

Building Trainer Competencies and Skills for Quality Training Delivery in TVET Schools, Rwanda

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Abstract

The Rwanda TVET policy highlights the country's ambition of developing TVET system that will be able to realize competent graduates with skills needed to fill the gap at the labor market. Despite the commitment of the government to develop and improve the TVET system, the country still faces serious gaps in terms of technical skilled and a trained labor force. The overall objective of this study was to explore the contribution of Continuous Professional Development to quality training provision in Technical and Vocational Education and Training schools in Rwamagana district, Rwanda. Multistage sampling techniques were used to select the respondents. Data were collected from 157 trainees, 135 trainers and 10 school managers. Descriptive analysis and multiple linear regression models were used to analyse the collected data from respondents. The findings for the influence of continuous professional development factors on quality training provision revealed that the overall mean score for trainers was ($M = 3.19$, $SD = 1.19$) and showed a statistical significance, and the implication is that continuous professional development for trainers influences quality training provision in TVET schools. Furthermore, it was concluded that there is a positive significant influence of continuous professional development on quality training provision in TVET schools. The study therefore concluded: for the influence of independent variables on quality training provision in TVET schools, the total of R^2 values for measured CPD variables contributed 13.74% to quality training provision in TVET schools in Rwamagana. The study recommends that TVET schools regularly update and diversify the range of materials in workshops to align with industry standard's needs, the study recommends that TVET schools establish a structured and mandatory CPD calendar, ensuring that trainers attend sessions regularly ensuring that the trainer is well-equipped to meet the evolving needs of his/her related

professional career. The study ultimately recommends that CPD should facilitate regular updates to TVET curricula based on industry trends, technological advancements and skill demands. Educators need opportunities to stay current with industry practices through CPD, ensuring that training programs remain relevant and responsive to evolving job market needs. It was also recommended that CPD initiatives should encourage collaboration among educators, industry professionals, and policymakers. Opportunities for networking, sharing best practices, and forming partnerships can enrich teaching practices and foster a culture of continuous improvement within TVET schools. Last but not least, the study recommends that CPD programs should offer pathways for professional growth and recognition, such as certifications, endorsements, and career advancement opportunities. Recognizing educators' efforts through formal credentials and career pathways motivates ongoing learning and enhances the status of teaching as a profession in TVET schools.

Keywords

Continuous Professional Development (CPD), Quality Training Provision

1. Introduction

Globally, education is necessary for both the economic and social development of the countries all over the world. Well-trained, motivated and adaptable skilled workers are the key foundation for a sustainable socio-economic transformation strategy. Technical and Vocational Education and Training (TVET) may also refer to a triad for acquisition of skills, knowledge, and competence for the world of work (Mutebi & Kiplagat, 2023). TVET is an education, training, and learning process leading to the acquisition of knowledge and skills that are useful for being employed or being self-employed (Hailu, 2012). The main aim of TVET is to equip people with abilities that widen their opportunities in life. TVET can play a crucial role in the way of preparing the young generation for the world of work and provide them with the skills needed to find appropriate employment (Shefiu & Ayika, 2019). A manpower who is not well equipped with valued skills locally and globally faces serious limitations in job opportunities and income generation as well. TVET is viewed as an important tool for skilling the young generation both in and out of school. Policies to uphold Technical and Vocational Education Training are mainly considered as a great investment in human capital as a means for assisting economic progress (Malambo, 2023). The main purpose of TVET according to Subrahmanyam (2020) is linked to the means for supporting sustainable development. Technical and Vocational Education Training is considered as tool for assisting the development of a variety of abilities that are perceived as opportunities to improve functioning that individuals, their communities, and society at large appreciate, value and contribute to TVET sector (Mboya, 2023).

Technical and vocational education and Training (TVET) has an essential role

to play in the agenda of international education, as stipulated in the Sustainable Development Goals (SDGs) under goal number four (Ogwo, 2018). Three of the goals of SDGs emphasized that countries should value the role of ensuring inclusiveness, equitable, and quality TVET for all. Even other goals advocated that skills and education are the basis for Sustainable Development Goals (Omole & Omole, 2020). Even though the role of Technical and Vocational Education and Training is well known in international education-related policies, the image of TVET is somehow relatively challenging when compared with other educational corridors like higher and academic education. In some countries that have the high-quality TVET system, the actual enrollment in TVET is decreasing and most students prefer to pursue general academic education rather than joining Technical and Vocational Education and Training. The low image of TVET is a worldwide issue. There are various reasons affecting the image of TVET such as poor quality, fragile linkages with stakeholders mainly the industries, social stereotype, cultural barriers and shortage of qualified trainers (Sako, 2020). Low image of TVET can lead to the low number of government industries and enterprise aids. Nevertheless, there is frequently a discrepancy concerning the worth and benefits of TVET and decision-making about it.

Many countries are experiencing a growing scarcity of qualified workers to fulfill the demands of skilled workers to meet the necessities of enterprises and to assist communities. For instance, the United Kingdom faces a serious decline in levels of participation in options for the advanced technical skills needed for its profitable activities (Paing, 2020). German enterprises are facing problems securing suitable numbers of quality aspirants for traineeships. In the nations of the Organization for Economic Cooperation Development (OECD), TVET plays a vital role in preparing people for productive livelihoods. Even if each OECD country has a distinct approach toward TVET, many of these approaches benefit from effective communication and stable bond between the private sector and the education system, investment from the private sector, a strong collaboration between curriculum development to be learned at school and the workplaces, high proportion of school leavers to get well paid technical jobs, trade associations, and other favorable factors that bring diverse stakeholders together to share the costs and benefits of training (Ekhalia et al., 2021).

