



Impact of continuous professional development programmes on TVET trainers in Uganda

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ABSTRACT

Continuous Professional Development (CPD) is important for maintaining the technical and pedagogical competence of Technical and Vocational Education and Training (TVET) trainers. However, concerns remain about the extent to which CPD programmes improve trainer competence and which programme characteristics determine their effectiveness in Uganda. This study examined the impact of CPD programmes on the technical and pedagogical competence of TVET trainers and the influence of CPD programme characteristics on CPD effectiveness. The study was guided by Experiential Learning Theory. An explanatory sequential mixed-methods design was adopted. The target population comprised TVET trainers in Uganda who had participated in CPD programmes. A sample of 204 trainers was selected using stratified random sampling, with key informants purposively selected. Data were collected using both structured questionnaires and key-informant interview guides and the data analysed using descriptive statistics and a multiple regression analysis for the quantitative data, while a theme analysis for the qualitative data was undertaken. The results indicate that CPD was instrumental in enhancing trainers' overall (both technical and pedagogical) competence, especially in terms of acquired skills, knowledge and professional behaviours and self-confidence while, to a lesser extent, on teaching techniques. The regression model was significant, $F(4,199) = 33.13$, $p < 0.001$ and accounted for 40.0% of the variance in the effectiveness of CPD ($R = 0.400$). The programmatically relevant content ($\beta = 0.42$, $p < 0.01$) emerged as the most significant predictor, followed by the incorporation of activity learning techniques in to the programmes ($\beta = 0.35$, $p < 0.01$), programme duration ($\beta = 0.28$, $p < 0.05$) while support provided by an institution was not statistically significant ($\beta = 0.15$, $p = 0.11$). The study thus concludes that while CPD does strengthen trainer's competencies, its impact is significantly determined by certain program characteristics and the impact of CPD is currently less integrated with institutional development and training advancement. The study recommends a competency-based national CPD framework, needs-based content, practical and active learning approaches, sustained CPD opportunities, and stronger integration of CPD into institutional performance and career progression systems.

Keywords: TVET, Continuous Professional Development, TVET trainers, professional competence, Uganda

1. INTRODUCTION

TVET has an important role to provide skilled workforce for work, entrepreneurial, and national development. The TVET system is recognized as increasingly relevant in Uganda with increasing concern regarding youth employment, the existing skills gap in many sectors, and changing labour market demands (Charles et al., 2023). However, the quality of TVET delivery depends on not only the infrastructure, equipment and curriculum delivered, but also by how effective those structures, systems and curricula are used and converted into meaningful learning experience (Okumu & Bbaale, 2019). It is therefore important that trainers have continuous opportunities to update their expertise and teaching skills.

A practical strategy to maintain the professionalism of these trainers is Continuous Professional Development (CPD). The rationale is based on the assumption that effective professional development strengthens teachers' subject knowledge, teaching practices, confidence, reflection and capacity to adapt to evolving workplaces and to learner-related circumstances (Saleem et al., 2021). Research on professional learning has demonstrated that practice is often changed and influenced by focused professional development that incorporates the content, learning process and time frame necessary, and offers opportunity for feedback and reflection (Darling-Hammond, Hyler, & Gardner, 2017). In other words, just attending any CPD program may not be adequate. The program design and delivery is a key component to determine the impact of CPD on trainer competences (Van der Bijl, 2021).



This is crucial for TVET trainers working at the interfaces between the education system and world of work, where both current subject expertise and competent delivery methods are required to developing students' practical skills.

Thus, those CPD programs that are related to the trainers' areas of expertise, facilitate practical engagement, and provide reflection are likely more effective for improvement of trainer competence compared with the rather theoretical short training provided (Van der Bijl, 2021). Accordingly, this study examines the extent to which CPD activities enhance the technical and pedagogical competencies of TVET trainer in Uganda, and identifies the characteristics of the program activities that make them more and less effective. Knowing the degree of improvement on technical and pedagogic capacity for a type of CPD activity alone is not necessarily linked to change practice, since professional learning does not directly equates to change practice; effective program quality and characteristics are essential to trigger such change (Darling-Hammond et al., 2017).

Considering this broad framework the current research investigates the impact of the Continuous Professional Development (CPD) Programmes on TVET trainers in Uganda focusing on trainers' Competences as the subject matter, the specific characteristics of those programs being linked to improvement of these competences.

