Relevance of industry stakeholder partnership in the production of skilled electrical engineering trade graduates

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Abstract

This paper explores the relevance of the industry stakeholder in the production of skilled electrical installation and maintenance technical college (TC) graduates in Port Harcourt, Nigeria. One research question was set in the study: What is the relevance of stakeholder partnerships in the production of skilled Electrical Installation and Maintenance Trade (EIMT) Graduates? A qualitative exploratory case study involving a Community-Based Participatory Action Research (CBPAR) approach was used to purposively select ten participants. The data were generated through individual interviews and focus group discussions and were analysed thematically. Experiential learning theory was employed as a theoretical framework in the study. The study’s findings revealed the emergence of the following themes: development of willingness to learn, exposure/development of new relevant trade-related skills, exposure/development of practical skills, challenges of the technical college programme, and innovative teaching. From these findings, the study concludes that the industry stakeholder is necessary for producing skilled EIMT graduates in line with the objectives of the TC programme in Nigeria. Thus, the study contributes to the body of existing knowledge on the Technical College programme and within the field of Technical and Vocational Education and Training (TVET) on the relevance of industry stakeholder partnership in the production of skilled EIMT. Recommendations were also made based on the conclusion.

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Introduction

Technical Colleges, established on the philosophical foundations of Technical and Vocational Education and Training (TVET, hereafter), are principal training institutions mandated to provide vocational education and training to equip graduates as well as prepare them for gainful employment in public and private industry as stipulated in the Federal Republic of Nigeria National Policy on Education (FRN, 2013). Recipients of this type of training are expected to possess vocational skills, knowledge, attitudes, a particular way of thinking, and character qualities (Okolie et al., 2019). This is to produce technicians guaranteed the skills to be self-employed and contribute to their nations’ economic development (Okolie et al., 2019). TCs as post-primary institutions (Legg-Jack, 2014) are top vocational colleges established in Nigeria which is premeditated to set up an individual to acquire practical competencies, knowledge and attitude indispensable for craftsmen and technicians at the sub-professional level (Okoro, 2006). Those admitted at TCs are students with Basic Six (Grade 6) certificates for six years of vocational training at junior and senior levels, referred to as pre-vocational (Basic 7-9) and Vocational (Basic 10-12) levels, respectively. According to the education policy, graduates of TC are to acquire competencies in Electrical Installations and Maintenance Trade, among others (FGN, 2013). These trades are designed to consist of theory and practice alongside general education (Okolie, Igwe, & Elom, 2019).

EIMT offered at the senior phase of TC programme is designed to impart knowledge and practical skills in different aspects of the trade areas such as house wiring (conduit & surface), coil winding and rewinding, electrical gadgets repairs, installation and...
maintenance of electrical machines among others (Ohanu et al., 2020). According to the National Board for Technical Education (NBTE, hereafter), skills developed in any of these listed areas listed above are meant to produce craftsmen and technicians as well as other skilled personnel who will be enterprising and self-reliant in the electrical industry (NBTE, 2001). Graduates of EIMT, according to the program's design, should be able to execute diverse experiments involving series and parallel connections alongside domestic and industrial installations (FRN, 2013). The implication is that they are to possess skills in these areas. Besides, the graduates of the EIMT are to possess skills in electric cable preparation and joining, installation/connection of batteries for charging systems, and apply various tools in the dismantling, recoiling and recoupling of electric machines, among others (NBTE, 2004). In addition, EIMT graduates are to possess skills in industry/factory electrical installations and maintenance work (Mbaga, 2011). Skills in these areas aim to produce the quality of manpower resources responsible for the country’s economic and social development (Umar & Ma’aji, 2010).

Nevertheless, from inception of the TC programme, most graduates of EIMT still roam the streets unemployed or unable to establish their workshops due to a lack of marketable skills resulting from poor training or inadequate skills acquisition in the trade (Odika & Tom, 2020). Several scholars attribute the lack of the required skills amongst EIMT graduates to diverse reasons, namely, misaligned curriculum (Arfo, 2016), skills mismatch (Legg-Jack, 2014), poor funding, shortage and lack of qualified technical teachers (Kumazhege & Egunsola, 2014; Okorafur & Okorafur, 2016) and inadequate facilities among others (Umar & Ma’aji, 2010); (Legg-Jack, 2018).

