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Article

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International Journal for Research in Vocational Education and Training (IJRVET)

Provided in Cooperation with:

European Research Network in Vocational Education and Training (VETNET), European Educational Research Association

Suggested Citation: Njenga, Moses (2023) : How do vocational teachers learn? Formal and informal learning by vocational teachers in Kenya, International Journal for Research in Vocational Education and Training (IJRVET), ISSN 2197-8646, European Research Network in Vocational Education and Training (VETNET), European Educational Research Association, Bremen, Vol. 10, Iss. 1, pp. 24-45,
<https://doi.org/10.13152/IJRVET.10.1.2>

This Version is available at:

<https://hdl.handle.net/10419/271292>

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How do Vocational Teachers Learn? Formal and Informal Learning by Vocational Teachers in Kenya

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Received: 28 November 2022, Accepted: 03 February 2023

Abstract

Context: Participation in Continuing Professional Development (CPD) supports the development of vocational teacher competencies. However, it is often not clear what learning methods vocational teachers use in their CPD. This study therefore investigated the CPD practices of vocational teachers in Kenya, with a specific focus on the formal and informal learning methods used.

Approach: The study used a questionnaire survey to collect data from TVET teachers randomly drawn from six Technical and Vocational Colleges in Kenya's Nairobi Metropolitan Area. Descriptive and inferential analysis of the data was used to determine how frequently different learning methods are used and to identify associations between CPD practices and teacher characteristics.

Findings: TVET teachers in Kenya were found to use different learning methods depending on the availability of the learning methods and the learning goals teachers have. Formal academic learning and discussions with colleagues are frequently used while collaborative learning methods and practice-based learning activities are less frequently used. Rarely used are written reflections about practice and its outcomes. Despite viewing Lecturer Industrial Attachment (LIA) as important and therefore wishing to attend LIA, more than a third of the participants indicated that they had never attended LIA. The use of professional literature

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is restricted to text books with limited use of primary and secondary literature. CPD activities such as mentoring, supervising other teachers, and school visits were found to form a unique category of CPD activities that is more frequently used by teachers with administrative responsibilities.

Conclusion: The limited use of active learning methods that involve critical evaluation of practices and their outcomes risks limiting the ability of vocational teachers in Kenya to transform and adopt better practices. It is recommended that vocational teachers in Kenya are encouraged to adopt a broad conception of teacher CPD that embraces collaborative, reflective, and practice-based learning.

Keywords: Teachers, Continuing Professional Development, Formal and Informal Learning, TVET, VET, Vocational Education and Training, Kenya

1 Introduction

Improving the professional competencies of vocational teachers is essential for ensuring the quality of vocational education. The United Nations Educational, Scientific and Cultural Organization (UNESCO) uses the term Technical and Vocational Education and Training (TVET) and has defined TVET as a broad set of educational processes which enable the development of technical competencies related to occupations in various sectors of the economy and social life in addition to supporting the acquisition of general knowledge, skills and attitudes (UNESCO, 2001). This broad scope of TVET highlights the need for TVET teachers to possess a broad range of competencies and in light of rapid scientific and technological changes, TVET teachers must continually update their knowledge, skills and competencies. Accordingly, the Continuing Professional Development (CPD) of TVET teachers is critical in the provision of quality vocational education and training (Cedefop, 2016; Gamble, 2013; Wheelahan, 2010).

Richter et al. (2011) defined teacher CPD as the ongoing formal and informal learning activities that deepen and extend teachers' professional competencies. The learning enables TVET teachers to offer relevant and up to date content and to deal with the challenges of vocational teaching (Anselmann et al., 2022; Dymock & Tyler, 2018; Hoekstra et al., 2018). TVET teacher CPD is thus essential to ensuring quality of vocational education and training (Gamble, 2013; Misra, 2011; Winch, 2013).

Despite its importance, effective TVET teacher CPD remains unavailable to many teachers across the world (Axmann et al., 2015; Rawkins, 2018) and especially in Sub-Saharan Africa (Grijpstra & Papier, 2015). Kenya is one such country in Sub-Saharan Africa where a key concern over the years has been that TVET teachers in the country have been unable to improve their professional competencies (Akala & Changilwa, 2018; Sifuna, 2020). Moreover,

there exists no formal policy on the Continuing Professional Development of teachers. In the absence of policies and professional guidelines, teacher CPD in Kenya remains under resourced and poorly targeted (Lowe & Prout, 2018). Within this context and given the limited research into the CPD practices of TVET teachers in Kenya, it remains unclear how TVET teachers in Kenya improve their professional competencies, and in particular, the formal and informal CPD practices they use. To address the existing research gap into the CPD practices of teachers in Kenya and to potentially identify appropriate measures to support TVET teacher CPD in Kenya, this study sought to investigate and profile the CPD practices of TVET teachers in Kenya with a specific focus on the formal and informal learning methods used.

