

Influence of Trainers' Competencies on Competency-Based Education and Training Implementation in Public Technical Institutions in Meru County, Kenya

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Abstract

Trainers are central in implementing the Technical and Vocational Education and Training (TVET) curricula, especially the integration of the Competency-Based Education and Training (CBET) approach aimed at improving the quality of education and training. As a result, trainers' competencies are an important aspect that should be examined, because despite CBET receiving a significant attention in the in the 21st century Sub-Saharan Africa, it is still facing implementation challenges. This study therefore sought to establish the influence of Trainers' Competencies on CBET Implementation in public TVET institutions in Meru County, Kenya. The study adopted the Vocational Teacher Competencies Model as the guiding framework. The target population consisted of 850 trainers. Proportionate random sampling technique was used to select 265 respondents. The study took a positivist philosophical view and employed a descriptive survey design. Data was collected using a questionnaire and analyzed using descriptive statistics, Pearson's product moment correlation coefficient and simple linear regression. The results showed that trainers' competencies had a significant positive effect on CBET implementation ($\beta=.401, p<0.05$), suggesting that trainers' competencies have a significant impact on CBET implementation. This implies that increasing trainers' competencies through training and development, the trainers can better understand and apply CBET principles, which will lead to more effective learning outcomes. Therefore, the study concludes that developing and nurturing trainers' competencies, can enhance the quality delivery and effectiveness of CBET courses, resulting into better prepared trainees who possess the requisite competencies for success in the world of work and beyond. These findings will benefit TVET stakeholders, the Curriculum Development Assessment and Certification Council (CDACC), and government policymakers in developing targeted policies for CBET implementation.

Key Words: *Trainers' Competencies, Competency-Based Education and Training, Technical and Vocation Education and Training.*

1.0 Introduction

Competency-Based Education and Training (CBET) implementation in TVET institutions has led to a paradigm shift in teaching and learning from the traditional knowledge-based to a competence-based system. The competence based system is a more outcome-based approach where

trainees are expected to demonstrate competence expected in the world of work (Republic of Kenya, 2020). The CBET education framework places the trainee at the core of the teaching-learning process and therefore, the trainers' role shifts from the "conventional teacher" to a facilitator (Dambudzo, 2018).

Although many African countries are moving towards integrating CBET into TVET as it enhances skill formation and productivity in global economy, quality and relevance are the key components of TVET worldwide (Zuva & Zuva, 2020). Competency-Based Education and Training enhances quality and relevance of TVET, its successful implementation heavily depends on competent trainers who possess the necessary competencies, and can adapt to dynamic instructional strategies to meet diverse trainee needs (Kufaine & Chitera, 2013).

However, Trainers play a vital role in shaping the learning environment by ensuring effective skills development within TVET institutions. They actively engage trainees in the learning process, foster and sustain motivation for learning and utilize creative teaching and learning techniques (Muraraneza & Mtshali, 2018). Therefore, understanding the role of trainers' competencies on CBET implementation would be of great importance to help in designing effective trainer professional development programs and improve the overall quality of CBET.

1.1 Statement of the problem

Competency-Based Education and Training (CBET) has gained prominence in the 21st century Sub-Saharan Africa as an educational framework that aligns the learning outcomes with ever-changing demands of the industry (Lawyer, 2021). In Kenya, the implementation of CBET approach in TVET institutions aimed at enhancing the quality and relevance of technical and vocational training by equipping trainees with the demanded technological workplace skills needed to attain global competitiveness geared towards attainment of Kenya's Vision 2030 (Mutua et al., 2019).

The success of TVET Competence-Based Education and Training depends on trainers' occupational skills, competencies, and how much capacity they have to embrace the approach (Kipngetich et al., 2022). Trainer's competence is crucial in curriculum implementation in any TVET educational system since trainers are facilitators of the learning process. Trainers play a critical role in enhancing CBET implementation in Kenya to ensure that its basic tenets are followed during training and assessment (Mwagunga et al., 2020).

Most trainers have been retooled through CBET capacity building workshops and possess the requisite competencies to implement the CBET approach in their classrooms (Kipngetich et al., 2021). However, there is still a missing link between the trainers' competencies and how CBET is implemented in the TVET classrooms since there is slow uptake of CBET courses. Furthermore, the CBET concept has not sufficiently been mainstreamed in the TVET legal and policy frameworks.

Although empirical studies have extensively discussed CBET implementation (Kipngetich et al., 2022; Mutua & Mulwa, et al., 2019; Mwagunga et al., 2020), there is paucity of literature on the influence of trainers' competencies on CBET implementation. This study therefore, sets out to de-

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termine the influence of Trainers' Competencies on CBET Implementation in public TVET institutions in Meru County, Kenya.