Several studies have been conducted around TC programmes, EIMT inclusive, but none of these studies employed an intervention approach involving stakeholders representing the academia, industry and government. For instance, a study highlighted that graduates’ EIMT acquired skills in some aspects of the trade while they were deficient in certain competencies; thus, on-the-job training was recommended (Moses et al., 2017). In two different studies carried out in Enugu and Rivers States, Nigeria, it was highlighted that skills needed to be integrated into EIMT curriculum to ensure the objectives of the programme are met (Onoh & Oneyebuenyi, 2015; Odika & Tom, 2020). Other studies highlighted that EIMT teachers need more specific skills to deliver the training TC students need in the programme. Hence they need retraining (Eze & Ekuma, 2016). In Yobe State, it was shown that graduates of EIMT were unemployed due to a lack of the skills required in the trade for self-employment (Abdullahi et al., 2020). From the studies reviewed, a similar trait appears across all, the need to acquire the required skills in EIMT for both graduates and teachers. Although some of the studies recommended it, only some considered the relevance of the industry stakeholder in producing skilled EIMT graduates.

Hence, this points to the need for the present study, which explores the relevance of industry stakeholders in the production of EIMT graduates. The objective is to explore the relevance of the industry stakeholder in the production of skilled EIMT graduates at TC. Thus, the study addresses one question: What is the relevance of the industry stakeholder in producing skilled EIMT graduates at TC? The study employed a qualitative approach that involved community-based participatory action research in responding to the question asked. The data were generated through individual interviews and focus group discussions and analysed thematically. The significance of the study is that it contributes to the body of existing knowledge on the Technical College programme and the field of Technical and Vocational Education and Training (TVET) on the relevance of industry stakeholder partnership in the production of skilled EIMT.

In presenting the findings, the paper begins with the introduction, followed by the literature review, theoretical framework and methodology. Other sections include findings and discussion, implications, conclusion, and recommendations.

**Literature Review**

**Theoretical and Conceptual Background**

The first section of the review presents the theoretical background, followed by the conceptual.

**Experiential Learning Theory**

This paper is framed using Experiential Learning Theory (ELT, hereafter). The history of the theory is traceable to John Dewey, Kurt Lewin, Jean Piaget, William James, Paulo Freire and Carl Rogers, in their attempt to explain and develop the experiential learning process alongside the multilinear model for adult development (Kolb & Kolb, 2005). Dewey (1938) asserts that the idea of people learning by doing or active involvement can be achieved through experience. Thus, ELT is defined as the process whereby knowledge is created through the transformation of experience and the combination of grasping and transforming experience (Kolb, 1984, p. 41). The ELT is a derivative of the constructivist theory of learning which suggests that social knowledge is created and re-created through the personal knowledge of the learner (Kolb & Kolb, 2005, p. 194). Experiential learning most times involves an explicit intention of the part of the learner to learn (Moon, 2004), with the understanding that learning can take place when accompanied with experience (Morris, 2020).

The development of the ELT is premised on learning which is composed of four elements namely concrete experience, reflective observation, abstract conceptualisation and active experimentation (Malale & Sentsho, 2014; Tennant, 2006). This method of learning investigates specific components as skills, techniques and the environment, which will ensure that the learner gains knowledge that is relevant to those particular components (Kolb, 2006). True experiential learning can also be labelled as an “atmosphere” created
by the teacher to enhance the learning capacity of a learner (Kolb & Kolb, 2005, p. 199). Retrospectively, as an organisational method of instruction, experiential learning, if correctly developed, planned and implemented, may progressively enhance learners’ learning style and enhance teachers’ teaching style (Pherson-Geyser et al., 2020).

The choice of the framework is premised on the fact that its application has direct bearing on the objective of the study, which focuses on the stakeholders’ relevance in the production of skilled EIMT graduates. Also, since the study is hinged on an intervention programme that typifies workplace training, the rationale for this theory became more apparent. The suitability of the ELT is skill-based learning has been exemplified in several studies namely, the development of vocational and technical knowledge and skills of adult learners (Owusu-Agyeman & Fourie-Malherbe, 2021) TVET stakeholders’ experiences of implementing work-based education for students in a rural ecology (Ngubane et al., 2020) and as teaching strategy in Life Sciences (Pherson-Geyser et al., 2020).

Thus, the ELT as employed in the study is used to explore industry stakeholder partnership with TVET institution in the practical training of Technical College graduate in EIMT

Industry Stakeholder and TVET Institution Collaborations

Collaboration involving TVET training colleges and the business enterprise has become a necessity in the production of human capital that is needed to transform any given economy. In the era of the fourth industrial revolution, the latest skills and technology developments are needed to ensure the success of any TVET institution in the production of highly competent graduates that satisfies industrial requirements (Mustafa et al., 2022). Thus, such partnership between business and TVET institutions is a mechanism in developing and strengthening the vocational education system, especially in the production of work-ready graduates through empowerment in technical skills technology as well as increased employability (Mustafa et al., 2022). Different scholars have highlighted reasons why collaboration between TVET institutions and industry is important (Mandivivalla et al, 2015; Akooje, 2016; Okoye & Arimonu, 2016; Makgato & Moila, 2019; Makgato & Afeti, 2020; Vinayan et al, 2020; Msibi, 2021).