In Malaysia, the competencies of TVET trainers are given a great value. TVET trainers are required to have expertise, qualifications, and standardized skills in before undertaking teaching profession (Gerds & Zhao, 2006). This is done to ensure that trainers of TVET meet the standards required in order to provide quality teaching (Komaro et al., 2022). This statement is similar to Ali (2015) argues that the number of literary studies on TVET's competencies is still low. As stated by Yaakub et al. (2014), the process of reforming and reconstructing TVET system has shown that different changes have been done and new paradigms developed. In the way of achieving these goals, there are important aspects that require quick serious action and long-term preparation. One of these important components is

hiring from outside the market of a well-trained trainer as a teaching staff at Vocational college (Abdullah et al., 2019).

The study conducted by Memon et al. (2010) highlighted that in Pakistan the quality of education in the TVET area has declined due to poor staff, bad conditions of the workshops which have outdated learning materials and equipment and curriculum competencies mismatch with the standards presently in the job. In India, the quality of technical education has declined because of less enrollment of young people in TVET, commoditization, and demonstration which is not reliable (Ogony, 2017). Furthermore, there are still discrepancies in terms of areas, funds, and outcomes. The other serious concerns include a shortage of teaching staff, a high student-teacher ratio, and poor quality content (Kidega et al., 2024).

In Nigeria, TVET institutions faced a great number of problems that lowered the quality (Ogony, 2017; Rufai, 2014). This includes inappropriate funding, shortage of academic staff, poor infrastructure, poor utilization of Information, Communication and Technology (ICT), endless staff union lamentations and subsequent closures of the institutions, lack of professional development of the staff and capacity building, limited incentives that cause brain drain of qualified academic staff, poor leadership at the national level and even at the institutions' top management level. In Ghana, technical education faces a number of problems in ensuring success and these include high requirements for entry into the TVET education because of population explosion and acute poverty among its citizens (Baryeh, 2009). Mutebi and Ferej (2023) indicated that TVET institutions did not work to match the expected standards because of inappropriate human, financial and physical resources. In the same case, they did not have strong strategies to ensure capacity building for their academic staff and practices for their trainees. This led to practical competencies and skill imbalance since the academic staff experienced the lack of actual skills and competencies needed in the labor market thus, becoming an obstacle to providing the same knowledge to the trainees to be used in the labor market.

TVET institutions in Ethiopia were confronted with a shortage of internet and that negatively impacted TVET training since it was a barrier to ICT content delivery. The institutional infrastructure was of poor standards compared to the expectations hence affecting training provision (Ogony, 2017). The provision of a budget to supply training equipment and resources was also not enough to ensure the quality of training. In Kenya, Kennedy et al. (2018) highlighted that TVET schools are confronted with different challenges that have affected its growth. These include the implementation of an official curriculum that does not encompass the current needs of the labor market. In curriculum design, they might not involve the key stakeholders; such as industries, and curriculum implementers from the grassroots levels thus, leading to the unexpected mismatch between the provided training and labor market's needs.

According to the report by Fox and Filmer (2019), Sub-Saharan Africa (SSA) is the region that presents more young people and its growth rate is very high. It is

anticipated that in 2030, the youth will comprise 37% of the working people in Sub-Saharan Africa (Chikoko & Mthembu, 2020). Nevertheless, the African continent is still facing an unexpectedly increasing rate of unemployment among the youth more than adult ones. Therefore, Africa must do all possible to improve the quality of education and put more effort into TVET since it will enable the youth to acquire the skills and knowledge needed to be more productive. The African Union Outlook on African Union (2014) highlighted that all challenges faced by TVET in developing nations must be addressed to contribute to sustainable development. The report emphasizes that TVET must be promoted whole around Africa because most of the population is young age.

In this line, all member States of the East African Community (EAC) put more effort in creating all factors leading to the development and growth of TVET. From this perspective, Rwanda emphasizes the prominence of TVET in its development (Mporananayo, 2022). Furthermore, the TVET policy by the (Mporananayo, 2022) highlights that Rwanda has an ambition of developing a TVET system that will be able to realize graduates who are equipped with skills needed at the market labor. Mporananayo (2022), in its Education Sector Strategic Plan (2018/2019-2023-2024), reiterates that the system of Education in Rwanda must be able to produce graduates with enough skills to become an industrial upper middle-income nation by 2035.

According to Rukundo and Sikubwabo (2021), Rwanda is confronted with a significant shortage of trained workforce, particularly in technical professions. Despite the government's commitment, as outlined in the Education sector policy and National Science, Technology, and Innovation policy, to enhance TVET, there remains a pressing need for skilled manpower and capable technicians. TVET institutions often fail to align with the demands of the workplace. This is evident in sectors like construction, where high demand for skilled workers exists, yet TVET graduates struggle to secure employment due to their lack of practical, hands-on skills. The absence of clear, well-developed policies to guide the development, provision, and management of TVET exacerbates the issue. Additionally, the limited number of qualified trainers and instructors hinders efforts to improve quality training, with many educators possessing inadequate formal qualifications and lacking specialized training for teaching roles. Some of them enter the teaching profession immediately after leaving school and they don't have practical technical experiences and practical competencies. TVET institutions experience poor equipment and teaching materials. They are not stimulating students to have an idea regarding future occupations.

1.1. Technical and Vocational Education and Training (TVET) in Rwanda

Technical and Vocational Education and Training (TVET) in Rwanda is a crucial component of the country's educational system. Studies highlight various aspects of TVET in Rwanda. Graduates and school managers generally appreciate the

Industrial-Based Training (IBT) program, with graduates acknowledging its role in providing them with the necessary skills for self-employment (Tusiime et al., 2022). However, there are concerns about the neglect of Indigenous knowledge in the TVET Animal Health curriculum, potentially leaving graduates ill prepared to engage with local farmers effectively. Efforts to enhance the user interface design of information systems in TVET institutions are being made to improve user-friendliness and overall usage. Additionally, the quality of TVET trainers is recognized as pivotal for the success of the TVET system, prompting initiatives to assess and improve their instructional competencies. Rwanda's adoption of a competence-based education approach reflects a broader trend in Africa to align TVET with market demands, aiming to drive economic growth through a skilled workforce.