1.2 Objective of the study

To determine the influence of Trainers' Competencies on CBET Implementation in public TVET institutions in Meru County, Kenya.

1.3 Research Hypothesis

The following research hypothesis was tested at $\alpha=0.05$ level of significance in the study:

H₀₁: Trainers' Competencies does not have a statistically significant influence on CBET Implementation in public TVET institutions in Meru County, Kenya

1.4 Theoretical Framework and model underpinning

The study was guided by the Vocational Teacher Competencies Model. The Model suggests that a vocational high school teacher is expected to possess the pedagogical competence required for classroom instruction. Secondly, professional competency emphasizes on the mastery of content in the trade area and being aware and proactive with changing skills demands in the industry and how technical education can be guided and integrated with the industrial context. In addition, the vocational aspect ensures that the teacher has the necessary technical experience and competence. Lastly, the technological aspect of utilizing and using ICT to successfully implement the teaching and learning activities (Wahyuni & Sugihartini, 2021).

In Kenya, the basic requirement for a TVET trainer is the professional competence in the relevant area of specialization and pedagogy from the Kenya school of TVET (KSTVET), formally known as Kenya Technical Teachers Training College (KTTC), or any recognized university (Republic of Kenya, 2019). A TVET trainer is therefore expected to possess the pedagogical and professional competencies required for classroom implementation of the CBET approach. He/she should also be proactive with changing skills-demands in the world of work respectively.

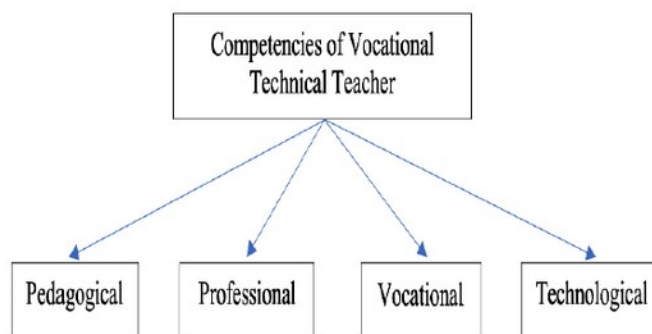
Although vocational teacher professionalism and competence requirements result from the changing paradigm of learning, TVET education policies, labor market, and technological developments, the model asserts that the pedagogical aspect is the most important competency aspect for the vocational high school teachers (Köpsén & Andersson, 2017; Wahyuni et al., 2020).

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Figure 1: Vocational Teacher Competencies Model

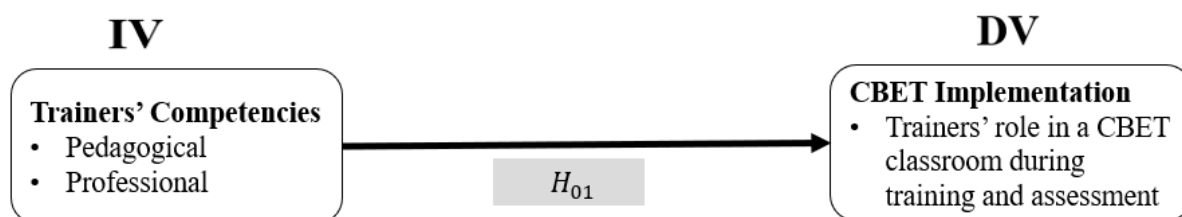


Source: (Wahyuni & Sugihartini, 2021)

1.3 Conceptual framework

Figure 2 shows a conceptual framework illustrating the inter-relation of variables under investigation in a study. CBET implementation, the Dependent Variable (DV) in the study, was conceptualized in terms of the expected roles of a trainer in a CBET classroom during training and assessment. Trainers’ competencies, the Independent variable (IV) in the study was conceptualized in terms of pedagogical and professional competencies aspects.

Figure 2 Conceptual Framework



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Source: (Researchers’ Construct, 2023)

2.0 Literature Review

2.1 Trainers’ competencies and CBET implementation

Competency-Based Education and Training is an outcome-based approach where trainees are expected to demonstrate competence expected in the world upon completion of any level of training (Republic of Kenya, 2020). Implementation of CBET refers to methods trainers integrate the competency-based approach in the teaching and learning during the training and assessment of trainees in the TVET institutions (TVETA, 2019).