Besides, the necessity of industry involvement in the training has been reported in different studies globally. These include exposure to practical-based training (Winberg & Hollis-Turner, 2021), exposure to experiential learning by real-life experimentation and latest technology to produce work ready graduates as well as the latest technology to produce work ready graduates (Pherson-Geyser et al., 2020; Mustafa et al., 2022). Others include exposure to industrial transformation for knowledge enhancement as well as adapt to knowledge and update teaching materials (Adams, 2019) and for practical skills acquisition that are aligned to labour market demand (Nathaniel et al., 2019). It is important to note that in the absence of collaboration with the industry, TVET graduates cannot maintain professional competencies and the industrial productivity cannot be achieved with low-level human resources (Singh & Tolessa, 2019).

Research and Methodology

This paper employed a mixed method approach paradigm. Thus, this article, located in the constructivist paradigm and based on qualitative approach involving Community-based Participatory Action Research (CBPAR) addressed one research question namely, what is the relevance of the industry stakeholder in the production skilled electrical engineering trade graduates at technical colleges? A qualitative case study design involving Community-based Participatory Action Research (CBPAR) involving intervention was employed to provide answers to the research questions. Case study on the other hand, as declared by Yin (2018, p. 18) beams at “a contemporary phenomenon in-depth and within its real-life context, especially when the boundaries between the phenomenon and the context are not clearly evident”. CBPAR is a methodological approach to research which focuses on seeking answers to practical questions from concerned stakeholders within same community with the intention to generate evidence-based knowledge for the improvement of practice as well as empower those involved for change action (Banks et al., 2013; Hacker, 2013; Koshy et al., 2011; McNiff & Whitehead, 2011). CBPAR proposes a framework that begins with problem associated with a specific community, proposed action, and then supports this action with research that is community based and engaged (Burns, Cooke, & Schweidler, 2011) for solutions. The CBPAR intervention programme consisted of five stages (Burns et al., 2011), and these were all implemented. Firstly, the constitution of stakeholders within the community of practice invited to participate in the study was guided by the CBPAR framework namely, the academia, industry and government. Secondly, a programme was planned on teaching a topic in electrical trade titled: The Use and functions of a Contactor Switch. Thirdly, on the implementation of the programme, where students from electrical trade were taught the Use and functions of Contactor Switch by the industry personnel in the classroom since there was no workshop, using the tools and equipment which he provided. Fourthly, the students were invited to identify and make connections on the Contactor. Fifthly, the students did the connection effectively, as a result they developed certain trade-related and other skills.

Therefore, the paper describes in detail how stakeholders namely, principal, teacher, students, industry employer as well as government representative construct their relevance on the production of skilled electrical engineering trade graduates at technical colleges.

Sample and sampling

The sample for the study consisted of ten participants representing the academia, industry and government that were purposively selected (Ames, Glenton & Lewin, 2019). Eight participants were selected from the study site – technical college namely, the
principal, one teacher (Head of Department) and six students from Vocational One (Grade 9) within the electrical engineering trade. One participant each represented the government and industry sector (electrical engineering precisely), respectively. It is important to mention that convenience sampling was employed to select participants in the students’ category. In convenience sampling, participation is based on choice of the participant after being informed of the research by the researcher (Stratton, 2021). Thus, students’ involvement in the study was based on their willingness and availability to participate.

Data collection
As highlighted above, the study involved intervention. Hence, some aspect of the data generation in the study was executed twice namely, before and after intervention. From the principal, teacher, industry employer, and government representatives, data was generated through minutes of meetings and interviews (Whittaker, Laban & Tucker, 2005; DeJonckheere & Vaughn, 2019), whilst for students focus group discussions was applied. These methods provided avenues to achieve credibility in findings of the study as it allowed for the data triangulation of sources (Bans-Akutey & Tiimub, 2021).

The above five stages in the CBPAR intervention programme were all implemented in this study in the planning of the topic in electrical trade titled: The Use and functions of a Contactor Switch (Burns et al., 2011). A Contactor is an electrically controlled switch used for switching an electrical power circuit.

