline including of teachers according to their performance on the job.

Recommendations

1. Each tertiary institution involved curriculum to be strong in theoretical in TVEET should collaborate with appropriate industrial sector to review its content so as to be relevant to current and future needs of the industry.
2. The owners of TVET tertiary institutions should build them up and provide excellent learning environment for the experiential learning nature of TVET.
3. All the owners of TVET tertiary institutions should ensure that their existent TVET teachers are retrained with reference to the revised curriculum.
4. The Federal Government should re-invigorate the abandoned industrial establishments intended to supply the basic ingredients of an industrial economy raw materials and machines tools to industries and TVET institutions.
5. The owners of TVET tertiary institutions should make provision for constant and reliable electric power supply for teaching and learning to be done properly.

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