The effectiveness of TVET education relies heavily on the capabilities of its instructors. The focus of TVET trainer competence frameworks should be placed on essential skills needed to foster a transformative life-learning approach, enabling individuals to continually adapt to the evolving de-

mands in the 21st century workplace skills (Chakroun, 2019). Moreover, Mutua et al. (2019) posited that effectiveness of CBET implementation relies heavily on the proficiency of TVET trainers. Therefore, a competent TVET trainer is a form of quality assurance for trainees' learning (Ismail et al., 2017).

Trainers' competency is a fundamental issue regarding quality teaching, innovation, general success, and effectiveness when dealing with the educational process (Simonović, 2021). The changing role of education exerts additional demands on education systems and hence the educators (Olema et al., 2021). Teachers' competency is vital for trainees "well development". However, these competencies depend on the extent to which trainers consistently engage in learning and enhance their knowledge and abilities (Njenga, 2018).

In Iran, trainers' professional competencies encompass pedagogical and technical skills, along with the ability to effectively commercialize ideas and uphold high standards of professional ethics (Yeganegi, 2018). In Indonesia, Vocational accounting teachers possess core competencies that encompass pedagogical, technological, collaborative, and creative skills which are integrated to foster an environment of continuous learning (Mardi et al., 2021). A study done in Malaysia showed a positive correlation between teachers' competency and students' academic progress and skills development. Moreover, it also highlighted that enhancing teachers' competence supports their professional growth and enhances their instructional methodologies (Omar et al., 2018).

Ethiopia's TVET strategy mandates that trainers undergo specialized training and obtain certification before being able to work, and a commitment to continuous professional development to continually enhance their competencies (Tamrat, 2022). A national survey in Rwanda on TVET trainers' instructional competencies showed that trainers' teaching behaviors improved after completing a Trainer of Trainers (ToT). This implied that trainers got a better understanding of the instructional competencies of the TVET curriculum program (Kim et al., 2019).

Mwagunga et al. (2020) in a study on trainees' perceptions on CBET curriculum in Kenya, indicated that trainers had a good understanding and a positive perception of the concept and objectives of the CBET Curriculum. However, Alajmi (2021) asserted that major challenges in curriculum implementation include inadequacies in professional growth and training and deficiencies in assessment procedures. Miseda & Kitainge (2021) recommended that in-service courses, pre-service training, and capacity-building workshops for TVET trainers could enhance their competencies. Therefore, in adapting to the new CBET approach, trainers' competencies and abilities must be enhanced to carry out their work competently (Arifin et al., 2021).

Despite the empirical studies discussing extensively the role of the trainer in CBET implementation, there is limited literature on the influence of trainers' competencies on CBET implementation. This study therefore sought to fill that empirical gap.

3.0 Materials and methods

3.1 Study population and sample

The target population for this study was 850 in-service trainers employed by both the public service commission and the Board of Management in the 8 public TVET institutions in Meru County, Kenya. The study used Kothari's sample size determination formula to obtain a sample of 265 respondents from the targeted population (Kothari, 2004). The sample population was selected using proportionate to size random sampling technique. This ensured that the number of trainers selected from each institution was proportionate to the total number of trainers in that institution.

3.2 Research instrument

A standardized questionnaire was used to gather data from the participants in the study. The questionnaire comprised of 27 items. CBET implementation construct had 13 items measured on a five-point Likert scale (1=strongly disagree to 5= strongly agree). The items were formulated from the roles of the trainer during training (teaching in the classroom and carrying out practical sessions in workshops) and assessment of the trainees (internal and external assessments) (Directorate of TVET, 2018). The scale posed statements for trainers to respond to how often they did what was required for CBET implementation during training and assessment of trainees. For instance, *"How often do you conduct assessment and performance tests using the CBET approach."*

On the other hand, trainers' competencies construct was conceptualized in terms of pedagogical and professional aspects and had 14 items measured on a five-point Likert scale (1=strongly disagree to 5= strongly agree). The items were adapted from the Vocational Teacher Competencies Model (Wahyuni & Sugihartini, 2021). Trainers' competencies were modified to fit in the Kenyan TVET CBET context. The scale posed statements for trainers to respond on their level of agreement with competencies for CBET implementation. For instance, *"I am familiar with the strategies for implementing CBET."*

3.3 Validity and reliability

The questionnaire was checked for face and content validity by expert judgement to ascertain if it measured the constructs it was intended to measure. Further, the instrument was piloted to assess the validity and reliability of the research tool and help the researcher in identifying any potential areas that may need improvement and refine them before undertaking the main study (Fraenkel et al., 2019).