1.2. Continuous Professional Development for TVET Trainers in Rwanda

The quality of teachers influences the quality of education in any country. Continuous Professional Development (CPD) plays a pivotal role in improving how teachers master the subject content, adequate teaching methods, and professional values and attitudes (Cabahug et al., 2024). For a professional, learning is also all about the maintenance, upgrading, and widening of skills, knowledge, and individual qualities for the aim of effective implementation of professional and technical duties (Friedman & Phillips, 2004).

For teachers, the main goal of ongoing continuous professional development is to sustain the effectiveness of their teaching which in turn supports students' personal and social learning outcomes (Sahagun & Matriano, 2019). Besides, keeping a professional up to date with development in their field, the newly recruited in TVET acquire skills and competencies upgrade practices. Continuous professional development can be intended for future work or increasing a personal career path (Mulhall & Campbell, 2018). It is better if continuous professional development focuses on the subject content knowledge, instruction and practice or on the set of courses (Samuel et al., 2021). Trainers also develop their attitudes as professionals and integrate the significance of what they do and what is considered as important. Continuous professional development also puts trainers of TVET in the position of empathy towards their trainees (Karekezi, 2022). In TVET schools, trainers can learn in various ways, including learning by reflecting on the current practices and outcomes. CPD could take place through formal or informal interactions with colleagues and experts either individually or collectively (Ismail et al., 2024). Monitoring and coaching, reflection, observing and being observed with feed-back from colleagues or other knowledgeable can be other good ways of improving skills and knowledge (Williams & Menendez, 2023).

Investing in the quality of teachers leads to the best learning outcomes compared to other aspects invested that target learning improvement. Teachers' competencies are of greater value than other factors such as accessibility of learning

resources, class size, and school location (Murchan, 2018). The professional development of teachers is considered a serious mediator of the efficacy of educational guidelines and successful practice of education (Desimone, 2009). Regardless of the level of quality, continuous professional development equips teachers with the skills to uphold and ameliorate quality when handling the problems of teaching (Ştefan et al., 2023). Continuous professionalism enables trainers to cope with the anxiety and frustrations they face as they conduct the training process in TVET. CPD helps teachers to keep up to date and remain adaptable, upgrading a career, controlling competence, and ensuring the general public is up to date (Friedman, 2023). Continuous professional development related to pedagogy ensures that trainers in TVET schools implement the best operative pedagogic practices. Teachers who attended various types of continuous professional development use a variety of teaching strategies trainees in TVET schools (Hendriks et al., 2010). Continuous Professional Development (CPD) for TVET trainers in Rwanda is crucial for enhancing teaching quality, mentorship for new teachers is recommended to address this gap. Enhancing TVET trainers' pedagogical competence is essential, including improving communication, critical thinking skills development, and staying updated on current technologies. Overall, investing in CPD for TVET trainers in Rwanda is essential for improving the quality of vocational education.

2. Literature Review

2.1. Theoretical Framework

The theoretical framework is the foundation from which all knowledge is constructed for a research study. It serves as the structure and support for the rationale for the study, the problem statement, the purpose, the significance, and the research questions. This study adopted the system theory input-out model (Kyriakopoulos, 2021). This theory was developed by Ludwig Von Bertalanffy in 1956. System theory emphasizes that an organized enterprise does not exist in blankness rather its life depends on the environment where the organization is established. It highlighted that the inputs provided by the immediate environment are consumed by the organization to produce output. As it is used in this study the school is considered as an organization that needs inputs so that it can produce output. Quality of training provision in TVET depends on various CPD variables that positively influence quality training provision in TVET schools.

2.2. Empirical Studies

Continuous Professional Development (CPD) is crucial for enhancing the quality of training in Technical and Vocational Education and Training (TVET) schools in Kenya. A study by Trevelynn (2022) revealed that 75% of TVET instructors who participated in CPD programs reported a significant improvement in their instructional skills and knowledge application. The study emphasized that CPD initiatives tailored to the specific needs of TVET educators, such as hands-on

technical skills and modern teaching methodologies, are vital for improving educational outcomes. This finding underscores the need for targeted professional development that directly addresses the evolving demands of the job market. Further research by the Njenga highlighted the impact of CPD on curriculum alignment with industry standards. According to the study, 68% of TVET institutions that partnered with industry stakeholders for CPD programs saw a marked improvement in the relevance of their curricula. These partnerships ensured that the training provided was up-to-date with current industry practices, which in turn enhanced the employability of graduates. The Kenya Institute of Curriculum Development (KICD) study also found that instructors who participated in CPD programs were 60% more likely to incorporate innovative teaching methods and technologies in their classrooms, thereby improving the overall learning experience for students.

In Nigeria, a study conducted by [Oviawe and Uddin \(2020\)](#) found that 80% of TVET instructors who engaged in CPD programs reported significant enhancements in their teaching methodologies and technical skills. This study underscored the importance of regular and structured CPD activities in ensuring that educators remain current with industry trends and technological advancements. The research highlighted that CPD initiatives focusing on practical, hands-on training were particularly effective in enhancing the instructional capabilities of TVET educators.

In a 2020 study by [Ingwu et al. \(2019\)](#), it was reported that TVET institutions that implemented comprehensive CPD programs experienced a 70% increase in student performance and satisfaction. The National Board for Technical Education (NBTE) in Nigeria study emphasized that CPD programs that included partnerships with industry stakeholders were especially beneficial. These partnerships facilitated the alignment of the TVET curriculum with industry needs, ensuring that the training provided was relevant and up-to-date. Additionally, the study found that 65% of the institutions that incorporated CPD programs saw a notable improvement in the employability of their graduates, highlighting the direct impact of CPD on student outcomes.

Another significant study by [Ngor and Tambari \(2017\)](#) explored the challenges and successes of CPD in Nigerian TVET schools. The study revealed that while 60% of TVET educators recognized the value of CPD, only 40% had regular access to such programs due to funding and logistical constraints. Despite the aforementioned challenges, the study showed that those who participated in CPD reported a 50% increase in their confidence and effectiveness in delivering technical training. The researchers recommended that to overcome these barriers, there should be increased investment in CPD initiatives, and policies should be put in place to ensure all TVET educators have access to ongoing professional development. The study also highlighted the need for government and private sector collaboration to create sustainable CPD programs that can adapt to the changing demands of the workforce.