Data analysis
Data generated from individual interviews and focus group discussion were analysed thematically. According to Clarke and Braun (2013) as well as Hesse-Biber and Leavy (2011), data analyses in thematic method follows five stages namely: transcribing of recorded interview (data); reading and familiarisation with interest on items noted; open-source coding through close examination of data using questionnaire items from the sources of data; sorting for themes; and review, define and name themes that emerge for subsequent reporting. The above outline stages were strictly followed in the analyses of data generated in the study.

The following abbreviations are used to denote the participants in the analysis. Electrical installation and maintenance trade students are denoted as “EIMTS”, the teacher with Electrical installation and maintenance trade teacher “EIMTT), technical college principal as “TCP”. The others are electrical industry employer as “EIE” and State economic empowerment government representative as “SEEFOR”.

Findings and Discussion
Findings
This section presents the analysis and findings from data generated from EIMTS, EIMTT, EIE, TCP and SEEFOR representatives. The presentation commences with students’ experiences and concludes with the SEEFOR representative. From the analysis of students’ experiences using focus group discussion, the following three themes emerged namely:

i. Willingness/eagerness to learn;

ii. Development of new relevant trade-related knowledge; and

iii. Development of enhanced knowledge through experiential learning.

Students Experiences
Willingness/eagerness to learn
This category refers to the ability to arouse the students’ intrinsic value to learn. This means the inculcation of the desire, interest and readiness of an individual to learn new things. This willingness/eagerness they expressed in the various sample excerpts outlined below.

“I will like......you people to be coming every time, like on Tuesdays, which is our departmental day, so we will acquire more knowledge, even though not the Contactor part, more knowledge in Electrical installation (EIMTS 3).”

Similarly, on the willingness to learn, another student solicited the government’s assistance in making such method of teaching a reality. This, he expressed:

“I would like to say that, let the government just help us so we will be doing this thing like twice a week, that’s it will help us... I will say that this one we learnt today is very, very good more than the one we have been learning (EIMTS 4).”

As can be seen in the excerpts above, the outcome of the lesson as delivered by the industry personnel has imbibed in the students the essential value to learn, as this is evident in the first excerpt as the student calls for an extension of similar approach across other Electrical Installations and Maintenance trade subjects. On the other hand, EIMTS 4 solicits for the government’s assistance for a continuation of the programme.
Development of new relevant trade-related knowledge

This category refers to the ability to acquire and develop new trade-related skills relevant to the students’ trade. This can be seen from the comments below.

My experience based on the teachings of the man from industry this day and the one our teacher, the one of the man from the industry is quite comforting, that it has educated me more in the area of using electrical terms. To compare both of them, I think the one of the industry is better, because he enlightened us, he gave us tips on the industrialisation of electrical things, and it make us to understand the deep things of the Contactor than that of our HOD ... (EIMTS 1).”

From the excerpt above, it is obvious the lesson on Contactor by the industry personnel has exposed this student to new things such as the terminologies and other skills that are applicable in the field other than what he used to know. This in his comparison of both instructors. On the benefits of the programme in developing a new relevant trade-related knowledge, a student also comments that:

“I like the lecture of today because the man showed us the principle of electrical work, that we should not be showing the physical side and the practical that we are doing, that we should show the symbol side so that we will know the difference in our electrical language and that of outsiders so that they will not understand what we are doing. We can definitely do it in a symbolised way not in the way that others will be taking from our knowledge adding to their own. (EIMTS 6).”

On the development of new relevant trade-related knowledge, another student remarked that the lesson on Contactor has opened him up to new symbolic representation on the study of Contactor as compared to what he used know. This experience, he expressed thus:

“My experience towards the lecture was that the man was a very good teacher, he also imparted positively on us. He also imparted things that we don’t know like the industry man taught us about the symbols which was different from the one our HOD taught us, because the pattern of the Contactor for the one the HOD taught us is a square form with a cross inside, but the one he (industry man) showed us was solely different from the one the HOD taught us. My benefit is that, as the man came, he has shown me a lot of things, and I benefitted from the way he taught us and how the motors are (EIMTS 2).”

However, a student in describing his benefits on the development of new relevant trade-related skills asserted that he was imparted more on the languages used in the field of electrical installation trade. The student thus gained disciplinary language. This he confirmed in his comment:

I was imparted more in the electrical language, and, I enjoyed the lesson (EIMTS 3).”

Conclusively, the last student who commented on the development of new trade-related skill was of the view that:

Today, I have learnt more about the Contactor, I know the Star connection (EIMTS 4).”