An Exploratory Factor analysis (EFA) using the Principal Component Analysis (PCA) method with Varimax rotation was performed on the pilot data to establish construct validity of the questionnaire items. The items were able to constitute factors with no cross-loading observed. Moreover, the extracted factors had Cronbach alpha coefficients of above 0.7. This implied the questionnaire was reliable, the items demonstrated both internal consistency and met the criteria for convergent and discriminant validity (Hair et al., 2019)..

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3.4 Data collection procedure

The questionnaires were administered by the researchers. The questionnaire had an introductory section that gave respondents' the instructions on how to fill in the questionnaire. The respondents received assurance that the information they provided would exclusively be used for research purposes. To ensure a high questionnaire return rates, they were administered during tea breaks and lunch breaks when majority of the trainers were in the staff room. A total of 245 questionnaires were dully filled and returned.

3.5 Ethical considerations

The study observed ethical considerations for conducting research in Kenya. The researchers sought ethical clearance from the research ethics committee of Moi University, and also obtained national research permit to conduct research in Kenya from the National Commission of Science, Technology and Innovation (NACOSTI). The researchers, then sought necessary permission from the institutions administrators to allow access to the study sites. Privacy, confidentiality, and anonymity in data collection were ensured throughout the study. Participants were required not to indicate any personal identifying information or the name of institution on the questionnaires. Participants were not coerced into filling the questionnaires and participation in the study was entirely voluntary.

3.5 Data analysis procedure and model specification

Data from the collected 245 questionnaires was analyzed using descriptive statistics, correlation coefficients and simple linear regression and inferential statistics with the help of IBM Statistical Package for Social Sciences (SPSS) version 27. Data cleaning was done at the prescreening stage to improve the quality of the results.

In order to determine the influence of trainers' competencies on CBET implementation in public TVET institutions in Meru county, Kenya, the aggregate mean scores of the independent variable; trainers' competencies (Tcomp) was regressed on the aggregate mean scores of the dependent variable; CBET implementation (CBET Imp) in the following Model:

$$\text{CBET Imp} = \beta_0 + \beta_1 \text{TComp} + \varepsilon \dots \dots \dots (H_{01})$$

Where;

TComp= Trainers' Competencies (Independent Variable)

CBET Imp= CBET Implementation (Dependent Variable)

β_0 = Y-intercept (Constant)

β_1 = Coefficient (Effect size)

ε = Error term

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4.0 Results

4.1 CBET Implementation

Descriptive statistics for the 13 items on CBET implementation was obtained using frequencies, percentages, means and standard deviations and presented using a frequency distribution table. Participants were asked to indicate how often they did what is expected for CBET implementation during training and assessment of trainees. The results are shown in Table 1.

Table 1: Descriptive Statistics on CBET Implementation

Item Code	Tested Item	Never	Rarely	Sometimes	Often	Always	Mean	SD
CIMP1	Ensuring trainees have the right Protective PPEs	1 (0.4%)	10 (4.1%)	25 (10.2%)	70 (28.6%)	139 (56.7%)	4.371	0.857
CIMP2	Providing program learning guides as provided in the OS	1 (0.4%)	5 (2%)	53 (21.6%)	64 (26.1%)	122 (49.8%)	4.229	0.885
CIMP3	Providing resources for specific modules	0 (0%)	5 (2.0%)	18 (7.3%)	85 (34.7%)	137 (55.9%)	4.444	0.720
CIMP4	Ensuring that trainees follow learning guide instructions	0 (%)	5 (2.0%)	9 (3.7%)	69 (28.2%)	162 (66.1%)	4.583	0.664
CIMP5	Ensuring trainees carry out a self-check	1 (0.4%)	8 (3.3%)	42 (17.1%)	98 (40.0%)	96 (39.2%)	4.143	0.844
CIMP6	Utilizing tasks when demonstrating to trainees	0 (0%)	2 (0.8%)	19 (7.8%)	88 (35.9%)	136 (55.5%)	4.461	0.674
CIMP7	Maintaining a conducive and safe working environment	1 (0.4%)	6 (2.4%)	7 (2.9%)	84 (34.3%)	147 (60.0%)	4.510	0.711
CIMP8	Guiding trainees in achieving the requisite competencies	0 (0%)	2 (0.8%)	16 (6.5%)	64 (26.1)	163 (66.5%)	4.584	0.651
CIMP9	Conducting assessment tests using the CBET approach	3 (1.2%)	11 (4.5%)	29 (11.8%)	70 (28.6%)	132 (53.9%)	4.294	0.930
CIMP10	Providing assessment tests to trainees	0 (0%)	12 (4.9%)	20 (8.2%)	78 (31.8%)	135 (55.1%)	4.371	0.833
CIMP11	Referring back trainees who do not meet standards	6 (2.4%)	8 (3.3%)	40 (16.3%)	79 (32.2%)	112 (45.7%)	4.155	0.975
CIMP12	Assessing trainees at the institution and & the industry	6 (2.4%)	12 (4.9%)	32 (13.1%)	59 (24.1%)	136 (55.5%)	4.253	1.021
CIMP13	Preparing and maintaining trainees' progress records.	1 (0.4%)	0 (0%)	13 (5.3%)	60 (24.5%)	171 (69.8%)	4.633	0.624
	Valid N=245							
	Grand Mean						4.387	0.799