To guide the study, a narrative review of literature focusing on the learning methods vocational teachers use and the factors that influence participation in teacher CPD was carried out. These are described below followed by a description of the context of the study, its design and findings.

1.1 TVET Teacher CPD

Researchers have in the past sought to identify the different learning methods vocational teachers use and the frequency of using such methods. In their systematic review of literature on the professional learning of vocational teachers, Zhou et al. (2022) identified four categories of learning methods that vocational teachers have been observed to use. These are: (a) Pre-defined professional development programs which are purposefully designed and therefore formal in character such as formal education and academic workshops, (b) self-directed learning activities which involve learning by doing, reflection and active exploration of new ideas and approaches in the workplace, (c) collaborative learning activities in the school which involve the active exchange of ideas and practical information through activities such as peer collaboration or informal discussions, and (d) industry-based learning activities whereby vocational teachers visit industries and other work places for the purposes of learning. Similar learning methods were identified in studies focusing on the CPD practices of TVET teachers in Sweden (Andersson & Köpsén, 2015, 2018), China (Zhou et al., 2021) and Britain (Broad, 2016).

While vocational teachers in different countries use similar learning methods, variations have been observed in how frequently vocational teachers in different countries use the learning methods available to them. For example, in a study focusing on Swedish vocational teachers and using a questionnaire survey on vocational teacher participation in different CPD activities, Andersson & Köpsén (2018) found that reading professional literature was the most common learning method followed by study visits and students' placement respectively. Focusing on vocational teachers in England, Broad (2016) used a questionnaire survey supplemented by interviews to identify how frequently vocational teachers in Britain use

different learning methods. Reading journals and books together with accessing materials and resources online were the most commonly used methods, while industrial placement was among the least commonly used. Focusing on vocational teachers in different countries and using a combination of desk work, interviews and surveys, Stanley (2021) observed wide variations in how frequently vocational teachers in different countries used the learning methods available to them.

With respect to factors influencing what learning methods teachers use in their CPD, a range of factors have been identified. In particular, the choice of learning method has been linked to teachers' career stages, available learning methods, and organisational practices such as the recognized learning methods (Njenga, 2022). For example Barrera-Pedemonte's (2016) review of literature found that across different countries, access and participation to different forms of professional development varies with teachers' characteristics such as age, and completion of pre-service training. For example, in a study focusing on German secondary school teachers, Richter et al. (2011) found that the use of formal and informal learning practices differed along career stages with formal in-service training being used most frequently by mid-career stage teachers. Other studies have shown variations in participation rates due to educational attainment, age, occupational area, and prior CPD experiences (Appova & Arbaugh, 2018; de Vries et al., 2013; Njenga, 2022). In Serbia, Maksimovic (2016) found that young vocational teachers participate in fewer CPD activities and report fewer hours of CPD compared to their older and more experienced teachers. In similar studies focusing on VET teachers in Turkey (Durgun, 2016) and Sweden (Andersson & Köpsén, 2015), regional disparities in participation rates were observed. Other studies have linked CPD practices to contextual factors such as the type of school and policies guiding the professional development of teachers. Other factors include clear opportunities to participate in CPD, availability of resources and incentives for participation (Andersson & Köpsén, 2015; Appova & Arbaugh, 2018; Boylan et al., 2018; Desimone et al., 2007; Organization for Economic Co-operation and Development [OECD], 2014; Sancar et al., 2021; Stanley, 2021).

The reviewed literature shows that TVET teacher CPD consists of all learning that TVET teachers engage in with the aim of improving their professional competencies. The literature also shows that TVET teachers use multiple learning methods and that the learning methods used do not differ radically from the learning methods used by general education teachers. However, due to the dual character of vocational teaching, TVET teachers make use of additional methods such as work or industry placement for vocational teachers (also referred to as Lecturer Industrial Attachment) whereby teachers visit work places or industrial firms for extended periods of time to maintain and improve their knowledge and skills related to emerging technologies and modern work process (Andersson & Köpsén, 2018; Broad, 2016; Kaske et al., 2022; Zhou et al., 2022).

The reviewed literature also shows that participation in teacher CPD and the use of different learning methods is influenced by both personal and contextual factors. Personal factors relate to teacher characteristics such as age, career stage, and prior educational qualifications. Contextual factors relate to the institutional and organizational conditions within which teachers work. These include regulations on teacher CPD, available opportunities for CPD, and the support and resources available to teachers from their employers or government (Appova & Arbaugh, 2018; Boylan et al., 2018; Desimone et al., 2007; OECD, 2014; Sancar et al., 2021; Stanley, 2021).