1.2 Statement of the Problem

Over time, Uganda has seen TVET as an avenue to produce essential technical and life skills in enabling national transformation (Okumu & Bbaale, 2019), which, in turn places a high premium on the competence of TVET trainers. TVET trainers are required to continually up skill in both their technical and pedagogic practices, given the evolving world of work and Uganda's TVET policy, it further stipulates on the need for well-resourced and adequate numbers of staff to facilitate the learning and development of good quality skills (Ministry of Education and Sports, 2019). As central to human resources; it is considered appropriate to focus CPD on TVET trainers to the enhancement of their abilities (2003).

However, little attention is placed on the implementation of continuous professional development (CPD) in enhancing TVET trainers in Uganda or linking this training to their competency in the country.

A study conducted in the Uganda confirmed that practices regarding CPD and ongoing training were mostly judged to be relevant, but were fragmented, uneven and that it showed that a variety of CPD experiences had significant positive relationship with professional competence of TVET trainers (Charles et al, 2023). Such findings imply that just being subjected to some form of CPD in terms of scope and focus does not automatically guarantee quality output and there could be issues around what constitutes effectiveness, since such factors as pedagogical elements, engagement, duration, pedagogical engagement, relevant course content and the support provided may influence it. Accordingly, the problem statement is that, we know relatively little about the extent of effects of CPD programs on improving professional ability, both technically and pedagogically, of TVET trainers and which characteristics are instrumental in its effectiveness in Ugandan context. In this regard, this study investigate how CPD enhances professional ability, both technologically, pedagogical and which features of CPD program contribute to their effectiveness.

1.3 Research Objectives

- i. To assess the impact of Continuous Professional Development programmes on the technical and pedagogical competence of TVET trainers in Uganda.
- ii. To examine the influence of CPD programme characteristics on the effectiveness of Continuous Professional Development programmes among TVET trainers in Uganda.

II. LITERATURE REVIEW

2.1 Theoretical Framework

2.1.1 Experiential Learning Theory

The study is guided by the Experiential Learning Theory (ELT), whereby learning is regarded as a transformation process whereby knowledge and competence are gained by reflecting upon and applying experiences (Kolb & Kolb, 2009). ELT is relevant to TVET because professional competence involves relating theories to practice. The characteristics of CPD activities such as demonstration, practice, problem-solving, reflection and application allow TVET trainers to change what they know and then improve practice (Jonathan & Laik, 2019)..

The ELT also offers rationale for why CPD program characteristics affect the learning. For instance if the characteristics of a program allow active learning, real-life practice, engagement and reflection, the likelihood of the trainers' integrating new learning in practice is high. This is supported by a recent study from Uganda: a study by Sempala, Ochieng and Kisilu, 2025, revealed a statistically significant positive correlation between CPD practices



and TVET master trainers' professional competence, whereby CPD accounting for 21.1% variation of professional competence.

2.2 Empirical Review

2.2.1 Impact of CPD on the Technical and Pedagogical Competence of TVET Trainers

Many sources regard CPD as vital for the maintenance and enhancing of teachers professional capabilities. Professional development through engagement with CPD should strengthen teacher's knowledge, professional development, competence, confidence, responsiveness to changing needs of learners and workplace requirement. Especially in TVET contexts where they need occupational expertise coupled with the capacity to provide competence-based and practical instructions.

A survey among the Kenyan vocational teachers confirmed that they engagement in formal and in formal CPD practices that helped in; improving competence in performance, addressing their needs of professional (Tororei, 2015).

Similar evidence has been documented for Uganda; a survey that investigated TVET master trainers' experiences with CPD, Sempala et al. (2015) established that CPD practices of master trainers at TVET master training colleges in Uganda were positively associated with their professional competence, whereas their work experiences in relation to CPD explain 21.1 percent of the variance in professional competence. The authors however conclude that CPD still remain poorly implemented and inaccessible by majority of the trainers. These studies show that CDP can meaningfully improve trainer's Competence although there are no assurances for equality in effect from participation. The evidence available from such surveys indicates that CPD can improve trainers' skills, pedagogies and confidence therefore the expectation that professional development in TVET leads to improve competent professional is reasonable.