Source: Field data (2023)

Results in Table 1 shows CBET implementation items had a high grand mean (4.387) and a low overall standard deviation (0.799). The high grand mean and low variance is an indication of strong positive response on the CBET implementation items. Item CIMP12 “Assessing trainees at the institution and & the industry” had the highest standard deviation. This is indication that the respondents had varied opinions on how often they conducted internal and external assessment of

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trainees at the institution and industry levels respectively. For instance, 136 (55.5%) always assessed trainees at the institution and the industry levels, 59 (24.1%) often assessed trainees at the two levels, 32(13.1%) sometimes assessed trainees, 12 (4.9%) rarely and 6 (2.4%) never assessed trainees at the institution and the industry levels (Mean=4.253, SD=1.021).

However, majority 171 (69.8%) always *prepared and maintained trainees' progress records* (CIMP13, Mean=4.633, SD=0.624). Moreover, 163 (66.5%) of the respondents always "*ensured that trainees follow the learning guide instructions as outlined in the Occupation Standards (OS)*" (CIMP8, Mean=4.584, SD=0.651). This implies that trainers in the TVET institutions are implementing the CBET approach to a large extent in their classrooms. These results are in tandem with a study on trainees perception on CBET implementation which showed that trainers had a good understanding of the concept and objectives of CBET Curriculum (Mwagunga et al., 2020).

4.2 Trainers' competencies

To obtain responses on trainers' competencies, participants were asked to indicate their level of agreement with competencies needed for CBET Implementation. The Results in Table 2 shows that Trainers' competencies items had a high grand mean (4.284) and a low overall standard deviation (0.902). The high grand mean and low variance is an indication of strong positive response on the trainers' competencies items. Item TCMP10 "*I can apply my content knowledge in teaching my trainees*" had the highest mean (4.65) and low standard deviation (0.51). This suggests that a majority of the respondents expressed confidence in utilizing their content knowledge to teach students in their classrooms. Furthermore, 153(62.4%) strongly agreed that they had *mastered the content knowledge in their trade areas* (TCMP9, mean=4.592, SD=0.555) and 153(62.4%) strongly agreed that they *communicated effectively in class when teaching their trainees* (TCMP4, Mean=4.567, SD=0.607).

On contrary, item TCMP1 "*I have attended CBET capacity- building workshop/ seminar*" had the lowest mean 3.24 and the highest standard deviation 2.52. The large standard deviation is indication that participants had varied opinions with item TCMP1 compared to other items. For instance, 89(36.7%) strongly agreed that they had attended CBET capacity building workshop, 80(32.7%) agreed that they had attended CBET Capacity Building workshop, 33(13.5%) remained neutral, 25(10.2%) disagreed while 17(6.9%) strongly disagreed that they had never attended CBET capacity building workshop (Mean=3.242, SD=2.525). These findings agrees with Kipngetich et al., (2022), who highlighted that whereas majority of the trainers understood the concept of CBET and most of the TVET colleges were much ahead of the CDACC in terms of training, the body had lagged behind in terms of capacity building.

Table 2: Descriptive statistics of Trainers' Competencies

Item Code	Tested Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	SD
TCMP1	I have attended CBET capacity-building workshop	17 (6.9%)	25 (10.2%)	33 (13.5%)	80 (32.7%)	89 (36.7%)	3.242	2.525
TCMP2	The workshop equipped me with	10	22	35	84	94	3.435	2.094