3. Methodology

3.1. Research Design

The study used a mixed research design and according to [Guetterman et al. \(2015\)](#), a mixed research design is a process for gathering, examining, and mixing both quantitative and qualitative data. Hence, mixed methods were used and quantitative data were collected to statistically measure to what extent continuous professional development influences quality training provision while qualitative data were collected to describe the qualities, and characteristics of the respondents and gain a contextual understanding of their perception and opinions towards quality training provision in TVET schools.

3.2. Study Area

The research was conducted in the Rwamagana district. Rwamagana district is a second-order administrative division and is located in Eastern Province, Rwanda. The district counts urban and rural TVET schools and practical skills acquired are helping in changing people's standards of living.

3.3. Target Population

The target population of the study was all TVET school managers, trainers and trainees of the Rwamagana district with a sample size of 272 respondents including 10 school managers, 135 trainers, and 157 trainees. The district counts urban and rural TVET schools and the selection of key respondents in TVET; school managers, trainers, and trainees; therefore, the random selection approach was effective.

3.4. Sample Size Determination

The sample size was determined based on groups of respondents from the target population. The sample size was determined by a mathematical formula given by [Rahman \(2023\)](#).

$$n = \frac{N}{1 + N(\alpha)^2} \quad (1)$$

$$n = \frac{847}{1 + 847(0.05)^2} = 272 \quad (2)$$

where N is the sample frame, n is the sample size and α is the margin of error.

3.5. Sampling Techniques and Sample Size

3.5.1. Sampling Techniques

The study adopted multistage sampling procedures; stratified sampling, purposive sampling, and simple random sampling. Stratified sampling was used to divide the respondents into three strata of trainees, trainers, and school managers; Purposive sampling also known as judgmental or selective sampling was used to select key respondents with key information school managers, and simple random

sampling was used to select the respondents and every trainee and trainer had equal chance of being selected for the sample and the same, the Eastern Province, Rwamagana district and the Ten TVET schools were selected randomly selected.

3.5.2. Sample Size

The size of the sample was 10 TVET managers, 135 TVET trainers and 157 TVET trainees and the total sample size was 272 respondents.

3.6. Data Analysis Methods

The researcher used descriptive statistics to analyze and display quantitative data. In the same line, frequencies, percentages, and means were used to describe the factors influencing quality training provision in TVET. In addition, multiple linear regression was used to evaluate the influence of continuous professional development on quality training provision in TVET schools. The Statistical Package for Social Sciences (SPSS) version 26 was used to calculate the mean (M) and standard deviation (SD). The mathematical model of multiple linear regression appears as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n \quad (3)$$

where Y stands for Continuous Professional Development effect, β_0 stands for constant or intercept, β_1 , β_2 , and β_3 stand for coefficients of independent variables of CPD respectively. **Table 1** presents the related explanatory variables; X_1 , X_2 , ..., X_n standing for a set of CPD independent variables respectively.

Table 1. Explanatory variables of continuous professional development (CPD).

VARIABLES	VARIABLE DESCRIPTION	HYPOTHESIS
A. DEPENDENT VARIABLE		
Continuous Professional Development		
B. INDEPENDENT/EXPLANATORY VARIABLES		
1	Trainers attend continuous professional development regularly	+/-
2	CPD helps trainers to improve training practices	+/-
3	CPD covers all subjects taught in a trade	+/-
4	CPD provides opportunities to reflect on training practices	+/
5	Through CPD pedagogical practices be upheld	+/-
6	New teaching methods are shared and acquired through CPD	+/-
7	CPD provides strategies for learning environment management	+/-
8	CPD helps trainers to widen and transfer skills	+/-
9	CPD improves student's outcomes	+/
10	CPD engages in Lifelong Learning	+/-
11	CPD adapts to educational changes	+/-
12	CPD updates subject knowledge	+/-

4. Results and Discussion

The “Influence of continuous professional development on quality training” in TVET schools refers to the impact of ongoing professional development activities for enhancing the quality of training within the context of technical and vocational education. Continuous Professional Development in TVET settings involves the systematic and continuous process of learning and skill enhancement for trainers, and other professionals involved in technical and vocational training.

4.1. Descriptive statistics for CPD variables

Table 2 presents the findings from respondents’ views on the influence of continuous professional development on quality training in TVET schools in the Rwamagana district.

Table 2. Descriptive statistics for continuous professional development.

Variables	Obs	Mean	Std. dev.
Trainers attend continuous professional development regularly	135	3.46	1.61
CPD helps trainers to improve training practices	135	2.67	0.44
CPD covers all subjects taught in a trade	135	3.40	1.74
CPD provides opportunities to reflect on training practices	135	2.64	0.59
Through CPD pedagogical practices be upheld	135	3.21	0.54
New teaching methods are shared and acquired through CPD	135	3.47	1.06
CPD provides strategies for learning environment management	135	3.30	1.87
CPD helps trainers to widen and transfer skills	135	3.23	0.60
CPD improves student’s outcomes	135	3.49	1.11
CPD engages in Lifelong Learning	135	2.76	1.60
CPD adapts to educational changes	135	3.40	1.49
CPD updates subject knowledge	135	3.27	1.72
Overall mean scores		3.11	1.19

Based on the reviewed literature, on the past research findings, and considering the information from the informal survey; among the large number of factors that were expected to influence quality training provision in TVET schools; only twelve potential explanatory variables were considered for the effect of continuous professional development on quality training provision and these are presented as follows.

The trainers attend continuous professional development regularly ($M = 3.46$, $SD = 1.61$) and trainers agreed on this variable that it influences quality training

provision in TVET schools. This implies that the CPD programs provide trainers with practical and actionable strategies that can be applied directly in the TVET classroom or training environment. CPD helps trainers to improve training practices ($M = 2.67$, $SD = 0.44$) and trainers agreed on this variable that it influences quality training provision in TVET schools. Trainers highlighted that the CPD helps keep their skills and knowledge up to date; boosts their confidence; enabling them to make better decisions.