From the excerpts above, it can be seen that the lesson on Contactor as delivered by the Electrical Industry Employer (EIE) has exposed these students to different aspects of the trade that are lagging. From the comment of EIMTS 2, 3 and 6, one can deduce that the lesson has exposed them to the symbolic languages of the field, which gives them more confidence as a skilled person in the trade. On the other hand, the lesson also, for the first time has exposed EIMTS 5 to what a Contactor is, whilst for EIMTS 4, he has learnt how these Contactors are connected.

Development of enhanced knowledge through experiential learning

This category refers to the ability to develop student’s knowledge through practical application of concepts in learning. This is expressed in the comments below.

“I was imparted more in the programme because I had no idea about the Contactor. I only heard about the Contactor, but I had no experience to connect the Contactor. And I was imparted more knowledge in the connection, (EIMTS 3).”

Similarly, another student concurs by further amplifying the experience derived on how to connect the Contactor. This, he explained in his comments below:

“... And today lecture made me to open my eyes in the way that we now know how to connect the motor and the Contactor straight to the motor six poles and the twelve, we only know six poles; and the man showed us the practical in the aspect that he gave us time to ask question and he showed us the practical aspect of it, and he had patience with us, he showed us the equipment, he brought them with him, but in this our class, we have the theory teachers, they teach us and expect us to go and buy materials which we don’t have much money to buy these materials, and it hinders our knowledge of knowing the thing (EIMTS 6).”

From the excerpt above, it is evident that the student’s experience has improved due to the practical approach applied in the delivery of the lesson. It is also apparent that the use of the actual equipment in the presentation of the lesson facilitated the acquisition of the relevant skills with regard to the topic being delivered. Similarly, the presentation of the equipment also exposed a student what the Contactor looks like and how it functions as seen in the comment below.

“What I benefitted in the lesson that I studied today is that I have not heard about the Contactor before, and today is the first time that I am seeing it, the symbol and the way it works, so I am so impressed, I enjoyed the topic (EIMTS 5).”
From the analysis presented above, it is revealed that students’ skills and knowledge were enhanced through experiential learning. The immediate and practical application of what they were being taught facilitated their acquisition of the relevant skills as regards the trade. The implication is that, learning in such trades as Electrical Installation and Maintenance requires learning with the same equipment as seen in normal industrial settings, this will boost their confidence and also enhance their understanding on what is being taught. The teacher’s experiences are presented in the next section.

**Teacher’s Experience**

Findings from the analysis of individual interview with the teacher highlights the three categories of experiences namely:

i. Development of knowledge through experiential learning

ii. Exposure to relevant trade-related knowledge

iii. The use of outmoded curriculum

**Development of knowledge through experiential learning**

This category of experience refers to the ability to develop knowledge or skills by way of doing. Learning with the right equipment in the right environment is one sure way to develop knowledge through experience. This assertion the teacher acknowledged in his comments below.

“Now, yes… the intervention, it’s a lot of change …! Like now, the one we have done now, they have now known Contactor, and they have known the functions; because, since they have not seen it before, even if you speak from now till tomorrow, they cannot retain it in their memory. Now if you mention Contactor, they will now tell you the definition, they can tell you the functions, they can tell you where it is used, so that’s the change (EIMTT).”

As can be seen from the analysis of the excerpt above, learning with the equipment has imparted on the students the knowledge on how the Contactor functions through experiential learning. Thus, this implies that the availability of the actual resources needed for learning aids in the development of the required knowledge in that field of specialisation.

**Development of new relevant trade-related knowledge**

This category of experience refers to the ability of the lesson delivered to impart new knowledge that is relevant to the trade under study. The lesson delivered by the industry personnel enhanced the development of new relevant trade-related knowledge by both teacher and students, as expressed below.

“…. It has opened my….it has now made all of us to know that we have a lot of things to do such as anytime we are teaching, a lot of benefits! Like myself as a teacher, when I was teaching, I used a symbol of a Contactor; but himself (Industry man) when he was teaching, he drew another diagram, practical diagram of Contactor, and he said anywhere you see it, it is like this. I have learnt something there; my students have also learnt something. We were now writing symbol of Contactor, we just put it like this, as I was taught then, but today I have learnt something new-new knowledge. Then, he has also told me…because I was also thinking of squirrel gauge industrial motor which is three phase, you can also use to control DC motor, but in my own experience I was thinking that it is only squirrel gauge industrial motor that is three phase motor. That connection of Star-Delta, Delta-Star, I have also known it and my students have also learnt new things today, (EIMTT).”