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	CBET skills	(4.1%)	(9.0%)	(14.3%)	(34.3%)	(38.4%)		
TCMP3	I am familiar with CBET Implementation strategies	6 (2.4%)	8 (3.3%)	59 (24.1%)	89 (36.3%)	83 (33.9%)	3.959	0.966
TCMP4	I communicate effectively in class while teaching	0 (0%)	1 (0.4%)	12 (4.9%)	79 (32.2%)	153 (62.4%)	4.567	0.607
TCMP5	I can recognize trainees' personalities in my class	1 (0.4%)	2 (0.8%)	20 (8.2%)	116 (47.3%)	106 (43.3%)	4.322	0.694
TCMP6	I can prepare CBET assessment tools	3 (1.2%)	4 (1.6%)	19 (7.8%)	96 (39.2%)	123 (50.2%)	4.355	0.795
TCMP7	I can conduct internal assessments and evaluate my trainees	1 (0.4%)	1 (0.4%)	15 (6.1%)	91 (37.1%)	137 (55.9%)	4.478	0.669
TCMP8	I assess trainees during the industrial attachment period	1 (0.4%)	2 (0.8%)	11 (4.5%)	85 (34.7%)	146 (59.6%)	4.522	0.663
TCMP9	I have mastered the content knowledge in my trade area	0 (0%)	0 (0%)	8 (3.3%)	84 (34.3%)	153 (62.4%)	4.592	0.555
TCMP10	I can apply my content knowledge in teaching my trainees	0 (0%)	0 (0%)	4 (1.6%)	78 (31.8%)	163 (66.5%)	4.649	0.511
TCMP11	I can carry out self-development in a sustainable manner	0 (0%)	1 (0.4%)	18 (7.3%)	103 (42.0%)	123 (50.2%)	4.420	0.646
TCMP12	I work productively with other colleagues in my department	0 (0%)	0 (0%)	14 (5.7%)	93 (38.0%)	138 (56.2%)	4.506	0.605
TCMP13	I always reflect on my own practice in the classroom	0 (0%)	0 (0%)	16 (6.5%)	94 (38.4%)	135 (55.1%)	4.486	0.618
TCMP14	I strive to ensure that the trainees meet CBET requirements	1 (0.4%)	1 (0.4%)	18 (7.3%)	93 (38.0%)	132 (53.9%)	4.444	0.685
	Valid N=245							
	Grand Mean						4.284	0.902

Source: Field Data (2023)

4.3 Data reduction using factor analysis

The items in the two variables in the study were explored for data reduction using Exploratory Factor Analysis (EFA). Hair et al. (2019) suggested that prior to conducting factor analysis in any dataset, the variable items should be inter-correlated and the sample size should be adequate. This was explored using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and the Bartlett's Test of Sphericity. The results are shown in Table 3.

Table 3: KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.838
Bartlett's Test of Sphericity	Approx. Chi-Square	3429.29
	df	741
	Sig.	.000

Source: Field Data (2023)

Results in Table 3 shows that the KMO value was above the recommended threshold of 0.8, implying that the sample size was adequate for factor analysis to proceed. Moreover, the Bartlett's

Test was significant ($p < 0.05$), implying that the study variables are inter-related and suitable for factor analysis (Hair et al., 2019).

The twenty seven (27) questionnaire items, were subjected to Maximum Likelihood Extraction and twelve (12) items were deleted (****) at a factor loading cut off of 0.5 that is considered practically significant (Hair et al., 2019). The factor loading scores ranged from 0.546 to 0.782, indicating a good correlation between the items and the factor they belong to. There were no cross-loading observed, therefore the factor solution was further rotated using Promax approach and as a result three (3) factors were extracted.

Results in Table 4 shows that the extracted three factors had Eigen Values above 1. The first factor was labeled CBET implementation which formed the dependent variable in the study, while the second and the third were labeled pedagogy and mastery of content respectively. Although the second and third factors are distinct, they demonstrated a meaningful relationship since they represent the same construct. Therefore, they were combined into a single composite measure labelled Trainers' Competencies that formed the independent variable in the study (Rosenblad, 2015). Furthermore, Cronbach's alpha of above 0.7 in each factor is an indication of internal consistency.

Table 4: Exploratory Factor Analysis Rotated Component Matrix for Study Variables

Item Code	Components	1	2	3	Eigen Values	Cronbach's α
FACTOR 1: CBET Implementation					2.770	0.751
CIMP7	Maintaining a safe working environment	0.782				
CIMP6	Competently demonstrating to trainees	0.648				
CIMP5	Ensuring trainees carry out a self-check	0.615				
CIMP8	Guiding trainees in achieving competencies	0.584				
CIMP4	Ensuring trainees follow guides' instructions	0.576				
FACTOR 2: Pedagogy					2.198	0.800
TCMP6	Preparing CBET assessment tools		0.684			
TCMP7	Conducting CBET internal assessments		0.667			
TCMP8	Conducting industrial assessments		0.658			
TCMP4	Communicating effectively		0.560			
TCMP5	Recognizing trainees' personalities		0.549			
FACTOR 3: Mastery of Content					1.859	0.728
TCMP9	Mastering content knowledge			0.718		
TCMP14	Meeting CBET requirements			0.638		
TCMP11	Carrying out self-development			0.609		
TCMP12	Working with other colleagues			0.546		

Source: Field data (2023)

4.4 Test for normality

The data set was tested for the underlying statistical assumption of normal probability distribution before carrying out regression analysis and testing the hypotheses of the study. The skewness and kurtosis coefficients in Table 5 indicated the variable scores showed a moderate negatively skewed distribution (Mertler & Reinhart, 2017).