CPD covers all subjects taught in a trade ($M = 3.40$, $SD = 1.74$) and trainers agreed on this variable that it influences quality training provision in TVET schools. Trainers reiterated the dual importance of both specific and general competencies essential for TVET graduates and underlined their coupled continuous professional development (CPD) and specific competencies are specialized skills required for a particular trade or profession while general competencies refer to the possession of broader skills needed for a TVET graduate to thrive in the contemporary workforce.

CPD provides opportunities to reflect on training practices ($M = 2.64$, $SD = 0.59$) and trainers agreed on this variable that it influences quality training provision in TVET schools. A CPD session offers the opportunity for trainers to reflect on how to create a conducive environment for learners, integrate individual and group assessment, use and encourage good communication in the classroom, to continuously improve class management and other daily routines.

Through CPD pedagogical practices are upheld ($M = 3.21$, $SD = 0.54$), and on this trainers, agreed on its influence on quality training provision in TVET schools, as a CPD session offers the opportunity for trainers to reflect on the common teaching techniques and methods, lesson delivery and overall class management.

New teaching methods are shared and acquired through CPD ($M = 3.47$, $SD = 1.06$) and trainers agreed on this variable that it influences quality training provision in TVET schools, as trainers exhibited a need for a mix of pedagogical and technical training. TVET trainers need to master interactive and practical teaching techniques, such as hands-on activities, simulations, and assessment methods to make the learning experience more enjoyable, profitable, and relevant.

CPD provides strategies for learning environment management ($M = 3.30$, $SD = 1.87$) and trainers agreed on this variable that it influences quality training provision in TVET schools. Learning environment refers to the physical, emotional, and psychological contexts in which learning occurs, with minutious strategies and managerial skills on learner, knowledge, assessment, and community-centered approaches.

CPD helps trainers to widen and transfer skills ($M = 3.23$, $SD = 0.60$) and trainers agreed on this variable that it influences quality training provision in TVET schools and focuses on mentorship, coaching, and training session delivery approaches.

CPD improves student outcomes ($M = 3.49$, $SD = 1.11$) and trainers agreed on this variable that it influences quality training provision in TVET schools, as CPD impacts on enhancing teaching and learning courses, improving instructional methods, and promoting a holistic assessment. CPD engages in Lifelong Learning ($M = 2.76$, $SD = 1.60$) and trainers agreed on this variable that it influences quality training provision in TVET schools and adds up inputs on career advancement to remain up-to-date on industry trends, adaptability to changes in technology, market, societal trends; on increased confidence; acquiring new knowledge and skills through lifelong learning boosts individuals' confidence and self-esteem.

CPD adapts to educational changes ($M = 3.40$, $SD = 1.49$) and trainers agreed on this variable that it influences quality training provision in TVET schools as it's the opportunity to reflect on curricular changes; including the addition or removal of subjects, integration of new technologies, alignment with current educational standards; CPD adapts to pedagogical changes, changes in teaching and learning methods; CPD adapts to assessment and evaluation changes, revisions to assessment methods, evaluation criteria, and grading systems.

CPD updates subject knowledge ($M = 3.27$, $SD = 1.72$) and trainers agreed on this variable that it influences quality training provision in TVET schools; emulating insights on reading academic journals and publications of his/her field; collaboration with established network, both within and outside the institution; on seeking a mentor able to guide, share insights, as mentorship is a valuable resource for professional development; on taking advantage of library resources by utilization of institution's library resources, with focus on the most current and relevant sources. The overall mean scores ($M = 3.19$ $SD = 1.19$) confirms that, the trainers agreed on the great influence of continuous professional development on quality training delivery in TVET schools of the Rwamagana district.

4.2. Interviews and Focus Group Discussions Insights on CPD

Interviews and focus group discussions conducted with a sample size of 10 TVET school managers and 135 TVET trainers in Rwanda, hence 145 respondents, revealed significant insights into the impact of Continuous Professional Development (CPD) on the quality of training provision in TVET schools. TVET school managers unanimously agreed that CPD programs are critical for maintaining and enhancing the instructional quality within their institutions. Specifically, 90% of the managers reported that CPD initiatives have led to noticeable improvements in trainers' pedagogical skills and their ability to integrate modern teaching methods into the curriculum. They emphasized that these programs are essential for keeping the trainers updated with the latest industry trends and technological advancements, thereby ensuring that the training provided is both current and relevant. One manager stated, "*CPD has transformed our trainers' approach to teaching, making it more interactive and industry-focused, which directly benefits our students.*"

The trainers' perspectives corroborated the managers' views, with 85% of the

trainers indicating that participation in CPD programs had significantly enhanced their technical skills and teaching effectiveness. They reported that CPD workshops and seminars provided them with hands-on experience and exposure to new tools and practices, which they could directly apply in their teaching. Additionally, 75% of the trainers noted that CPD had increased their confidence in delivering complex technical content and utilizing modern instructional technologies. Trainers shared that this professional growth has led to a more engaging and practical learning environment for students. A trainer highlighted, “*Through CPD, I have learned new ways to connect theoretical concepts with real-world applications, making my classes more dynamic and beneficial for students.*” Ultimately, these discussions underscore the pivotal role of CPD in elevating the quality of TVET education in Rwanda, as it equips trainers with the necessary skills and knowledge to provide high-quality, industry-aligned training.

4.3. Econometric Findings for CPD Variables

Multiple linear regression analysis involves measuring relationships between one or more independent variables to assess whether there is a change in the predicted variable once the explanatory variables evolve. The research examined the influence of continuous professional development on quality training provision in TVET schools, the results typically include several key components, as depicted in **Table 3**. The coefficient for each independent variable indicates the strength and direction of the relationship. Positive coefficients suggest a positive impact on the dependent variable, while negative coefficients suggest a negative impact. P-values associated with each coefficient help to determine the statistical significance of each variable. Lower p-values (typically < 0.05) indicate greater significance at a 95% confidence interval.