To explain the use of different learning methods, the study adopted the view that teachers are adult learners and their professional development is adult education (Appova & Arbaugh, 2018; Beavers, 2009; Lawler, 2003). As Lawler notes, such a view allows the incorporation of ideas from the field of adult learning into teachers' professional development. The study therefore borrowed from literature on adult learning and in particular, the view that adults are self-directed learners, i.e., adults tend to be able to diagnose their learning needs, identify appropriate learning approaches and evaluate their learning outcomes (Brookfield, 2009; Gordon & Ross-Gordon, 2018; Henschke, 2009; Merriam & Bierema, 2014). In addition, to take into account the role of context, the study adopted Njenga's (2022) conceptualization of teachers' CPD as context-bound and goal-oriented adult education, characterized by multiple aims, diverse content, and a broad range of learning methods.

Accordingly, vocational teachers were viewed as adult learners who are self-directed in their learning and who therefore choose learning approaches that best suit their learning needs within their working contexts. This implies that teachers are strategic and selective in their choice of learning methods. Thus, rather than passively use whatever learning methods are available to them, teachers selectively choose and use specific learning methods from those available to them depending on their underlying learning goals and the dictates of the institutional context (Njenga, 2022). For example, Stanley (2021) found that in cases where vocational teachers pursue goals such as licensing or career progress, the learning methods vocational teachers choose align with the conditions for licensing and incentives set for career progress. Moreover, vocational teachers could only use the learning methods that they could access. Accordingly, it can be concluded that the learning methods that vocational teachers use and the frequency of using such methods depends on the learning methods that are available to vocational teachers in a particular context and how well the available learning methods support vocational teachers to meet their learning needs and goals.

1.2 Context of the Study

As a developing country with a large youth demographic, Kenya views TVET as vital for her social and economic development. TVET is seen as critical for the development of the manufacturing and services sectors of the economy and in solving the problem of youth

unemployment. Both formal and informal systems of vocational education exist in Kenya. Within the formal system of vocational education, public and private institutions offer training in engineering trades, agricultural studies, and business studies, among others (Ministry of Education Sector Working Group, 2019; Sifuna, 2020; Technical and Vocational Education and Training Authority [TVETA], 2020).

Formal TVET training leads to different qualifications depending on the entry characteristics of students and training institutions may be classified based on the characteristics of students and the qualifications students obtain. Vocational Training Centres or Youth Polytechnics offer training to students with primary level education (i.e., International Standard Classification of Education (ISCED) level 2) and study programs lead to the award of artisan certificates. Technical and Vocational Colleges (TVCs), often referred to as Technical Training Institutes, offer training to students with secondary level education. As non-university training institutions, TVCs offer craft certificate programs that run for two years (ISCED level 3) and diploma certificate programs that run for three years (ISCED level 4). National Polytechnics offer training leading to the award of diploma certificates or the Higher National Diploma (ISCED level 5) (UNESCO Institute of Statistics, 2022). This study focused on vocational teachers in public Technical and Vocational Colleges (TVCs) who teach craft and diploma level students.

1.3 Vocational Teachers in Kenya

Vocational teachers working in public TVCs, often referred to as TVET teachers, are responsible for providing theoretical and practical instruction in their trade areas. Ideally, all TVET teachers in Kenya should have received some form of teacher training in addition to formal training in their trade areas before being employed as teachers. This is usually a minimum of diploma or craft certificate in their trade area (International Centre for Technical and Vocational Education and Training [UNESCO-UNEVOC], 2018).

Vocational teachers may receive pedagogical training at the Kenya Technical Teachers Colleges (KTTC), leading to the award of a non-university diploma in teacher education. Vocational teachers may also receive training in a university and obtain a Bachelor of Education degree. However, there is no requirement for prior work experience to be admitted for teacher training or to be employed as a vocational teacher (Ronoh et al., 2013). Moreover, not all teachers have received pedagogical training while others lack the requisite educational qualifications. For example Kariuki (2013) found that one third of the teachers at two of the country's largest Technical Training Institutes had only diploma qualifications yet they were responsible for teaching diploma level students.

TVET teacher training in Kenya has been criticised for failing to provide adequate training in the practical skills that TVET teachers are later expected to teach (Sifuna, 2020).

TVET teachers are also largely responsible for their in-service training, although the government in conjunction with donor agencies may provide short in-service training programs (UNESCO-UNEVOC, 2018).

These conditions highlight the need for TVET teacher CPD in Kenya as well as research insights that can be used to improve TVET teacher CPD in Kenya. However, it remains unclear what learning methods TVET teachers in Kenya use in their CPD and the frequency of using the different learning methods available to them. It is also unclear what factors influence their choice of learning method and how teacher characteristics influence their choice of learning method.

2 Methods and Research Questions

This study therefore sought to investigate and profile TVET teacher CPD practices in Kenya with a focus on the formal and informal learning methods used. Further the study sought to investigate how TVET teacher characteristics influence the choice of learning methods used. To guide the study, the following two research questions were posed:

- a. What formal and informal learning methods characterize TVET teacher CPD in Kenya?
- b. How do TVET teacher characteristics influence the choice of learning method?