Therefore the literature supports this expectation that CDP participation leads to demonstrable improvement of knowledge, delivery methods and professionalism of trainers but still, it leaves a significant gap regarding specific outcomes realized by TVET trainers in Uganda which this present study is set to bridge by identifying whether engaging in any of CPD programmes offered at a TVET institutions resulted into improved knowledge ontechnical and pedagogical subjects, acquisition of new techniques in teaching, improved methods of delivery of subject contents, positive change of attitude towards work and work ethics, and enhanced self-confidence on technical knowledge during delivery.

2.2.2 Influence of CPD Programme Characteristics on Effectiveness

The effectiveness of a CPD not only concerns whether trainers engage in it, but rather on the content and processes surrounding this learning. In her review of 23 studies on effective CPD, Desimone (2009) concluded that four attributes-content focus (on specific academic content and instructional practice), active learning, coherence, length, and collaborative participation (by multiple participants) - "allow for participant engagement with the specific content or teaching practice of interest and permit transfer of professional knowledge back into daily teaching practice." Contemporary research has confirmed the importance of having up-to-date and practice-based CPD for vocational education and teachers (Njenga & Rarieya, 2015; Njenga, 2023; Sempala et al., 2025).

In TVET contexts, relevance is likely to matter most as practitioners in vocational and technical fields need to be continually abreast of rapidly evolving practices in their specific industries and vocational pedagogies. Indeed Njenga (2023) found that the reasons for vocational teacher's CPD include a drive to boost performance-based competence, and that "the form and nature of the participants' motivations determine their patterns of engaging with the learning." Likewise, in Uganda, Sempala et al. (2025) found "although teachers considered that the CPD modules were relevant they perceived that their delivery was inconsistent while accessibility and institutional factors limited effectiveness of CPD programs." It seems likely that these four characteristics (content relevance, active learning, length and institutional support) may affect the degree to which CPD leads to meaningful changes in teachers' professional knowledge, skills, and practices. Following this lead, this study explores these features of CPD programs to account for variation in their effectiveness for teachers engaged in vocational training in Uganda.

III. METHODOLOGY

3.1 Research Design

The study used a mixed methods explanatory sequential research design. Quantitative approach was used to identify the vocational training institution trainers stated they have gained through professional development training and, the vocational training institution trainers felt professional development skills and competences they needed to gain through CPD. The qualitative phase augmented these quantitative findings by providing more explanation and contextual knowledge



of the trainers' views and experiences of the need for professional development training. A mix method was deemed suitable for the study since it provided both quantitative evidence and qualitative explanations of the problem.

3.2 Study Area

The study area was vocational training institutions in the Central Region of Uganda that had active Continuous Professional Development CPD programme. This region was selected due to the presence of vocational training institution with active professional development CPD programmes providing an adequate back drop to assess the training needs of Vocational Training Institutions and to gain insight into the professional development skills which vocational training institution have to gained in their career.

3.3 Target Population

TVET trainers employed in vocational training institution active CPD programmes in the Central Region of Uganda and the stakeholders in the policy and implementation CPD policy; quantitative include 204 trainers from 24 vocational training institution and qualitative involved 10 key informants who represent officials in TVET Department at the Ministry of Education and Sport (MOES) and Education Development Partner's EDPs working on CPD.

3.4 Sampling and Sample Size

The sample consists of trainers from a sample of vocational training institution which have an active CPD programme in Central Region of Uganda. A sample of 204 trainers and administrators of the 24 vocational training institution was included for the quantitative approach of the study while a sample of 10 key persons were systematically selected from MOES TVET Department and EDPs working on CPD to cover the Qualitative approach. Sample sizes of 204 trainers/administrators, 10 stakeholders from the respective organizations/Departments were appropriate as it allowed for a representative sample of perceptions among vocational training institution trainers / administrators in the study area, and for inclusion of persons who held diverse experience and expertise pertinent to the issue under study.