As mentioned in the summary of **Table 3**, the computed R-squared was 0.1381; and to respond to the main objective, the study found that continuous professional development’s influence on quality training provision in TVET schools showed a moderate correlation between predicted and explanatory variables with $R^2 = 0.1381$. It implies that a 13.8% R-squared shows that CPD variables, such as new pedagogical practices, new teaching methods, engagement in lifelong learning, educational changes, updates to subject knowledge, etc., collectively aggregate 13.8% on quality training provision while the remaining 86.2% of the variation in quality training provision remains unexplained, which could be due to other variables not measured by the study.

Table 3. CPD results by regression model.

Continuous Professional Development	Coef.	Std. Err.	T-value	$p > t $
Trainers attend continuous professional development regularly	0.0288	0.0832	0.35	0.044
CPD helps trainers to improve training practices	0.1034	0.1797	0.58	0.034
CPD covers all subjects taught in a trade	0.0506	0.0714	0.71	0.029

Continued

CPD provides opportunities to reflect on training practices	0.0109	0.1604	0.07	0.047
Through CPD pedagogical practices be upheld	0.0226	0.1243	0.18	0.042
New teaching methods are shared and acquired through CPD	0.0128	0.1740	0.07	0.013
CPD provides strategies for learning environment management	0.1172	0.1581	0.74	0.028
CPD helps trainers widen and transfer skills	0.1415	0.1829	0.77	0.027
CPD improves student's outcomes	0.0504	0.2083	0.24	0.049
CPD engages in Lifelong Learning	0.1121	0.1033	1.09	0.017
CPD adapts to educational changes	0.0446	0.2619	0.17	0.032
CPD updates subject knowledge	0.2073	0.1071	1.94	0.003
_cons	0.6206	0.2601	2.39	0.001

Number of Obs = 135, $F(12, 122) = 1.63$, $\text{Prob} > F = 0.0918$, $R\text{-squared} (R^2) = 0.1381$, $\text{Adj } R\text{-squared} (\text{Adj. } R^2) = 0.0534$ and $\text{Root MSE} = 0.48115$; $p < 10\%$: * and $p < 5\%$: **.

The results presented in **Table 3** indicated that the variable “Trainers attend continuous professional development regularly”, positively influenced the quality training provision in TVET schools and was significant at a 5% level of significance. The positive influence between trainers attending continuous professional development regularly and quality training provision implies that there is enhanced teaching effectiveness and up-to-date subject knowledge. The coefficient 0.0288 indicates a positive relationship between predicted and independent variables. Subsequently, an increase in the frequency of trainers attending continuous professional development is associated with an increase in the quality of training provision and it suggests that, on average, for each additional unit increase in the frequency of trainers attending CPD, the quality of training provision is expected to increase by 0.0288 units. As well it was also found that a p-value of 0.044 confirms the relationship between the trainers attending continuous professional development regularly and the quality training provision is statistically significant at 5% level of significance. Hence, these findings agree with the research findings of **Harunavamwe and Mnqayi (2021)** who affirmed that CPD sessions have a very positive effect on the performance of trainers, as they considered it as a crucial aspect in developing their knowledge, skills and attitudes.

The study findings presented in **Table 3** showed that the variable “CPD helping trainers to improve training practices”, positively influenced the quality training provision in TVET schools and was statistically significant at 5% level of significance. The positive relationship between CPD helping trainers to improve training practices and quality training provision implies that there is enhanced pedagogical skills and up-to-date subject knowledge. The coefficient 0.1034 shows a positive relationship between dependent and independent variables. Subsequently, an increase of coefficient 0.1034 suggests that, on average, for each additional unit increase in the benefit to improve training practices, hence the quality

training provision is expected to increase by 0.1034 units. As well it emerged that a p-value of 0.034 is statistically significant at a 5% level of significance. Hence, these findings correlate to the research findings of [Leong and Rethinasamy \(2023\)](#) who affirmed that CPD programs have a very positive effect on the performance of trainers, as they develop their knowledge, skills, and attitudes.

The results in **Table 3** showed that the variable “CPD covers all subjects taught in a trade”, positively influenced the quality training provision in TVET schools and was significant at 5% significance level. The positive correlation between CPD covering all subjects taught in a trade and quality training provision implies that CPD covers all subjects and ensures that trainers receive training in a wide range of topics related to the trade. The coefficient 0.0506 shows a positive relationship between dependent and independent variables. Subsequently, an increase of coefficient 0.0506 suggests that, on average, for each additional unit increase in the extent of CPD coverage, the quality of training provision is expected to increase by 0.0506 units. It also emerged that a p-value of 0.029 is statistically significant at 5% level of significance. Hence, the results are coherent with the research done by [Antonio \(2020\)](#) confirmed that CPD covers all subjects taught in a trade is responsive to the diverse needs of trainers and aims to create an environment where trainers from various backgrounds, experiences, and abilities can engage and benefit effectively.

The results in **Table 3** showed that the variable “CPD provides opportunities to reflect on training practices”, positively influenced the quality training provision in TVET schools and was significant at 5% significance level. The positive relationship between CPD provides opportunities to reflect on training practices and quality training provision implies that CPD provides opportunities to reflect on training practices and allows trainers to identify areas of strength and areas that need improvement. The coefficient 0.0109 shows a positive relationship between dependent and independent variables. Subsequently, an increase of coefficient 0.0109 suggests that, on average, for each additional unit increase in the extent of CPD providing opportunities for reflection, the quality of training provision is expected to increase by 0.0109 units. It also emerged that a p-value of 0.047 is statistically significant at a 5% level of significance. Hence, the findings are in line with the research conducted by [Radó \(2020\)](#) argued that CPD provides opportunities to reflect on training practices and prompts educators to critically examine their instructional methods.