To attain the aim of the study and answer the research questions, it was necessary to collect empirical data on the learning methods used by a broad cross section of TVET teachers in Kenya and relate that data to the characteristics of the teachers providing the data. A survey questionnaire approach to data collection was therefore adopted for the study. This was in line with the approach used by similar studies in the past, e.g. Andersson & Köpsén (2018).

The review of literature showed that the CPD development practices of vocational teachers largely mirror those of general education teachers. Accordingly, rather than duplicate past efforts and develop an entirely new instrument that is similar to existing instruments, the questionnaire items were adopted from those used in the Teaching and Learning International Survey (TALIS) to explore the CPD practices of teachers (OECD, 2014, 2018). Moreover, this was in line with past studies that adopted the TALIS items to examine and compare the CPD practices of vocational teachers in nine countries in Western Balkans and Turkey (Stanley, 2021).

The questionnaire asked participants to indicate how frequently they used various learning methods in the past one year, and to provide basic information about themselves such as age, gender, educational qualifications, and career stage. However, the items were adapted to better fit the Kenyan TVET context. Thus, items specific to TVET, such as those focusing on participation in Lecturer Industrial Attachment, were added. The questionnaire was then

piloted in three Technical and Vocational Colleges and based on the response patterns, the final questionnaire was developed. For example, items with very low response rates were deemed unsuitable for the Kenyan context and were consequently removed.

For purposes of analysis, the CPD activities used in the questionnaire were categorized into two main categories i.e., formal and informal CPD activities. The informal category was further split into three sub-categories: Collaborative, self-paced, and practiced based. The four categories are described below.

- a. Formal CPD activities referred to structured and formally organized learning activities that are often facilitated by an expert. Examples include activities such as workshops and seminars, short and long courses offered by colleges and universities, and educational conferences.
- b. Collaborative CPD activities referred to CPD activities that rely on teamwork and peer-learning. Examples of collaborative CPD activities include co-teaching and lesson observation, mentoring and coaching other teachers, and participation in teacher clubs.
- c. Self-paced CPD activities referred to learning activities undertaken by and directed by the individual teacher and include studying professional literature, watching videos and online content relating to teaching content and teaching methods, and discussions with colleagues to solve practice challenges.
- d. Embedded and practice based CPD activities relate to work activities that are characterized by a high degree of learning and require teachers to step out of their normal routine and relook at content, practices and outcomes. These include participating in designing content and learning materials, curriculum development, and developing and marking national examinations. Other embedded activities include participating in research activities, writing reflections about practices and their outcomes, and participating in Lecturer Industrial Attachment (i.e., work placements for the vocational teachers in industries or other workplaces).

In line with the focus of the study, the study population were TVET teachers in Technical and Vocational Colleges (TVCs) in Kenya. Nairobi Metropolitan Area was chosen as the study location, owing to its size and representativeness. The area is Kenya's principal economic and cultural centre and consists of five of the 47 counties in Kenya's devolved system of governance (Mundia, 2017). The five counties are, Kiambu County, Kajiado County, Nairobi City County, Machakos County and Murang'a County.

In each county, there are between two and three TVCs and the sampling plan was to pick one TVCs from each county. However, due to access challenges following the Covid-19 pandemic, it was not possible to access any of the TVCs in Machakos County. Accordingly,

Machakos County was substituted with Nyeri County, a county neighbouring the metropolitan area, and one of the TVCs in Nyeri County was chosen by convenience. In the course of looking for a substitute for a TVC from Machakos County, a second TVC from Nairobi County accepted to participate in the study. In the end, six TVCs took part in the study, two from Nairobi County, and one from each of the other four counties.

At the institute level, participants were selected by simple random sampling. It was deemed acceptable to use simple random sampling because there was no reason to assume that teachers in the TVCs are not homogenous. Additionally, it was not possible to access data to develop a more sophisticated sampling plan.

After ethical permission was obtained from the Ethical Committee of the Faculty of Pedagogy and Psychology at Eötvös Loránd University, a research licence was obtained from Kenya's National Council for Science and Technology, after which data collection commenced. A pilot study was then conducted which helped refine the survey questionnaire. Data collection for the main study took place between January and February 2021 after the partial lifting of the Covid-19 restrictions in Kenya. Principals of the selected TVCs were approached to allow data collection in their respective TVCs, and with their help or assistance from a contact teacher, individual teachers were requested to fill in the questionnaires. The sample size set was 200 teachers, (i.e., 40 teachers from each of the five TVCs). The survey data was then analysed through descriptive and inferential analysis to determine the learning methods frequently used and associations between CPD practices and teacher characteristics.