3.5 Data Collection Instruments and Procedures

Structured questionnaires and interviews were the data collection instruments used in the study. The questionnaire used had items based on Likert- scale approach. These measuring tools sought to determine; trainers skills through training of continuous professional development they have undergone, what skills of professional development are they perceive still needed in career; as interview instrument facilitated to collect qualitative explanatory information to support the quantitative data. Procedures Data were collected after obtaining research and clearance permit from the institutional responsible authorities as well as approval from individual participants with their informed consent. Prior to administration, information with regard to the purpose of the study was explained to participants and, they were notified that their participation was voluntary and the information provided will only be used for academic research. Completed questionnaires were checked for any missing information prior to their entry and analysis. All interview sessions were recorded and immediately summarized for analysis

3.6 Data Analysis

The collected quantitative data were coded and analyzed using a social science statistical software package called Statistical Package for the Social Sciences (SPSS), version 26. Descriptive statistics such as frequencies, percentages, mean and standard deviations were utilized to summarize the training and staff needs and competencies of the Vocational training institution trainers and staff members of all the vocational institutions. The result obtained was then presented in tables in comparison across measured competencies. Regression Analysis were employed to identify the predictors of training outcomes were appropriate. The qualitative data from the interviews and questionnaires were transcribed and analyzed using a thematic analysis approach to identify commonalities, recurring concepts and themes regarding participants' skill acquisition and ongoing training and development needs. The qualitative and quantitative findings were finally synthesized for combined interpretation.

3.7 Ethical Considerations

The study was conducted adhering to basic research ethics principles and guidelines. Prior to participation, individuals were informed about the objectives of the study and they were given option to withdraw their participation at any time. Their participation was voluntary. Confidentiality was maintained, and no information would be attributed or



revealed in a manner that would personally identify them; only aggregates results would be reported. All relevant approvals and permit necessary were also obtained from the authorities concerned.

IV. FINDINGS AND DISCUSSION

4.1 Impact of CPD Programmes on the Technical and Pedagogical Competence of TVET Trainers

The first objective examined the impact of Continuous Professional Development (CPD) programmes on the technical and pedagogical competence of TVET trainers in Uganda. The results are presented in Table 1.

Table 1

Impact of the CPD Programme to TVET Trainers (N=204)

Statement	SD	D	NS	A	SA	Mean	SD
The learner acquired new skills and knowledge	1 (0.5%)	2 (1.0%)	10 (4.9%)	48 (23.5%)	143 (70.1%)	4.62	0.63
The training led to promotion at work	5 (2.5%)	15 (7.4%)	45 (22.1%)	80 (39.2%)	59 (28.9%)	3.85	1.01
The certificate received from the training is useful	2 (1.0%)	6 (2.9%)	25 (12.3%)	82 (40.2%)	89 (43.6%)	4.23	0.84
The training led to improved attitude towards work	1 (0.5%)	3 (1.5%)	14 (6.9%)	52 (25.5%)	134 (65.7%)	4.54	0.7
The training led to use of improved methods of delivery	1 (0.5%)	2 (1.0%)	12 (5.9%)	50 (24.5%)	139 (68.1%)	4.59	0.65
The training led to improved work ethics	2 (1.0%)	4 (2.0%)	18 (8.8%)	56 (27.5%)	124 (60.8%)	4.45	0.76
The training boosted the confidence of the learners in skills delivery	1 (0.5%)	2 (1.0%)	15 (7.4%)	54 (26.5%)	132 (64.7%)	4.54	0.68
The training accorded the participant time to relax and reflect	6 (2.9%)	18 (8.8%)	42 (20.6%)	78 (38.2%)	60 (29.4%)	3.83	1.06
The participants were able to obtain industrial linkages	3 (1.5%)	10 (4.9%)	30 (14.7%)	85 (41.7%)	76 (37.3%)	4.08	0.92
The training motivated participants to participate in other trainings	2 (1.0%)	5 (2.5%)	20 (9.8%)	68 (33.3%)	109 (53.4%)	4.35	0.82
Overall Mean						4.31	0.81

The findings in Table indicate a generally strong positive assessment of CPD outcomes among the 204 trainers. The overall mean was 4.31 (SD = 0.81), suggesting a high level of agreement that participation in CPD contributed to professional improvement.

The strongest reported outcome was the acquisition of new skills and knowledge (M = 4.62, SD = 0.63). This was followed by improved methods of delivery (M = 4.59, SD = 0.65). Improvements in attitude towards work and confidence in skills delivery both recorded a mean of 4.54, while improved work ethics recorded M = 4.45. The findings suggest that the most immediate benefits of CPD were related to trainers' knowledge, instructional practice and confidence. Other outcomes were comparatively lower: the usefulness of certificates recorded M = 4.23, industrial linkages M = 4.08, promotion M = 3.85 and opportunities for relaxation and reflection M = 3.83. These findings indicate that CPD has its strongest perceived effect at the individual professional level, particularly in strengthening trainers' knowledge and classroom or workshop delivery.