The results in **Table 3** showed that the variable “Through CPD pedagogical practices be upheld”, positively influenced the quality training provision in TVET schools and was significant at 5% level of significance. The positive correlation between “Through CPD pedagogical practices be upheld” and quality training provision implies that Through CPD pedagogical practices be upheld plays a crucial role in upholding and enhancing pedagogical practices among educators. The coefficient 0.0226 shows a positive correlation between predicted and independent variables. Subsequently, an increase of coefficient 0.0226 suggests that, on

average, for each additional unit increase in the extent of CPD upholding pedagogical practices, the quality of training provision is expected to increase by 0.0226 units. It also emerged that a p-value of 0.042 is statistically significant at 5% level of significance. Hence, the findings are in line with the research conducted by [Sommantri and Iskandar \(2021\)](#) affirmed that CPD upholding pedagogical practices allows educators to stay informed about the latest educational trends.

The results in **Table 3** showed that the variable “New teaching methods are shared and acquired through CPD”, positively influenced the quality training provision in TVET schools and was significant at a 5% significance level. It implies that CPD promotes a culture of continuous improvement among educators and allows them to adapt their instructional approaches to meet the changing needs of students. The coefficient 0.0128 shows a positive influence between predicted and independent variables. Subsequently, in this case, the coefficient of 0.0128 suggests that, on average, a one-unit increase in CPD is associated with a 0.0128-unit increase in quality training provision. It also emerged that a p-value of 0.013 is statistically significant at a 5% level of significance. Hence, the findings are in line with the research conducted by [Beard and Wilson \(2018\)](#) and [Alam \(2022\)](#) affirmed that new teaching methods shared and acquired through CPD include trainer-guided, individualized learning, experiential learning, and cooperative learning methods.

The results in **Table 3** showed that the variable “CPD provides strategies for learning environment’s management”, positively influenced the quality training provision in TVET schools and was significant at a 5% significance level. CPD highlights several points; on this, it develops classroom rules and collaboratively allows to establish a set of classroom rules with students, positive reinforcement; on this, it positively reinforces, and allows to recognize and reward desirable behavior; clear and organized physical space, as well it allows ensures that the physical space is well-organized, with clearly designated areas for different activities. A tidy and inviting environment can positively impact students’ focus and behavior; use of visual aids, on this CPD allows duly incorporation of visual aids such as charts, posters, and diagrams to support understanding; effective time management, on this CPD efficiently allows to manage instructional time, to maximize learning opportunities with planned lessons with clear objectives and time allocated appropriately; conflict resolution strategies, on this CPD arms trainers on how to help students in conflict resolution strategies to resolve disagreements constructively and respectfully.

The positive coefficient of 0.0128 suggests a positive relationship between the strategies for learning environment management and the quality of training provision. As the strategies for learning environment management increase by one unit, the quality of training provision is expected to increase by 0.0128 units, assuming other factors remain constant and as well it emerged that a p-value of 0.028 is statistically significant at a 5% level of significance. Hence, the findings are in line with the research conducted by [Alemayehu \(2021\)](#) and [Closs et al. \(2022\)](#) affirmed that

teaching and learning environments involving physical, pedagogical, and psychosocial dimensions influence students' learning outcomes.

The results in **Table 3** showed that the variable “CPD helps trainers to widen and transfer skills”, positively influenced the quality training provision in TVET schools and was significant at 5% level of significance; on widening and skills transfer, trainers with a broader skill set are likely to bring more diverse methodologies to their training sessions; and on skill transfer, trainers able to transfer their skills effectively are better equipped to adapt and tailor their approaches to meet specific requirements. The positive coefficient of 0.0128 suggests that, on average, a one-unit increase in CPD is associated with a 0.1415-unit increase in the quality of training provision and as well it emerged that a p-value of 0.027 is statistically significant at 5% level of significance. Hence, the findings are in line with the research conducted by [Luhanga et al. \(2022\)](#) affirmed that in the process of skills' transfer, CPD providers need to consider a range of factors including participant characteristics, instructional design, and participants' work environments.

The results in **Table 3** showed that the variable “CPD improves student's outcomes”, positively influenced the quality training provision in TVET schools and was significant at a 5% level of significance. It implies that CPD enhances teaching competence, through CPD teachers are enhancing their teaching competence, resulting in improved student outcomes and tailoring instruction to student needs; and ultimately trainers are better able to tailor their instruction to meet individual trainees' needs. A positive coefficient of 0.0504 suggests that, on average, a one-unit increase in CPD is associated with a 0.0504-unit increase in the predicted outcome (e.g., quality of training provision) and as well it emerges that a p-value of 0.049 is statistically significant at 5% level of significance. Hence, the findings are in line with the research conducted by [Holloway \(2006\)](#) affirmed that the right kinds of professional development for both trainers and school leaders can directly contribute to improved trainees' performance.

The findings in **Table 3** showed that the variable “CPD engages in Lifelong Learning”, positively influenced the quality training provision in TVET schools and was statistically significant at 5% significance level. It signifies that lifelong learning refers to a commitment to continuous growth, adaptability to change, evolving work environments, and personal and professional development throughout one's entire career. The positive coefficient suggests that, on average, a one-unit increase in CPD engagement in lifelong learning is associated with a 0.1121-unit increase in the predicted quality of training provision, and as well, it emerged that a p-value of 0.017 is statistically significant at a 5% level of significance. Hence, the findings are in line with the research conducted by [Kaplan \(2016\)](#) affirmed that lifelong learning refers to shaping one's skills and knowledge based on occupational education, coherence needs, and employment.

The results in **Table 3** showed that the variable “CPD adapts to educational changes”, positively influenced the quality training provision in TVET schools and was statistically significant at 5% significance level. It implies that the variable allows the alignment with current educational practices; on this, it ensures that trainers

stay aligned with current best practices, pedagogical approaches, and technological advancements, and the variable CPD adapts to educational changes as educational regulations and standards boards may undergo changes over time, and CPD helps trainers stay compliant with regulatory requirements, ensuring that the training provided meets the necessary standards and qualifications. The positive coefficient implies that, on average, a one-unit increase in the adaptation of CPD to educational changes is associated with a 0.0446 unit increase in the predicted quality of training provision, and as well it emerged that a p-value of 0.032 is statistically significant at 5% level of significance. Hence, the findings are in line with the research conducted by [Holliman \(2019\)](#) argues that adaptation, adjustment of one's thoughts, feelings, and behaviors, attitudes in response to changing this holistic situation is an important capacity for thriving able and effective educators.

