TVET Institutions and Industry Collaborative Practices on Electronics Laboratory Training for Skill Acquisition among Technician Trainees in Kenya

ABSTRACT

Aims: To establish if there exist any TVET-industry collaborative practices to aid electronics laboratory training in TVET institutions in Nairobi County, Kenya.
Study design: Qualitative research design.
Place and Duration of Study: Electrical and Electronics Departments of public Technical and Vocational Education and Training institutions in Nairobi County Kenya, between September 2019 and March 2020.
Methodology: Qqualitative phenomenological research design was employed. The target population comprised of eight (8) HODs and eight (8) electronics experts drawn from electrical and electronics departments in the 8 public TVET institutions in Nairobi County. All HODs were selected for an interview while purposive sampling was used to select experts for a focus group discussion. An interview schedule and a focus group discussion guide were developed and administered face to face. Qualitative data obtained was analyzed using thematic analysis.
Results: Sample sizes for FGD and HODs was 8 each. The response rate was 100% and 75% respectively. The findings of study revealed that TVET institutions were aware of the skills needed in the industry although the institutions did not have collaboration with the industry. The institutions had tried to incorporate industry skills in laboratory practice on their own without input from the industry.
Conclusion: It was concluded that TVET institutions had little interest in seeking out collaborations with the industry. It was therefore recommended that TVET institutions should develop collaborations with specific industries for purposes of supporting laboratory instruction.

Keywords: Industry, practices, electronics, laboratory, skills, acquisition

Technical and Vocational Education and Training (TVET): research subject is the best keywords.

The abbreviation must have full name at first time.

1. INTRODUCTION

Employers seek to increase their productivity by engaging qualified personnel with the right skills. They expect that by the time they are recruiting the graduate trainees from TVET institutions, they are competent enough to undertake the assigned tasks. TVET institutions on the other hand desire to have their graduates develop the required skills to enable them secure jobs in the industry. What this means is that the skills offered in training institutions must be congruent with the skills that the industry requires. As such, collaboration between these two entities is a critical component in skill acquisition. This is only possible when

industry can provide practical training opportunities in the workplace, participate in improvement of equipment and capacity development of instructors (Raihan 2014).

According to Mulati, Kyalo, and Dimo (2019), collaboration between colleges and industry has a lot of relevance in skill acquisition among trainees. Krivickas and Krivickas (2007) echo the same sentiments. In a study carried out in a polytechnic in Lithuana, the researchers pointed out that collaboration with industry enhances the success of technical training. The authors, further, asserted that colleges and industry have symbiotic relationship where industry needs graduates from the colleges and colleges are supposed to receive training support from the industry. Industry provides support to TVET institutions in a number of ways. One of the ways is offering industrial training opportunities for college students to "work in a real environment with modern instruments" (p.195). Another way is through donation of modern laboratory equipment for laboratory training. This makes it possible for training institutions to have enough training equipment. This is evident in a study that was carried out in Australia. The study by Kostulski and Murray (2010) found out that one university had sufficient equipment for laboratory instruction as a result of donations received from the industry. Another way in which the industry supports the training of trainees to acquire skills is by getting involved in the programme design, allowing their staff to work as trainers in TVET programmes as well as collaborating in practical sessions (Ahmadu, 2013).

In spite of numerous rewards accruable from establishing workable collaborations between the TVET institutions and the industry, the link between them is seen to be weak and, in most cases, ad hoc (Ashmawi, 2015). However, it has been found out that there is no proper collaboration between the training institutions and the industry. In a study carried out in Ghana, Dasmani (2011) found out that there was a weak link between the training institutions and the industry hence whatever skills trainees received fell short of the industrial expectations. In Kenya, Sang, Muthaa, and Mbugua (2012) found out that there was a weak link between TVET institutions and industries. This led to a disconnection between what is taught in colleges and what is needed in the industry. Obwoge, Mwangi, and Nyongesa (2013) in a study done in Nairobi, Kenya, also found out that the TVET institutions and the industry had a very big gap between them.

Although the link between industry and TVET institutions in Kenya is observed to be weak, there is some level of collaboration. It has been established that TVET institutions and industry collaborate majorly on industrial attachment (Obwoge, Mwangi, and Nyongesa, 2013). According to Jahonga, Canute, Murey, Otunga, Kiprop, and Kosgey (2016), the industry to some extent, provides insurance cover for students on attachment, and also provide TVET institutions with training and learning materials.

Despite the fact that there exists no strong linkage between TVET institutions and the industry in many countries, one thing that cannot be ignored is that the two entities have a symbiotic relationship and cannot be separated as they depend on each other. Therefore, collaboration between them is strongly argued. Ashmawi, (2015) contends that TVET institutions must involve the industry in the education process. Equally employers must actively engage themselves in the process of training students.