4.2 Influence of CPD Programme Characteristics on CPD Effectiveness

The second objective examined the influence of CPD programme characteristics on effectiveness. Multiple regression analysis was conducted.

**Table 2***Model Summary*

R	R Square	Adjusted R Square	Std. Error
0.632	0.4	0.388	0.628

The model summary in Table 2 indicates a positive relationship between the selected CPD programme characteristics and CPD effectiveness ($R = 0.632$). The predictors jointly explained 40.0% of the variation in CPD effectiveness ($R^2 = 0.400$), while the adjusted R^2 was 0.388. This means that content relevance, active learning, duration and institutional support collectively accounted for approximately 38.8% of the adjusted variation in CPD effectiveness. The remaining variation may be explained by other factors not included in the model.

Table 3**ANOVA**

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	53.28	4	13.32	33.13	<0.001
Residual	79.91	199	0.402	—	—
Total	133.19	203	—	—	—

The ANOVA results in Table 3 show that the regression model was statistically significant, $F(4, 199) = 33.13$, $p < 0.001$. This indicates that the four CPD programme characteristics, when considered together, significantly predicted CPD effectiveness. Therefore, the null proposition that the selected programme characteristics have no significant relationship with CPD effectiveness is not supported. The findings suggest that the overall design and implementation of CPD programmes are important in explaining differences in reported CPD effectiveness among the trainers.

Table 4*Regression Coefficients*

Predictor	B	Std. Error	β	t	Sig.
Constant	0.85	0.25	—	3.4	<0.01
Content relevance	0.34	0.07	0.42	4.86	<0.01
Active learning	0.28	0.06	0.35	4.67	<0.01
Duration	0.23	0.06	0.28	3.83	<0.05
Institutional support	0.12	0.075	0.15	1.6	0.11

The regression coefficients show that content relevance was the strongest significant predictor of CPD effectiveness ($\beta = 0.42$, $p < 0.01$). This indicates that CPD programmes whose content is closely aligned with trainers' professional and technical needs are associated with higher levels of effectiveness. Active learning was the second strongest significant predictor ($\beta = 0.35$, $p < 0.01$), suggesting that practical participation, engagement and opportunities to apply new knowledge contribute positively to CPD outcomes. Duration also had a statistically significant positive relationship with CPD effectiveness ($\beta = 0.28$, $p < 0.05$), indicating that programmes providing adequate time for learning and application are more likely to produce positive outcomes.

Institutional support had a positive coefficient ($\beta = 0.15$), but its effect was not statistically significant ($p = 0.11$). Thus, although the direction of the relationship was positive, the study does not provide sufficient statistical evidence to conclude that institutional support was a significant predictor of CPD effectiveness in this model. Overall, the results indicate that content relevance, active learning and duration were the significant predictors of CPD effectiveness, with content relevance making the strongest contribution.

4.3 Discussion

4.3.1 Impact of Continuous Professional Development Programmes on the Technical and Pedagogical Competence of TVET Trainers

CPD makes a valuable contribution to the development of Ugandan TVET trainer's vocational and pedagogical competencies. The highest reported outcomes were new skill development and instructional improvement in methods of delivery. This suggests that CPD helps teachers develop updated knowledge of their occupational practices, and is also



supporting trainers' ability to transfer those learning into their work practice. These are important areas as teachers not only need up to date vocational knowledge in TVET, they also need up to date pedagogy.

The findings are consistent with Njenga (2023) argument that good quality CPD improves learners with usable skills and recent knowledge. This has been well supported in recent policy work too with the TVET Policy 2019. Zhang (2025) also found that teachers develop new skills that increase their confidence and encourage instructional changes in TVET related technical teaching in China. This indicates that CPD provides trainers with a sense of professional renewal where both their knowledge base and instructional competence are reinforced. The improvement in trainers' attitude to their jobs, work ethic, and confidence has broader professional impacts. This outcome has been supported with the findings of Langat et al. (2021); Darling-Hammond et al. (2021) and Njenga (2023), all finding improvements in the attitudes of learners as one outcome. Shergold et al., (2025) found gains in confidence as important proximity results, while Barigye et al. (2024) reported its value. In summary, CPD seems to have enhanced trainers'. Their knowledge base, instructional practice and attitudes to their work are likely enhanced by participation in PD activities.