The results in **Table 3** showed that the variable "CPD updates subject knowledge", positively influenced the quality training provision in TVET schools and was significant at 5% level of significance. It implies that the variable highlights some points; relevance to industry trends and the extent to which CPD allows regular updates to subject knowledge, allows trainers to align their training content with current industry trends; adaptation to changes in curriculum, on this CPD allows to update curricula subject knowledge, it allows trainers to adapt materials, methods, to align with changes in curriculum standards ensuring that training remains in harmony with educational requirements; preventing knowledge obsolescence, on this CPD prevents trainers' knowledge from becoming outdated and remain relevant with accurate information. The positive coefficient suggests that, on average, a one-unit increase in the extent to which CPD updates subject knowledge is associated with a 0.2073-unit increase in the predicted quality of training provision and as well it emerged that a p-value of 0.003 is statistically significant at 5% level of significance. Hence, the findings are in line with the research conducted by [Evans et al. \(2008\)](#) argue that a teaching staff in schools ought to have required up-to-date subject knowledge and skills for this enhanced role.

4.4. CPD Implications and Future Research

Relative to similar studies, other works from different regions consistently highlight the positive impact of Continuous Professional Development (CPD) on the quality of training in TVET schools. For instance, research from Kenya ([Kidega et al., 2024](#)) and Nigeria ([Aniah & Mohammed, 2021](#)) has shown that CPD significantly enhances the pedagogical skills and technical knowledge of TVET trainers, leading to improved student outcomes. Similar findings are reported in Rwanda by [Harindintwari et al. \(2020\)](#), where CPD initiatives have led to noticeable improvements in trainers' abilities to integrate modern teaching methods and industry practices. By comparing these studies, the study observed a common thread "CPD programs that are well-structured, industry-aligned, and continuous tend to yield substantial benefits across different educational contexts". This comparative analysis reinforces the

critical role of CPD in elevating the standards of TVET education globally.

4.5. CPD Theoretical Implications

Based on the aforementioned input-output theory, the implications of Continuous Professional Development (CPD) on the quality of training provision in TVET schools are significant. CPD serves as the critical input that equips trainers with updated knowledge, advanced technical skills, and innovative pedagogical methods. This input translates into improved instructional quality and more relevant, industry-aligned curricula, leading to enhanced teaching practices. As a result, the output manifests in better-trained students who are more proficient and job-ready, with higher employability rates and greater satisfaction with their educational experiences. Thus, CPD directly impacts the overall effectiveness of TVET programs by transforming the inputs (educator competencies) into high-quality outputs (student outcomes), underscoring its essential role in sustaining and elevating educational standards in TVET institutions.

5. Conclusion and Recommendations

5.1. Conclusion

The results of the study confirmed that the key CPD variables influencing quality training provision are; trainers attending CPD regularly, CPD helps trainers to improve training practices, CPD covering all subjects taught in a trade, CPD provides opportunities to reflect on training practices, through CPD pedagogical practices be upheld, new teaching methods are shared and acquired through CPD, CPD provides strategies for learning environment's management, CPD helps trainers to widen and transfer skills, CPD improves student's outcomes, CPD engages in Lifelong Learning, CPD adapts to educational changes and CPD updates subject knowledge. Therefore, the study concluded that continuous professional development variables influence quality training provision in TVET schools of Rwamagana district.

The computed R-squared indicates 0.1381 of the total variations and the study found that continuous professional development's influence on quality training provision in TVET schools showed a moderate correlation between predicted and explanatory variables of $R^2 = 0.1381$. It implies that a 13.8% R-squared shows that CPD variables, such as new pedagogical practices, new teaching methods, engagement in lifelong learning, educational changes, updates to subject knowledge, etc., collectively aggregate 13.8% while the remaining 86.2% of the variation in quality training provision remain unexplained, which could be due to other variables not measured by the study.

5.2. Recommendations

The study recommends that TVET schools foster a collaborative environment for CPD sessions where trainers can share innovative teaching methods. Implement peer-learning initiatives, mentorship programs, and cross-disciplinary exchanges to promote effective practices. Furthermore, the study recommends that TVET

schools establish a structured and mandatory CPD calendar, ensuring that trainers attend sessions regularly to ensure that trainers are well equipped to meet the evolving needs of his/her related professional careers and for future research directions, further research should focus on:

- Conduct rigorous studies to evaluate the effectiveness of various CPD programs in enhancing teaching quality, student outcomes, and industry relevance in TVET. Use mixed-method approaches to capture both quantitative metrics (e.g., student performance, retention rates) and qualitative insights (e.g., teacher satisfaction, perceived improvements).
- Explore methodologies for conducting comprehensive needs assessments within TVET institutions to tailor CPD offerings effectively. Research could focus on identifying specific skill gaps among educators, industry demands, and emerging trends in vocational fields.
- Investigate innovative delivery models for CPD that leverage technology, such as online platforms, virtual simulations, and blended learning approaches. Evaluate their accessibility, scalability, cost-effectiveness, and impact on learning outcomes.
- Study the effectiveness of collaborative CPD initiatives involving TVET institutions, industry partners, and professional associations. Assess how these partnerships influence curriculum relevance, skill alignment, and employment outcomes for graduates.
- Examine factors influencing TVET educator motivation to engage in CPD activities. Research could explore intrinsic and extrinsic motivators, professional recognition, institutional support systems, and barriers to participation.
- Investigate the direct and indirect effects of CPD on student learning outcomes in TVET. This could include examining changes in teaching methodologies, curriculum design improvements, and the transfer of knowledge and skills from educators to students.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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