From research it has been established that TVET institutions and industry can collaborate effectively. Ahmadu (2013) in a research carried out in Sierra Leone shows a successful case of TVET institution, the Eastern Polytechnic and industry collaboration. The Polytechnic collaborated with the industry on various aspects including: programme training design, teaching of the programmes and carrying out of practical training. The results of the collaboration were encouraging. The students secured jobs on graduation while the industry got employees with the requisite skills ready to undertake the job responsibilities

immediately. This demonstrates that collaboration can work to produce graduates who have requisite skills.

One area where TVET-industry is important to have competent graduates is the area of electrical and electronics. Since the electronics is virtually applicable in every area where there is equipment, from manufacturing, hospitals, telecommunication, aviation, domestic appliances among others. Electrical/electronic technician trainees therefore need to attain various skills in electronics by the time they graduate from TVET institutions. Some of the skills that they need to develop include: identification of electronic components like resistor, capacitors, and transistors and their symbols, design and construction of simple electronic circuits, operation of electronic instruments like oscilloscope, and signal generator, recording and interpreting of measured values (Salim, Puteh and Daud 2011). With these skills they will walk into the industry with required competence to undertake job related responsibilities without having to undergo intensive on-job training. To ensure that this is attained, industry and training institutions must collaborate on electronic lab practice where the trainees are exposed to the required skills.

In Kenya, electrical and electronics plays a critical role in the big four agenda, manufacturing and job creation; affordable housing; universal health care and food security. Basic electronics skills are developed in the laboratory where students operate and manipulate equipment, tools and materials. It is a reality many TVET institutions lack enough and appropriate equipment. This makes it imperative for collaboration between TVET institutions and the industry to be in place. Given that collaboration can be on various aspects of training, one area that needs attention is that of laboratory practice owing to the fact that skills are critical. Therefore, the purpose of the study was to establish if there exist any TVET-industry collaborative practices to aid electronics laboratory training in TVET institutions in Nairobi County, Kenya.

2. METHODOLOGY

2.1 Research Design

This study employed qualitative phenomenological research design(Reference) where HODs and Highly experienced trainers were used to investigate the TVET institutions – industry collaborative practices on electronic laboratory instruction training. The HODs and trainers were from different institutions which made it possible to obtain a variety of views regarding the subject under study. The key research techniques that were employed were interviews and focus group discussion as they could provide in-depth information.

2.2 Target Population

This study focused on eight (8) public TVET institutions located in Nairobi County, Kenya. The target population for this study comprised of Heads of Department and electronics laboratory practice experts in electrical & electronics departments. Each TVET institution had one HOD hence for the 8 institutions we had 8 HODs in electrical & electronics departments in total. For the experts, the researcher was interested in the electronic trainers with a longer time in training laboratory practice. So, the total population of experts considered in this study were 8 one from each institution.

2.3 Sampling Procedure

Since the target population was small and manageable, census method was employed to obtain the respondents for this study. The census method is that it accords the researcher

an opportunity to investigate the research problem extensively which in turn provided more detailed information on the research participants. Consequently, all the eight (8) HODs and eight (8) electronic lecturers who were considered experts were to be used in the study. But out of the eight (8) HODs, only six (6) were available for interview. (Reference)

2.4 Data Collection

This being a qualitative study, the research instruments used for data collection were interview schedule and focus group discussion guide. The interview schedule was used for collecting information from HODs. The interview schedule collected information on: awareness of the skills needed by the industry, how participants got to know the skills needed in the industry, whether TVET institutions incorporated industry skills in laboratory instruction, whether TVET colleges and industry collaborated in electronic laboratory training. The FGD guide was used to collect information from electronic experts. The guide also collected information on the same issues as the interview schedule. Both interviews and the focus group discussion were

2.5 Data Analysis

The qualitative data collected for this study was analysed using thematic analysis. According to Warren (2020) this method is considered useful when exploring opinions, views and even experiences of the subjects under study. This method involves looking at “patterns of meaning in a data set – for example, a set of interviews or focus group transcripts.” (Warren, 2020, n.p.). The author further points out that this method takes collected data and organizes it into themes to enable the researcher make meaning from it. For this study, after data was collected, it was prepared and organized into usable form after which themes were developed. Then interpretation of the findings was done.

3. RESULTS AND DISCUSSION

DATA ANALYSIS OF RESULTS AND DISCUSSION

The following were the findings of the study.

3.1 Were TVET institutions aware of the skills needed by the industry?

All the HODs of the various TVET institutions who were interviewed indicated that they were aware of the skills needed by the industry. Equally all the FGD participants agreed with the HODs that they were aware of the skills that were needed by industry/employers.

3.2 How did the HODs and FGD participants the skills needed in the industry?

There were several ways that the HODs used to know the skills that were needed in the industry. The main way they knew skill needs of the industry was through the industrial attachment assessment. When assessing the trainees on attachment, the trainers/assessors held discussions with the trainees and also observed what they were doing. These discussions and observations would assist point out what critical skills the trainees needed on the basis of what they performed well and what they did not do well. The trainer/assessor also had conversations with the trainees’ supervisors who would point out what skills were critical in the industry. The institutions also got to know the skills needed by the industry through feedback from the industry on weak and strong areas of the trainees which pointed out what the industry needed.