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Table 5: Skewness and Kurtosis Coefficients of the Original Study Variables

N=245				
Variable	Skewness		Kurtosis	
	Statistic	Std. Error	Statistic	Std. Error
CBET Implementation	-1.207	0.156	1.872	0.31
Trainers' Competencies	-0.959	0.156	0.612	0.31

Source: Field Data (2023)

Eighteen (18) outliers in the data set were identified using the standardized z-score limit values of -2 to +2 and were excluded from further analysis (Mishra et al., 2019). The dataset was transformed to normality using a two-step transformation by modifying the scores using the fractional rank method and *Idf.Normal (fractional rank, mean, Standard. deviation)* (Templeton, 2011). Results in Table 6 shows that skewness coefficients of the transformed variables were close to zero for the study variables indicating that the variable scores showed approximately zero skewness in the distribution (Mertler & Reinhart, 2017). This implies that by extension the data fits well and the normality assumption was met.

Table 6: Skewness and Kurtosis Coefficients of the Transformed Variables

N=227								
Transformed Variables	Min	Max	Mean	Std. Deviation	Skewness		Kurtosis	
					Statistic	Std. Error	Statistic	Std. Error
CBET Implementation	3.25	5.14	4.428	0.44697	0.0218	0.162	0.437	0.322
Trainers' Competencies	3.68	5.02	4.493	0.32626	0.0104	0.162	0.784	0.322

Source: Field Data (2023)

4.5 Correlation Analysis

Correlation analysis was done to determine the relationship between study variables using Pearson product moment correlation coefficient. Correlation results showed a positive and significant association between Trainers' Competencies and CBET implementation ($r = 0.401$, $p < 0.01$). therefore, the linearity assumption was met and it was safe to run regression analysis.

Table 7: Correlation Matrix (N=227)

	CBET Implementation	Trainers' Competencies
CBET Implementation	1	0.401**
Trainers' Competencies	.401**	1

** Correlation is significant at the 0.01 level (2-tailed).

Source: Field Data (2023)

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4.6 Influence of trainers’ competencies on CBET implementation

H_{01} = Trainers’ Competencies does not have a statistically significant influence on CBET Implementation in public TVET institutions in Meru County, Kenya.

A simple linear regression was performed at 95% confidence level to assess the predictive ability of Trainers’ Competencies on CBET Implementation. The model summary results in Table 8 indicated significant positive relationship between Trainers’ Competencies and CBET Implementation ($r = 0.401$, $p < .005$). The coefficient of determination ($R^2 = 0.161$) indicated that the linear relationship between Trainers’ Competencies and CBET Implementation account for approximately 16.1 % of the total variation in CBET Implementation.

Table 8 Model Summary for Simple Linear Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Sig.
1	.401 ^a	0.161	0.157	0.41042	.000

a Predictors: (Constant), Trainers’ Competencies
b Dependent Variable: CBET Implementation

Source: Field Data (2023)

To test the hypothesis that there is no statistically significant influence of Trainers’ Competencies on CBET Implementation, a test of significance of the regression model in predicting the dependent variable was done and ANOVA output was examined and results shown in table 9.

Table 9: Significance Level of Simple Linear Regression Analysis

ANOVA ^b						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.252	1	7.252	43.05	.000 ^b
	Residual	37.900	225	0.168	2	
	Total	45.151	226			

a Dependent Variable: CBET Implementation
b Predictors: (Constant), Gender, Trainers’ Competencies

Source: Field Data (2023)

The results in table 9 indicated that the regression model was significant in predicting the dependent variable at $F(1, 226) = 43.052$, $p < 0.05$. This, therefore indicated that Trainers’ Competencies predicted CBET Implementation hence we reject the null hypothesis (H_{01}) and conclude that Trainers’ Competencies have a significant positive influence on CBET Implementation.