3 Findings

In this section, the survey findings are presented. The section begins with a description of the participants followed with a description of CPD activities TVET teachers in Kenya were found to participate in.

3.1 Description of the Participants

From the issued questionnaires, 170 validly filled questionnaires were returned. By gender, 116 respondents were male and 54 were female, translating to 68% male and 32% female. The sample distribution by gender matched the national distribution of TVET teachers. In August 2020, the Directorate of Technical Education reported that of the 5,622 TVET teachers employed by the Public Service Commission, 65.36% were male while 34.61% were female (Ministry of Education-Directorate of Technical Education, 2020).

By age, 26.5% were below 30 years of age, a third (35.3%) were between 31 and 40 years of age, while 23.5% were between 41 and 50 years of age. The rest, 14.7%, were above 50 years of

age. With respect to educational qualifications, majority of the respondents had a Bachelor's degree (57.6%), while a quarter (24.7%) had a Master's degree, and 1.2% had a PhD degree. The rest, 16.5%, had a Diploma Certificate issued by a non-university tertiary educational institution.

By teaching area, teachers in science, technology, engineering, and mathematics (STEM) were the majority (72.4%), while those in business and social studies were 27.6 per cent. Two thirds of the respondents received pre-service teacher training before they were employed to work as teachers, 14% received teacher training after they started working as teachers, and a fifth have not received formal teacher training.

Majority of the respondents had a non-teaching responsibility (70.6%), which was either administrative (26.5%) or non-administrative (44.1%). Administrative responsibilities included being a principal, deputy principal, or head of an academic department, while non-administrative responsibilities included responsibility for student guidance and counselling and sports.

With respect to career stages, three career stages were defined; Early Career stage for teachers who had worked for less than five years, Middle Career stage for teachers who had worked for between six and twenty years, and Late Career stage for teachers who had worked for more than twenty years. The Early Career stage was further split into New Teachers, for teachers who had worked for less than two years, and Junior Teachers who had worked for between three and five years. The Middle Career stage category was the largest with 37% of the respondents followed by the Junior Teachers category with 23.5% of the respondents. The New Teachers and Late Career stage categories were roughly equal at 19.4 % and 20% respectively.

When the distribution of the participants across career stages was compared to their distribution across the non-teaching responsibilities held, a statistically significant association was found between career stage and having a non-teaching responsibility, $\chi^2(6) = 39.95$, $p < 0.001$. Late Career stage Teachers are more likely to have a non-teaching responsibility. On the other hand, New Teachers frequently do not have any responsibilities. The distribution of non-teaching responsibilities by career stages is shown in Table 1.

Table 1: Career Stages by Non-Teaching Roles

		Career Stages				Total
		New	Junior	Middle CS	Late CS	
Non-teaching roles	None	18	13	15	4	50
	Administrative	-	4	22	19	45
	Other	15	23	26	11	75
	Total	33	40	63	34	170

3.2 Participation in Formal and Informal CPD Activities

The study focused on the formal and informal CPD activities that TVET teachers in Kenya participate in. These were categorized into formal, collaborative, embedded and self-directed CPD activities. In this sub-section, the survey findings on how frequently teachers participate in these activities are presented together with analysis focused on how participation in the activities varies with the background characteristics of teachers.

3.2.1 Formal CPD Activities

Teachers reported a high prevalence of formal CPD activities. Other than for participation in educational conferences, more than three quarters of the survey participants indicated that they had participated at least once in a workshop or seminar, a short training course or a university course. Further, at least half of the participants indicated that they had participated twice or more in such formal CPD activities. However, teachers appear to lack opportunities for participating in educational conferences, with more than a third indicating that they had never attended an educational conference. Results are indicated in Table 2.

Table 2: Frequency of Participation in Formal CPD Activities

Organized and Formal CPD Activity	Never (%)	Once (%)	At least twice (%)
Workshops and Seminars	13.50	27.10	59.40
Short training courses	14.10	33.50	52.40
College and university courses	23.70	26.60	49.70
Online courses	26.50	24.10	49.40
Educational conferences	35.50	25.40	39.10

To assess the use of formal academic education as part of teachers' CPD, the educational qualifications of the participants at the start of their teaching careers were compared with their current educational qualifications. It was found that 34 per cent of the participants started teaching with only a Diploma Certificate and 64.7 per cent started teaching with a Bachelor's degree. At present only 16.5 per cent still have a Diploma Certificate while 57.6 per cent have a Bachelor's degree. On the other hand, while only 2 (i.e., 1.2%) of the respondents started teaching with a Master's degree, the proportion of teachers with a Master's degree has increased to 42 (i.e., 24.7 %). Further, two of the participants have acquired a PhD degree. There has thus been significant progression in academic qualifications, implying the use of formal academic CPD to improve educational qualifications. The cross tabulation of entry qualifications with present academic qualifications is shown in Table 3.