On the other hand, the FGD held pointed out similar ways as HODs. They pointed out that they get feedback from the industry when they go to assess the trainees on attachment.

Additionally, the participants added other ways which included: attending workshops, seminars and symposia; monitoring the new developments in emerging technologies; the internet; innovations during TVET fairs; trainees reporting to their trainers on the specific skills they found lacking while they were on attachment.

3.3 How are industry required skills incorporated in electronic laboratory training?

Incorporation of industry skills in laboratory instruction was a big challenge as many HODs indicated. This was because, although the trainers are aware of the needed skills, the syllabus used was obsolete and static which did not allow for dynamism in training. Many trainers followed curriculum for exam purposes. This was in contrast to the industry which was dynamic and already had automated their operations and also incorporated new technologies. However, as one of the HODs pointed out, that "some trainers try to prepare trainees for what they will find out there in the industry." These they did by engaging the trainees outside the normal teaching hours when both trainers and trainees were free though rare.

The FGD participants agreed with the HODs that incorporating industry needed skills in laboratory instruction is a challenge owing to a number of issues which include: lack of modern equipment and current technology and the nature of the curriculum. However, even with these challenges, the participants indicated that they sometimes refer students to YouTube links on particular aspects of laboratory practice to learn; using laboratory training software to demonstrate the skills. They also indicated that they plan educational visits to industries where students get exposure to the actual equipment and materials.

3.4 How are TVET institutions collaborating with industry in electronics laboratory training.

Interview with HODs revealed that TVET colleges and industries did not have any training collaboration between them. As such, trainers rarely had a chance to upgrade their skills on new equipment and latest technology in the industry. The simple collaboration they had for trainees was through industrial attachment but it was not formal. This agrees with findings of Obwoge, Mwangi, and Nyongesa, (2013) who found out that TVET institutions and industry collaborate majorly on industrial attachment. Except during attachment, trainees never have any other opportunity to get training in the industry. Also, trainees only got a chance for exposure to latest equipment and use of electronic equipment and tools during occasional educational field trips when they visit industries. However, this could not help much as they could only view the equipment and not operate them.

Equally, it was found out that because of lack of formal collaboration, there was no donation of equipment from the industry to TVET colleges. However, it is worth noting that some HODs pointed out that, although there was equipment donation to some colleges, it was in other specialty areas like automotive but not in electrical and electronics departments.

The FGD responses, equally, revealed that TVET colleges did not have any formal collaboration with the industry hence there was no partnership in training. This resulted in TVET institutions trainees acquiring skills not relevant with the industry needs. Actually, the FGD participants said that skills acquired by trainees lacked real hands-on skills needed in the industry. These findings are consistent with Dasmani (2011), who found out that there is a weak link between the training institutions and the industry hence whatever skills trainees received were not relevant to the requirements of the industry.

3.5 Discussion

From the findings it is clear that even though TVET institutions were aware of the skills needed in the industry, there was no formal collaboration which could set out the terms of engaged between the institutions. This could have spelled out the role of each entity in the electronics laboratory training. However, there is a weak link between the training institutions and the industry hence whatever skills trainees received were not relevant to the requirements of the industry (Dasmani, 2011; Mutua and Muriithi, 2015). This weak link was very evident as the industry rarely got involved, especially, in the training sessions which led the industry to re-train newly recruited employees. This lack of collaboration has been attributed to lack of initiatives by TVET institutions to approach the industry to initiate partnerships (Mutua and Muriithi, 2015).

4. CONCLUSION AND RECOMMENDATIONS

From the findings it was concluded that TVET institutions had little interest in seeking out formal collaborations with the industry which would have been a great support in electronics laboratory training of the trainees. It was therefore recommended that:

1. TVET institutions should intentionally seek to develop formal collaborations with specific industries for purposes of supporting electronics laboratory practice.
2. TVET institutions involve the industry in every aspect of the training, more particularly, in laboratory training for the benefit of the trainees.
3. TVET institutions keep constant communication with the industry to share information on changes in the industry and technology that affect electronic laboratory training.
4. Government to create an office to deal with linkages and collaborations between TVET institutions and industry

CONSENT

Written informed consent was obtained from the respondents for publication of this paper. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal.

ETHICAL APPROVAL

A research permit was obtained from the National Commission for Science, Technology and Innovation (NACOSTI) and an introductory letter from ministry of education. This letter was delivered to all institutions under study to allow for data collection. All information obtained from published sources was well cited to avoid plagiarism. Respondents consent was sought. Their personal details were not recorded anywhere for the sake of Confidentiality and Privacy, Anonymity and protection against Physical and Psychological Harm.

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DEFINITIONS, ACRONYMS, ABBREVIATIONS
(IT IS NOT THE FORMAL WRITING FOR RESEARCH ARTICLE)

Technician Trainee - Refers to a learner undertaking diploma in electrical and electronic engineering course in TVET institution.

TVET - Technical and vocational Education and Training
FGD - Focus Group Discussion
HOD - Head of Department