Improvement in teaching practice is particularly important since these findings indicate that training knowledge is likely to have translated into practice by enhancing trainers' use of instructional strategies and techniques. Darling-Hammond et al. (2021) reported improvements in learning practice as a feature of effective CPD. Coelho et al., (2025) noted the relevance of improving pedagogy for learners' centrality. For TVET teacher, translating the pedagogical understanding into teaching is vital in as they apply the technical concepts to learners using a range of instructional models including demonstrations and practice sessions.

However, the study found higher level of success in terms of personal level learning and instructional enhancement as compared with career professional advancement and business expansion related outcomes of CPD. Promotion recorded a low level of agreement from the trainers while the level of confidence on skill delivery, job motivation, work ethic, and method of delivery remained high. This finding suggests that the involvement in CDP activities does not guarantee an individual an upward mobility of cadre/level. Rather formal promotion depends upon structural or institutional policy of organization/institution, vacant posts, financial allocation and eligibility of an applicant. Similar findings were reported by Njenga (2022), where he pointed out that career change and personal achievement could be made possible through training, however 'formal promotion is dependent on certain factors related to the employment context. Also Langat et al. (2021) have argued that professional skills could be enhancing trainer's Employability yet their chances for formal promotion rely more on their institutional contexts. Njenga (2022) further posited that the certified qualification from recognised institutions increases their eligibility as they engaged both in academia and working in an industrial environment. The trainer perceptions however reveal an indication that the certification itself is less valued than the learning taking place within the CPD programmes or more specifically what is being taught and or the acquisition of those competencies.

It was indicated in the study that business extension related skills received moderate attention during the process. Industrial networking was one of these related skills which gained relatively lower positive reporting. Such networks have been acknowledged as enhancing trainer credibility, providing opportunities for professional, developing skills for their graduates (Lee et al, 2021) as suggested in the study and they often foster collaboration with business and industry, including those focused on providing real workplace opportunities for learners (Sim et al, 2025). As well they strengthen connections between the workplace and the training institutions; thereby, helping them to address skills gaps. This would also be viewed in light of TVET Policy 2019 which stresses importance of public-private partnerships but is less developed or a feature. However, the current reported low result indicates the lack of or insufficiency of organised link-ups, maybe to require specific and proactive engagement by an organisation or institution.

The relatively modest reporting about opportunities for reflection, rest and recreation also suggests room for improvement in the delivery process. Reflective activities are increasingly being considered essential for helping people engage deeply with vocational knowledge that is often complex and highly integrated. Also important is pacing of programme delivery to reduce the level of fatigue (Langat et al., 2021). The training providers could seek to incorporate some short but meaningful activities to cater for reflection, while also ensuring that appropriate time is provided for trainers to take breaks and or experience a light and engaging session for them to consolidate and reactivate what they may have acquired.

Finally, the high degree of willingness among TVET trainers to take further training, signals an enthusiastic outlook towards continuously enhance the competencies and the general welfare of trainers, as demonstrated by the fact that this aspect was positively accepted by the respondents in high measure, to a maximum extend. Zhou et al. (2024) found that when teachers experience positive CPD, they feel an increased motivation to continue professional learning, creating a cycle of continued growth. This aspect resonates well with the ambition outlined in the MoES CPD Costed Plan to encourage and facilitate systematic, ongoing capacity building for TVET trainers. In overall the study findings portray that the CPD



contributes much at immediate individual trainer levels rather than institutional career level; and additional work at institutional level could have great impact in enhancing trainer's satisfaction in their career.

4.3.2 Influence of CPD Programme Characteristics on the Effectiveness of CPD Programmes among TVET Trainers

The results of the regression confirm that specific characteristics of CPD programmes play an important role in explaining the differences in CPD effectiveness. Overall, the regression model achieved statistical significance and accounted for a fairly high level of variation in CPD effectiveness. This implies that participation alone, but not the characteristics of CPD programmes.