Table 3: Educational Qualifications at Entry Into Teaching by Current Educational Qualifications

		Highest level of education at present				Total
		Diploma	Bachelor	Masters	PhD	
Entry qualifications into teaching	Diploma	28	21	8	1	58
	Bachelor	-	77	32	1	110
	Masters	-	-	2	-	2
	Total	28	98	42	2	170

When participation in formal CPD activities was compared against different characteristics of teachers, a statistically significant association was observed between participating in conferences and having a non-teaching responsibility $\chi^2(12) = 20.81, p < 0.001$. Teachers with administrative responsibilities were found to participate more frequently in educational conferences compared to their colleagues without non-teaching responsibilities.

3.2.2 Collaborative CPD Activities

With respect to collaborative CPD practices, co-teaching and mentoring are the most popular collaborative CPD practices, i.e., three quarters of the participants indicated that they had participated in mentoring and coaching other teachers at least once. On the other hand, practices such as participating in teacher clubs, visiting other schools, and supervising other teachers, are relatively rare with more than half of the participants indicating that they had never participated in such activities. This could be due to the absence of such opportunities and the costs associated with participating in such activities. Table 4 summarizes the frequencies reported in the survey with respect to collaborative CPD activities.

When participation in collaborative CPD activities was compared against different teacher characteristics, teachers in their middle and late career stages were found to participate more frequently in mentoring and coaching activities compared to teachers in the early career stages $\chi^2(4) = 15.024, p = 0.005$. Middle and late career stage teachers were found to have participated more often in supervising other teachers than their early career stage teachers $\chi^2(4) = 33.835, p < 0.001$.

Table 4: Frequency of Participation in Collaborative CPD Activities

Collaborative CPD activity	Never (%)	Once (%)	At least twice (%)
Co-teaching (teaching the same lesson with another teacher)	28.80	25.90	45.30
Lesson observations (Lesson study with other teachers)	30.60	35.90	33.50
Mentoring and coaching of other teachers	25.30	25.30	49.40
Participation in teacher clubs	55.30	23.50	21.20
Visiting other institutes and schools to observe their teaching practices	52.90	26.50	20.60
Supervising other teachers	49.70	20.70	29.60

An association was also found between having being trained to work as a teacher and mentoring and coaching other teachers ($\chi^2(4) = 27.667, p < 0.001$), supervising other teachers ($\chi^2(4) = 14.183, p < 0.001$) and participating in educational conferences ($\chi^2(4) = 13.993, p < 0.001$). Teachers who have received teacher training, either before or after they started teaching, reported that they participated more frequently in these activities than those who are yet to receive teacher training. It is likely that teacher training sensitises teachers on the value of CPD and gives them confidence to participate in mentoring and coaching activities. On the other hand, since trained teachers are the ones more likely to be appointed into supervisory positions, they are more likely participate in mentoring and coaching activities, as well as get opportunities to participate in educational conferences.

3.2.3 Embedded CPD Activities

The survey revealed that participation in embedded CPD activities is relatively rare. For example, more than half of the survey participants indicated that they had never written reflections about their practices and outcomes, while only a quarter of the participants said they had participated in curriculum development activities in two or more occasions. The results are captured in Table 5.

Table 5: Frequency of Participation in Practice Based and Embedded CPD Activities

Practice based CPD activity	Never (%)	Once (%)	At least twice (%)
Lecturer Industrial Attachment	35.9	29.4	34.7
Designing and improving content and learning materials	30.0	35.9	34.1
Writing reflections about practices and their outcomes	53.5	28.2	18.2
Being involved in research activities	29.4	34.1	36.5
Curriculum development	37.6	35.9	26.5
Developing or marking of national exams	42.9	17.6	39.4

When participation in practice based CPD activities was compared against different characteristics of teachers, a statistically significant association was observed between participation in designing and improving content and the non-teaching responsibilities held by teachers $\chi^2(4) = 14.75, p < 0.05$. Teachers with administrative responsibilities were found to participate more frequently in designing and improving content and materials than teachers without administrative responsibilities. Moreover, teachers with administrative responsibilities participated more frequently in curriculum development activities than teachers without administrative responsibilities $\chi^2(4) = 11.825, p < 0.05$. A similar pattern was observed with respect to career stages where an association between career stage and participation in designing and improving content was observed, $\chi^2(4) = 20.99, p < 0.001$, as well as, between career stage and participation in curriculum development $\chi^2(4) = 22.17, p < 0.001$. Middle career stage teachers and late career stage teachers participated more frequently in designing and improving content as well as in curriculum development compared to early career stage teachers.

While Lecturer Industrial Attachment (LIA) plays an important role in keeping TVET teachers up to date with modern work practices and emerging technology, more than a third of the participants indicated that they had never attended LIA. Asked for their views on LIA, more than 90 per cent of the participants agreed that LIA is important for teachers. In line with this view, 87 per cent of the respondents wished to attend LIA. However, only 40 per cent of the respondents were willing to pay to attend LIA. With respect to the preferred frequency and duration of LIA, the most popular preference was once a year for four weeks.