As illustrated in the excerpt above, it can be concluded that the teacher and his students have gained new knowledge and skills related to electrical installation and maintenance trade. From his explanation, he has been feeding the students with the wrong information due to lack of updated skills in the field. This shows a misalignment in the teacher’s knowledge and what is actually obtained in the modern industry. Generally, as can be deduced from the teacher’s comment, the lesson has broadened their knowledge in the trade, as they have been equipped with what they rarely knew.

**Use of outmoded curriculum**

This category refers to the use of an old-fashioned curriculum in teaching and learning. According to the EIMTT, irrespective of the importance of the Contactor, it is conspicuously not included in the TC curriculum. This he expressed below.

“…. hahahaha….by this Contactor, when I was a student here, my teacher taught me in 1982 and 83, but today it’s not enshrined in the curriculum, and Contactor is the major device used in the factory, so since we are not teaching it to them, they will not learn, it will require the company to spend money and time to train them because they were not trained here (EIMTT).”

From the analysis of the excerpt above, it is evident that the present curriculum in use for EIMT in Nigerian Technical Colleges (TC) is out of date. This is clearly stated in the excerpt, as the teacher lamented on the absence of the topic on the Contactor device in the college curriculum despite its currency in industry. We present the employer’s experience in the next section.

**Electrical Industry Employer’s experience**

Findings from the analysis of individual interview with the employer signaled the following two categories of experiences:
i. Development of willingness/eagerness to learn; and
ii. Development practical skills through experiential learning.

**Willingness/eagerness to learn**

This category refers to the ability to develop the essential values that propel the interest to learn. According to the employer’s experience, the students were motivated to learn as expressed in his comment below.

“It is quite obvious that the students actually were glad, I spoke with them, they were actually interested, and actually requested more time to be given... (EIE).”

An analysis of the comment above from the employer’s view signposts that the students were actually willing to learn, as they expressed this in their call for more time to be given for the lesson. The implication is that, with the right equipment and trained personnel, students will be motivated and devoted to learning, hence, their level of skills acquisition will be improved upon.

**Development of practical skills through experiential learning**

This category refers to the acquisition of practical skills by doing. The lesson exposed the students to the acquisition of practical skills. This the employer expressed in his comment below.

“... hopefully I believe they are now practically oriented, they have not seen such practicals in the course of their classes, maybe because they don’t have the equipment physically there in the school. Things will be better if most practical things are put in place (EIE).”

As can be seen in the excerpt above, the availability of instructional facilities boosts learning and how skills are acquired. The employer’s comment confirms this, as he relates the lack of practical exercise in the trade to lack of the needed equipment. It is also seen from his comment that the college will record improved performance if most practical facilities are put in place.

**Principal’s experience**

Findings from the analysis of post-intervention minutes for the principal signposts one category of experience namely:

i. Exposure to challenges in Technical College programme

**Exposure to challenges in Technical College**

This category refers to the ability to know and understand the hidden issues that hinder the successful execution of TC programme. This is confirmed in the excerpt

“Understands the problems and challenges of technical colleges, improves technical colleges (TCP)”

From the excerpt above, it glaring that the CBPAR programme has actually exposed the principal and other stakeholders to the hidden problems that impedes the quality of TC programme. Thus, the continuation or implementation of the research findings according to the Principal will improve technical college programmes.

**SEEFOR Representative Experience**

Findings from the analysis of post-intervention minutes highlights for the SEEFOR representative illuminated two categories of experiences namely:

i. Exposure to practical learning; and
ii. Innovative teaching and learning.

**Exposure to practical learning**

Reference to this theme implies the mode of instruction that relates to working with real objects or materials having observed as an instructor demonstrate it. This is confirmed in the representative’s comment below.

“Students are exposed to practical activities... (SEEFOR Rep)”

From the excerpt presented above, one can conclude that the CBPAR intervention programme has exposed the students to practical activities in their trade since they were able to practice the theory being taught due to the availability of training materials and equipment. The implication is that students tend to learn more, and this stimulates their interest as they become motivated with the readiness of heart.

**Innovative teaching and learning**

This category is hinged on learning new ways of doing things. The intervention programme according to the SEEFOR representative has instilled in both the students and teachers’ new approaches to teaching and learning as expressed in the comment.
“... Students are exposed to new learning experiences, and teaching becomes innovative (SEEFOR Rep)”

From the analysis of the comments above, the intervention programme has really exposed the students to new learning experiences other than what they were used to. It has also exposed the teachers to more innovative ways of teaching to achieve greater results.

