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Factors influencing teachers' engagement in online continuing professional development programs in Kenya

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Abstract

The increasing adoption of digital learning platforms has transformed the delivery of Continuing Professional Development (CPD) for teachers worldwide. In Kenya, online CPD programs have emerged as an important mechanism for enhancing teachers' professional knowledge, pedagogical competencies, and adaptability to evolving educational demands. Despite the growing availability of such programs, variations in teachers' participation persist. This study examined teachers' perceptions of key factors associated with participation in online CPD programs in Kenya, focusing on internet connectivity, accessibility of Information and Communication Technology (ICT) devices, and perceived career progression. The study employed a quantitative cross-sectional survey design and collected data from 151 teachers who had participated in online CPD programs. Data were gathered using a structured questionnaire and analyzed using descriptive statistics, reliability analysis, correlation analysis, and comparative mean analysis. The findings indicate that teachers generally perceive internet connectivity, access to ICT devices, and opportunities for career progression as important factors associated with in participation in online CPD programs. Perceived career progression emerged as the highest-rated factor (M = 4.22), followed by internet connectivity (M = 3.92) and accessibility of ICT devices (M = 3.83). Correlation analysis further revealed positive relationships among the study variables, suggesting that technological access and professional growth considerations are closely associated within the context of online professional learning. The study concludes that effective participation in online CPD programs requires both enabling technological conditions and meaningful professional development

opportunities. Efforts to strengthen internet access, expand access to ICT resources, and link CPD participation to clear professional growth and career advancement pathways are likely to increase teachers' participation in online professional learning initiatives. The findings provide useful insights for policymakers, educational institutions, teacher employers, and professional development providers seeking to strengthen continuous teacher learning in Kenya.

Key terms: Continuing Professional Development (CPD), Online Professional Learning, ICT, Internet Connectivity, Career Progression, Teacher Professional Development, Kenya.

1.0 INTRODUCTION

1.1 Background of the study

The quality of any education system is closely linked to the competence, effectiveness, and continuous professional growth of its teachers. As educational environments continue to evolve due to technological advancements, curriculum reforms, changing learner needs, and increasing accountability demands, teachers must continually update their knowledge, pedagogical skills, and professional competencies. Consequently, Continuing Professional Development (CPD) has become an essential component of teacher professionalism and educational quality improvement worldwide.

CPD refers to structured, ongoing learning activities that enable teachers to enhance their professional knowledge, instructional practices, and subject-matter mastery throughout their careers. Effective CPD supports teachers in responding to emerging educational challenges, adopting innovative teaching approaches, and improving learner outcomes (Richter et al., 2011). Beyond improving classroom practice, CPD contributes to teachers' professional confidence, career growth, and adaptability within dynamic educational contexts. Globally, there has been growing recognition that pre-service teacher education alone is insufficient to equip teachers with the competencies required to meet the demands of contemporary education systems. Rapid technological change, the expansion of digital learning environments, and the emergence of knowledge-based economies require teachers to engage in lifelong learning and continuous skills development (Kim et al., 2019). As a result, governments, educational institutions, and professional bodies have increasingly invested in CPD initiatives to enhance teacher effectiveness and educational quality.

The advancement of information and communication technologies (ICTs) has significantly transformed the delivery of professional development programs. Traditional face-to-face professional development models are increasingly being complemented or replaced by online learning approaches that offer greater flexibility, accessibility, and scalability. Online CPD enables teachers to participate in learning activities regardless of their geographical location and to balance professional development with their teaching responsibilities (Bragg et al., 2021). The flexibility of online learning has made it an attractive option for teachers seeking to enhance their knowledge and skills without disrupting their regular work schedules.

In Kenya, efforts to improve teacher quality and strengthen professional standards have increased the importance of continuous professional development. The Government of Kenya, through various policy frameworks and educational reforms, has emphasized the role of technology in enhancing teaching and learning processes. The National ICT Policy recognizes the strategic role of digital technologies in expanding educational opportunities and supporting lifelong learning among educators (Republic of Kenya, 2019). Similarly, the Teachers Service Commission (TSC) has introduced initiatives to promote continuous professional growth among teachers through structured professional development programs. The growing adoption of online CPD programs in Kenya has created new opportunities for teachers to

access professional learning experiences. However, participation and engagement levels vary considerably among teachers. While some educators actively engage in online learning activities, others encounter challenges that limit their participation and completion of professional development programs. Existing studies suggest that technological, institutional, and motivational factors influence teachers' engagement in online professional learning environments (Lo & To, 2023; Trust & Prestridge, 2023).