3.2.4 Self-Directed and Self-Paced CPD Activities

Compared to the CPD activities presented above, self-paced learning activities are much more common. For example, nearly nine in ten of the survey participants indicated that they participate in discussions about practice occasionally, while more than three quarters of the participants indicated that they frequently read about their teaching subjects. More than two thirds of the participants indicated that they watch videos related to their teaching subjects. However, reading educational theory is less common with a quarter of the participants saying they never or rarely read about educational theory. Results are shown in Table 6.

Table 6: Frequency of Participation in Self-Paced CPD Activities

Self-Paced CPD activity	Never/rarely (%)	Occasionally (%)	Frequently (%)
Discussions about teaching practices with other teachers (professional dialogue)	11.80	44.40	43.80
Watch videos about teaching methods and practices	26.40	33.50	40.00
Read about my teaching subjects	5.30	19.50	75.20
Watch videos about my subjects	12.90	20.60	66.50
Read educational theory	24.80	36.10	39.10

Related to the use of self-paced CPD activities is the use of professional literature. The survey revealed that teachers rarely use primary and secondary literature but rely more on text books for their professional learning. Primary literature was classified as original research articles found in journals, while secondary literature was classified as review articles, and practice guidelines. Tertiary literature was classified as text books, handbooks and encyclopaedias. Finally, grey literature referred to policy and curriculum documents etc. This contradicts the expectation that TVET teachers would use primary and secondary literature to keep abreast of new developments in their fields. Table 7 shows the frequency of using different types of professional literature. However, this agrees with the finding that teachers do not frequently engage in research activities (see Table 5 and Table 8).

Table 7: Frequency of Using Professional Literature

	Never/Rarely (%)	Occasionally (%)	Frequently (%)
Primary Literature	49.40	28.20	20.60
Secondary Literature	40.60	31.80	25.90
Tertiary Literature	16.50	28.80	54.10
Grey Literature	35.30	32.90	30.00

Asked why they read professional literature, majority of the study participants indicated that they use professional literature to keep their knowledge up to date, with only one in five participants using professional literature as part of their post-graduate studies or for research purposes. Only a third of the respondents indicated that they use professional literature as part of their work. Findings are summarized in Table 8.

Table 8: Reasons for Reading Professional Literature

	Per cent of respondents (%)	No response (%)
Keep my knowledge up to date	88.8	11.2
As part of my work	28.2	71.8
As part of my Masters or PhD studies	20.6	79.4
I am involved in research	19.4	80.6

4 Discussion

A key aim of this study was to identify the CPD practices of TVET teachers in Kenya. A sample of 170 TVET teachers drawn from six TVET institutes in Kenya's Nairobi Metropolitan Area provided the data with CPD activities categorized into four categories i.e., formal, collaborative, self-paced, and embedded CPD activities.

From the category of formal CPD activities, the most frequent CPD activity was attending workshops and seminars, followed by short training courses and college and university

courses respectively. In the collaborative learning activities category, mentoring and coaching was the most frequent, and from the self-paced CPD category, reading on subject matter was the most popular followed by watching videos about subject matter. Teachers also frequently engage in discussions about teaching practices. Overall, the most frequent CPD activities were reading and watching videos about subject matter, followed by attending workshops and short training courses.

The least frequent CPD activities were in the collaborative category. These were participation in teacher clubs and visiting other institutes. Writing reflections is very rare, with more than half of the respondents indicating that they never engage in reflective writing about their practice and outcomes. Supervising other teachers is the fourth rarest CPD activity. In the self-paced category, watching videos about teaching methods ranked as the least popular, while in the formal CPD activities category, attending educational conferences was the least popular.

When educational qualifications of the participants at the start of their teaching careers were compared with their current educational qualifications, a large progression in academic qualifications was observed. The progression shows significant use of formal academic CPD to improve educational qualifications and qualify for promotions and other forms of career progress. This is likely the case because TVET teachers have previously been observed to seek in-service training in the hope of better placement (UNESCO-UNEVOC, 2018).

Informal learning methods such as discussions with colleagues are also frequently used, but likely with the aim of finding solutions to practice challenges and because the methods are easy to use. Other collaborative learning methods such as lesson observations are however rarely used, likely because the methods are more time consuming. These tentative explanations are based on the theoretical framework, i.e., as adult learners, TVET teachers use the learning methods available to them and that enable the teachers to attain their learning goals. Further research to verify the reasons for the observed use patterns is called for.