Discussion

This section presents the discussion of findings of the study. From the analyses of data generated across the participating stakeholders, seven themes emerged. These include, willingness/eagerness to learn; development of new relevant trade-related knowledge; enhanced knowledge through experiential learning; use of outmoded curriculum; development practical skills through experiential learning; exposure to challenges in Technical College programme and innovative teaching and learning.

Willingness to learn

The willingness/eagerness to learn emanated from the students in the problem-based learning approach. Since the programme was an intervention-based project, students were actively involved in the process of constructing their knowledge; hence this increased their motivation. The study found willingness/eagerness to learn from the perspectives of the students and industry employer. This aligns with the finding of Shin (2018) who reported that by participating in a project-based learning model, students can construct their own knowledge and reflect upon their learning projects, and this results in increased motivation and self-efficacy. Also, corroborating are the findings of Legg-Jack and Alant (2022), where it was reported that the use of a modern technological device which was made available through industry involvement in the teaching and learning process aroused and triggered students’ interest to learn thereby leading to the willingness to explore new ideas. In this study, the students expressed their willingness to learn by calling on government support for the continuation of similar approach to the teaching and learning to ensure their acquisition of skills the various aspects of their trade. This implies that, with a proper implementation of the findings from the CBPAR intervention programme, the idea of lack of willingness to learn from students will not much be heard of, as this will get them all busy in their respective fields of learning.

Development of new relevant trade-related knowledge

It was found that the lesson on the use and functions of a Contactor opened the students understanding as well as the teacher to the different skills in the field of Electrical Installations and Maintenance trade. The involvement practically in the intervention programme facilitated the learning of the different skills relevant to the students’ trade. This is also evident in literature as it is reported that effective practical training requires authentic learning tasks that addresses key vocational competencies (Winberg & Hollis-Turner, 2021), which was present in the intervention programme. The students’ experiential learning from the industrial trainer opened their minds on new relevant knowledge as it relates to skills in EIMT. This corroborates similar findings reported that the industry role is crucial to channel information on the latest technology used by the industry through collaborative partnership arrangements to produce work ready graduates (Mustafa et al., 2022). Another important revelation made in the study was the updating of the teacher’s knowledge whilst the industry employer was teaching. In the exact word of the teacher “I was taught then, but today I have learnt something new... “ the reality of this is seen the evolving nature of the industry in terms of dealing with recent technologies, skills and facilities. This confirms the result of Adams (2019) who reported that the because of the continuous evolving nature of the industry space, TVET college trainers need to be exposed to such changes to enhance their knowledge and to adapt their teaching style and update the study material.

Significantly, the study found the use of outmoded curriculum in the training of technical college students. This implies that graduates of the trade will find it difficult to secure employment, even if they do, they may not function properly since the teacher acknowledged that this device (Contactor) is a major component in use in factories. This revelation became apparent because of the involvement of the industry in the study; thus, it brings to light the use of modern equipment thereby highlighting the need for a review of the training programme. This revelation agrees with Makgato and Moila (2019), their study that explored partnerships between TVET colleges and industry to enhance work-related skills revealed the use of outdated curriculum that does not respond to the needs of students, changes in technical knowledge and skills, and latest trends in the labour market. Similarly, it was reported in a study conducted in two technical training institutions in South Africa that some of the curriculum used at the TVET colleges has been out of date for decades and this affects the alignment and responsiveness such colleges to the needs of its immediate community (Adams, 2019). The resultant impact of graduates produced by such curriculum is that they will lack the necessary skills required by employers as the outcome of this remains unemployment. It was also highlighted that if these graduates are eventually employed being taught with the outmoded curriculum it will then demand for more investment in training them to come to terms with the required skills. The use of outdated curriculum points to the absence of functional collaboration between training institutions and the industry. Thus, this aligns with one of the implications raised by another study on the need to close the gaps which exist between schools and industry to ensure the relevance of training institutions programmes (Sotshangane & Obioha, 2022).

Development of practical skills through experiential learning

Experiential learning involves active and purposeful processes that exemplifies the real-world environment and activities where students are availed the opportunity to construct and regulate their personal and professional learning (Kassem, 2007; Kotttilil, 2009). Practice-based learning is one of the components of TVET institution collaboration that occasions experiential learning (Nathaniel
et al., 2019). As highlighted in the study, the collaboration involving the industry gave room for practice-based learning; thus, leading to the acquisition of practical skills relevant to the trade and employer. This is typical to the affordance offered by experiential learning, where an individual learns by doing. Thus, this result corroborates the finding of Nathaniel et al. (2019) that technical and vocational education can only create room for the acquisition of practical skills and knowledge among others that are in alignment with the labour market demand when there is the existence of collaborations involving industry partner. This finding is also consistent with another study reported the development of the necessary practical skills through experiential learning occasioned by real-life experimentation (Pherson-Geyser et al., 2020). The primary aim of the training offered at technical colleges is to equip recipients of the programmes with practical skills that guarantee them employment in the industry; hence, collaboration with employers as obtained in this study, within that same occupation is one major way of achieving this objective, as the finding has highlighted.