To determine the contribution of independent variable on the overall model, the regression coefficient output was examined and results shown in Table 10

Table 10: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta (β)	t	Sig.
1	(Constant)	1.961	0.377		5.203	.000
	Trainers' Competencies	0.549	0.084	0.401	6.561	.000

a Dependent Variable: CBET Implementation

Source: Field Data (2023)

The standardized regression coefficient (β) results in Table 10 indicated that Trainers' Competencies had a significant positive effect on CBET implementation ($\beta=.401$, $p<0.05$). The positive effect size ($\beta=0.401$) was moderate, suggesting that trainers' competencies have a significant impact on CBET Implementation. In other words, for every one standard deviation increase in trainers' competencies, there is a predicted 0.401 standard deviations increase in CBET implementation. This means that if a trainer's competencies increase by one standard deviation, the likelihood of them implementing CBET effectively increases by 40.1%.

The optimal model was;

$$\text{CBET Imp} = 1.961 + 0.549\text{TComp}$$

Where;

TComp= Trainers' Competencies (Independent Variable)

CBET Imp= CBET Implementation (Dependent Variable)

1.961= Y-intercept (Constant)

0.549= Coefficient (Effect size)

4.7 Discussion of the results

In light of these findings it is evident that, trainers' competencies have a positive relationship with CBET implementation. The relationship is statistically significant, meaning it is not due to chance. Moreover, trainers' competencies have a positive predictive power on CBET implementation. These competencies include the pedagogical and mastery of content in the area of specialization. Hence, by increasing trainers' competencies through training and development, the trainers can better understand and apply CBET principles, which will lead to more effective learning outcomes. These results concur with Istiqomah et al. (2019), who indicated that vocational high school teacher competencies directly affects the students' learning outcomes.

Similarly, Nduku et al. (2019) found that trainers' background in CBET Implementation, positively and significantly enhanced acquisition of employable skills. Finally, the study's findings also agreed with Langat et al. (2021), suggesting that there is a significant correlation between Trainers' Competencies and Training Efficacy. Trainers' Competencies play a vital role in effectively delivering quality CBET. Trainers with a strong mastery of content in the area of specialization, and pedagogical knowledge are better positioned to deliver quality CBET. Kipngetch et al.

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(2022) suggested that, trainers who continually enhance their competencies through professional development activities such as capacity building workshops are better equipped to design and deliver CBET that meet trainees' needs and aligned with industry demands.

Moreover, a positive significant effect of trainers' competencies on CBET implementation highlights the importance of continuous professional development for trainers. This means that providing trainers with opportunities for collaboration and knowledge sharing, investing in trainers' skills development, and keeping them with abreast industry advancements can lead to a continuous improvement in CBET implementation. Lastly, trainers with strong competencies can develop robust assessment tools, provide constructive feedback to trainees, and ensure the validity and reliability of competency-based assessments.

This implies that trainers with high competencies are more likely to deliver quality CBET training, hence improved trainee outcomes and increased effectiveness in CBET implementation. This is because their expertise enables them to identify individual trainees' learning needs, employ appropriate instructional strategies and use competency-based assessment methods to evaluate if trainees have acquired the requisite competencies underlined in the occupational standards. Therefore, focusing on developing and nurturing trainers' competencies implies better training delivery, improved trainee outcomes, increased program effectiveness, and enhanced quality assurance in CBET and a continuous improvement in CBET implementation.

5.0 Conclusion and recommendations

Trainers' Competencies play a vital role in effectively delivering quality CBET. Trainers with a strong mastery of content in the area of specialization, and pedagogical knowledge are better positioned to deliver quality CBET. Therefore, developing and nurturing trainers' competencies, can enhance the quality delivery and effectiveness of CBET courses, resulting into better prepared trainees who possess the requisite competencies for success in the world of work and beyond. The study recommends the following to enhance effective implementation of quality CBET in the Kenyan TVET institutions. We recommend that TVET Curriculum Development and Assessment and Certification Council (TVET CDACC) should prioritize a well-structured and focused continuous professional development program for trainers on CBET implementation. This can be achieved through capacity-building workshops and conferences, or focused in-service training programs. The government should also support TVET trainers by providing opportunities for them to develop and nurture their competencies, such as through industrial partnerships and scholarships, to enhance quality CBET delivery.

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Acknowledgement

The Authors appreciate the German Academic Exchange Service (DAAD) and East and South African-German Centre of Educational Methodologies and Management (CERM-SA) for the financial support that facilitated this study. We also acknowledge all trainers that participated in this study and all institutional administrators that allowed access to the study sites.

Conflict of Interest

The authors have no conflict of interest to declare.

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