The results in this study mirror findings by other researchers. In TALIS 2018, the most frequently attended professional development activities were courses and seminars attended in person (76% of teachers in the survey) and reading professional literature (72% of the survey respondents). On the other hand, participation in collaborative forms of professional development was found to be much more infrequent, with only 44% of the respondents indicating that they had participated in coaching, peer-observation, and networking (OECD, 2019). Similarly, Broad (2016) identified that formal CPD methods are relatively popular in the Further Education sector in the United Kingdom, with 60% of her survey respondents indicating that they had attended workshops, while 51% indicated that they had attended a short course and 18% indicated that they had attended a long course.

Similar to the finding by Lecat et al. (2019) that teachers frequently use informal learning methods, TVET teachers in Kenya also use a variety of informal learning methods such as

the self-paced use of online resources and participation in professional dialogue. This finding is similar to Broad's (2016) finding, where 81 per cent of the further education teachers in the UK were found to read journals and books, while 68% indicated that they accessed learning materials online. However, for TVET teachers in Kenya, use of professional literature is restricted to text books with limited use of primary or secondary literature.

Based on the reviewed literature, it was expected that the choice of learning method is influenced by the characteristics of teachers. The findings of the study supported this expectation. The characteristics found to frequently influence participation were the career stage of the teachers, holding non-teaching responsibilities, and whether or not a teacher has received Initial Teacher Education (ITE). Teachers who have received ITE were found to participate more frequently in many of the CPD activities surveyed. Based on the theoretical framework, this was attributed to the positive role ITE plays in sensitizing teachers about the value of teacher CPD and the learning methods that they could use.

Despite viewing Lecturer Industrial Attachment (LIA) as important and therefore wishing to attend LIA, more than a third of the participants indicated that they had never attended LIA. The finding agrees with an earlier finding that TVET teachers in Kenya rarely have the opportunity to participate in Lecturer Industrial Attachment (Sang et al., 2012) and aligns with the theoretical framework that teachers in a given context use the learning methods that they are aware of and are able to access and use.

CPD activities related to attending educational conferences, mentoring and supervising other teachers, reading grey literature, and visiting other institutions formed a unique category of CPD activities that teachers with administrative responsibilities frequently took part in compared to teachers without administrative responsibilities. This finding mirrors the finding in TALIS 2018 that principals attend more CPD activities than other teachers (OECD, 2019). Middle and Late Career stage teachers were found to participate more frequently in coaching and mentoring activities, curriculum development, and the design and development of learning materials and content. Further research to verify these observations is called for.

The survey findings should be interpreted taking two limitations into account. First, self-reports of previous CPD activities may not be exhaustive. However, they likely represent general patterns. Second, the fact that the study participants were drawn from one region of the country limits the generalizability of the findings. Accordingly, further research using other methods of data collection and focusing on TVET teachers in other regions of the country is called for.

Given the limited scope of the study, the influence of contextual factors, such as conditions for promotion, were not investigated. Accordingly, the influence of institutional and organizational conditions could only be hypothesised from the data available. Further research is therefore called for.

5 Summary and Conclusions

TVET teachers in Kenya were found to use formal academic learning and discussions with colleagues frequently. However, collaborative learning methods and practice-based learning activities are less frequently used. TVET teachers in Kenya were also found to rarely engage in written reflections about practice and its outcomes. Further, the use of professional literature is restricted to text books with limited use of primary and secondary literature.

The limited use of active learning methods that involve critical evaluation of practices and their outcomes risks limiting the ability of TVET teachers in Kenya to transform and adopt better practices. TVET teachers in Kenya should thus be encouraged to engage in active and critical evaluation of their practices as well as critical exploration and adoption of new practices. Teachers should also be encouraged to participate more frequently in curriculum reviews and in the development of teaching and learning materials to help them develop a deeper understanding of the curricular they implement and learning materials they use. It is further recommended that TVET teachers in Kenya are encouraged to adopt a broad conception of teacher CPD that embraces collaborative, reflective, and practice-based learning. This may be achieved by recognizing and rewarding informal learning practices.

The low rates of participation in Lecturer Industrial Attachment (LIA) put to risk the currency and up-to-datedness of TVET teachers' knowledge of modern technology and work processes. TVET teachers should therefore be encouraged and facilitated to seek LIA to ensure that they keep up to date with developments in industry. A clear policy requiring TVET teachers to attend LIA every year for four weeks as suggested by the majority of participants is recommended. Finally, in the absence of research insights in the use of different learning methods, further research to verify the possible reasons for the use patterns observed is called for.

Ethical Statement

Ethical permission was obtained from the Ethical Committee of the Faculty of Pedagogy and Psychology at Eötvös Loránd University (permit no. 2019/243). The main ethical concerns in the study were informed consent and the privacy of the participants. These were addressed by informing the participants about the aims of the study and getting their fully informed consent, respecting their privacy (for example, the survey questionnaire did not collect names or other identifying information) and secure storage of the data in line with the data protection rules.

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