### Exposure to challenges in Technical College Programmes

Amongst other findings made in the study resulting from the collaborations between the various stakeholders is the discovery of the challenges inherent in technical college programmes. Critical to the advocacy of CBPAR is the identification and handling of challenges affecting its community members. As reported by Mustafa et al. (2022), some issues have been identified in the collaboration between TVET institutions and industries namely, lack of technology and facilities as well as expertise among others. These discoveries were only visible because on the instituted partnerships; hence, tackling these challenges will not be difficult because of the existence of mutual agreement governing such collaborations.

### Innovative teaching and learning

One piece of evidence brought about by the collaboration involving the industry is the introduction of innovative teaching and learning in electrical installation and maintenance trade. This finding agrees with the recommendation made because of poor instructional delivery in TVET programmes in one of the tertiary institutions in Nigeria, that there is need to collaborate with stakeholders to ensure the provision of innovative equipment and facilities to aid teaching and learning in public institutions (Obe et al., 2021).

### Implications

This paper raises practical implications and insights for stakeholders’ engagements in the planning, delivery and implementation of TVET programmes in Nigeria, South Africa and other developing countries that may facilitate educational legislation and policy review. Significantly, the findings hold implications for TVET training institutions, industry employers and the government. Firstly, for TVET training institutions, the findings point to the deficiency in the skills and pedagogical level of the trainers as well as the use of outmoded curriculum at TCs that can be mitigated through industry partnerships. Such partnerships as established during the CBPAR intervention created room for the provision of the needed facilities required for the training as well as the exposure of the TVET trainer and students to industry required skills and training. Thus, this satisfies the skills need of the industry thereby meeting the policy objectives TC programmes. Secondly, the implication for industry and training institutions is the production of graduates with the requisite skills that will boost productivity thereby erasing the need for further training given to employees after recruitment due to lack of the required skills. Also, such collaboration reduces the cost of maintenance of industry facilities damaged due to lack of skills on the part of the employees. Lastly, the implication for the government is the establishment of a functional policy framework that will cater for the challenges experienced by TVET institutions. It is indicative that the implementation of a collaborative framework involving TVET institutions, industry employer and the government will go a long way in tackling the challenges of skills shortages which is a major cause of unemployment in most developing countries, Nigeria and South Africa inclusive. This is because, whatever inhibits TVET provision will be catered for by the concerned stakeholders.

### Conclusions

The study explored the relevance of the industry stakeholder partnerships in the production of skilled electrical engineering trade graduates in Nigerian technical colleges. The findings revealed that in the involvement of the stakeholder partner leads to the inculcation of the desire, interest and readiness of an individual to learn new things, development of new relevant trade-related knowledge as well as practical skills in EIMT through experiential learning, innovative teaching and learning, revelation of the use of outmoded curriculum and other challenges in EIMT programme. From these findings and with the application of the ELT, the study concludes that the industry stakeholder is necessary in the production of skilled EIMT graduates in line with the objectives of TC programme in Nigeria.

From the conclusions, it is recommended that

i. The government should as a matter of urgency, move from document policy compliance to full implementation involving all stakeholders concerned in the planning and delivery of training programmes at technical colleges in Nigeria;

ii. Funds be made available for the provision of facilities needed for the production of skilled graduates in EIMT programmes;

iii. Regular training be organised for teachers in EIMT programmes to ensure the update of their knowledge in line with modern technology;

iv. Regularly review the curriculum to ensure it is alignment with what is obtainable in the industry.
It is essential to point out that this study has its limitations:

i. It was conducted based on one trade and one TC in Rivers State. Hence, its findings may not necessarily be interpreted in the light other colleges.

ii. The study employed a qualitative case study approach with a sample size limited to only ten participants, and this may inhibit the generalization of the result.

iii. The methods adopted for data generation only considered minutes of the meeting, individual interviews and focus group discussions.

Although there are limitations associated with the study, this indicates the possibility for further study. Future research may be conducted with a wider scope and different designs, considering other trades and colleges in different regions. However, irrespective of the limitations, the study has contributed to the body of knowledge on the relevance of the industry stakeholder in the production of skilled EIMT graduates in TC programmes.

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