Therefore CPD effectiveness depends substantially on characteristics and quality of professional learning environment. Relevance of content was found to be the most significant predictor for effective CPD programmes ($\beta = 0.42$, $p < 0.01$), implying that teachers benefit significantly when CPD engages participants in their specific areas of their occupational and academic competencies. This confirms Darling- Hammond et al. (2021) assertion that focuses on relevance of content must be highlighted as fundamental characteristic of high-quality professional learning. Similarly Njenga (2023) asserts that teachers pursue for Professional Development partly for purpose of enriching his or her career and competence, the result thus shows the importance of having the teachers-need-based approach in planning CPD programmes in line with competencies that need to be acquired. Furthermore, active learning was another significant predictor for effective CPD programmes ($\beta = 0.35$, $p < 0.01$) supported by a notion that meaningful learning is attained if participants are actively involved in the process than being passive to learn.

Darling- Hammond et al. (2021) note that active learning is one key criterion for high-quality professional learning. This is important especially in technical vocational and special education. Given the fact that vocational and special needs education demands for practical involvement and experience for effective knowledge transaction of the same will be transferred to classroom as an interactive part of their instruction. Duration was also significant ($\beta = 0.28$, $p < 0.05$) This lends support to the argument that, it is critical for effective professional learning experience be provided with an extended time to allow participants critically engage with new information, practices, etc., and reflect and apply them in their respective teaching-workplaces (Darling- Hammond et al, 2021).

In this case, short or limited in duration of CPD can be futile unless the content application aspect is addressed in terms of follow-ups and application. The coefficient for institutional support was positive, but did not reach conventional levels of statistical significance ($\beta = 0.15$, $p = 0.11$) While this result doesn't deny the importance of institutional supports, it indicates that after accounting for programme characteristics of CPD, institutional demonstrates not have a sufficient independent contribution effect on the CPD outcomes of teachers in technical vocational training. One explanation for this is that while organizational support may contribute positively to the participation of teachers, it does not necessarily impact the quality of professional learning.

These findings are also consistent with the research conducted by Sempala et al., (2020), where a positive and significant relationship was reported between TVET CPD practices and professionalism, alongside identifiable weaknesses in terms of CPD's implementation and accessibility among master trainers in Uganda. This research expands upon existing literature by confirming that specific CPD programme characteristics, namely, relevance, active involvement, and sufficient time, are strong independent predictor of their effectiveness within the considered factors, with Relevance having a stronger influence than others. Generally, the finding buttressed the argument about significance quality and nature of design CPD, instead of simple mere participation in the activities to the development of professional knowledge and skills among teachers. Relevance, active participation, Sufficient timing for practice and application become prominent factors in affecting CPD effectiveness, with Content Relevance taking the leading position.

The present study therefore supports and calls for an urgent transformation from broad or general-to tailor made, practical, sufficient timing based CPD activities for Technical Vocational and special needs teachers in Uganda. However; the less pronounced role of the latter factors with their positive significant career development outcomes shows that improving teacher skills via CPD alone isn't the complete package in addressing some broader professional development institution challenge(s). For their broader professional careers to enhance, in a broad range of organizational outcomes, career opportunities; professional growth and industry recognition need to be well supported by right institutional framework and policies.



V. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

In conclusion, the CPD programs play a role in contributing to professional competence of the TVET trainers in Uganda. We found evidence that CPD has a positive effect especially on the trainers' technical competence skills, technical confidence confidence, attitudes to work and training delivery approaches and strongest impact on immediate professional and pedagogical competence at trainer level. Second, the effectiveness of CPD is influenced considerably by the manner in which such programs were designed and implemented.

That the program contents responded to the trainers' actual technical and pedagogical competence, active learning/participation strategies, sufficient duration, time to be effective were all significant, but content was strongest, suggest that CPD which responded to real trainers needs would lead to meaningful outcomes.

However, findings demonstrate the contrast between individual trainer outcomes and collective institutional impacts where trainings had strong personal impact and less impact at organizational (e.g. Promotion and industrial link). While there was a positive association between effective support and training quality, support did not offer statistically significant independent contributions in the regression modeling process. Thus CPD can strengthen training competence but there is a risk of disjointed trainer improvements when disconnected from institutional mechanisms.

5.2 Recommendations

The study recommended the shift from fragmented, attendance-based training programs to relevant, practical, prolonged and competency-focused learning experiences and improves design and management practices of the CPD. Strengthening training mechanisms at institutional level with direct links to career structures and industry in Ugandan TVET would better ensure impact of training interventions on educational reforms.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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