Among the factors frequently associated with participation in online learning are internet connectivity, access to ICT devices, and perceptions of the program's professional benefits. Reliable internet connectivity is essential for accessing learning platforms, participating in virtual discussions, downloading learning resources, and completing online assessments. Similarly, access to functional ICT devices, such as smartphones, laptops, and desktop computers, affects how easily teachers participate in online learning activities. In addition, teachers are more likely to invest time and effort in professional development when they perceive that participation will contribute positively to their career advancement, professional recognition, and future opportunities (Lee & Tillema, 2022).

Although previous studies have examined various aspects of teacher professional development, there remains limited empirical evidence on the relative influence of internet connectivity, ICT device accessibility, and perceived career progression on teachers' engagement in online CPD programs within the Kenyan context. As online professional development becomes increasingly important in supporting teacher learning and educational transformation, understanding the factors that encourage or hinder teacher engagement becomes essential for policymakers, teacher employers, and professional development providers. This study, therefore, sought to examine the factors influencing teachers' engagement in online Continuing Professional Development programs in Kenya, focusing specifically on internet connectivity, accessibility of ICT devices, and perceived career progression. The findings are expected to contribute to the design and implementation of more effective, accessible, and sustainable online professional development programs for teachers.

1.2 Statement of the problem

The effectiveness of any education system depends largely on the quality and continuous professional growth of its teachers. As educational systems increasingly integrate technology into teaching, learning, and professional practice, teachers are expected to continuously update their knowledge and skills through CPD programs. In response to this need, online CPD programs have become an increasingly popular means of delivering professional learning opportunities because they offer flexibility, accessibility, and scalability. These programs enable teachers to participate in professional development activities without disrupting their teaching responsibilities and have the potential to reach large numbers of educators across diverse geographical locations.

In Kenya, efforts to strengthen teacher professionalism and improve educational outcomes have increased the emphasis on continuous professional development. The integration of technology into professional learning has further accelerated the adoption of online CPD programs by teacher employers, educational institutions, and professional development providers. Despite the growing availability of online professional development opportunities, evidence suggests that teachers' levels of participation and engagement remain uneven. While some teachers actively participate in online learning activities, others experience difficulties that limit their engagement with and completion of online CPD programs.

Previous studies have identified several factors that may influence participation in online professional development. These include technological factors such as internet connectivity and access to digital devices, as well as motivational factors such as perceived professional benefits and career advancement opportunities (Lee & Tillema, 2022; Lo & To, 2023). Similarly, studies conducted in Kenya have highlighted challenges related to technology infrastructure, access to digital resources, and the

implementation of online learning initiatives (Adika & Mung'ala, 2018; Kibuku et al., 2020). However, much of the existing literature has focused on online learning in general educational contexts or on teacher participation in professional development more broadly, without specifically examining the relative influence of internet connectivity, the accessibility of ICT devices, and perceived career progression on teachers' engagement in online CPD programs.

Furthermore, although online CPD programs continue to expand in Kenya, limited empirical evidence exists regarding how teachers themselves perceive these factors and the extent to which they influence engagement in online professional learning. Understanding these relationships is essential for designing effective professional development programs, improving participation rates, and ensuring that investments in teacher capacity-building achieve their intended outcomes. It is against this background that this study examined the factors influencing teachers' engagement in online Continuing Professional Development programs in Kenya, with a particular focus on internet connectivity, access to ICT devices, and perceived career progression. By generating empirical evidence from teachers participating in online CPD programs, the study aimed to provide insights that could inform policy, program design, and strategies to enhance teacher engagement in continuous professional learning.

1.3 Research Objectives

1.3.1 General Objective

To examine the factors influencing teachers' engagement in online Continuing Professional Development (CPD) programs in Kenya.

1.3.2 Specific Objectives

To examine the influence of internet connectivity on teachers' engagement in online Continuing Professional Development programs in Kenya.

To determine the influence of accessibility of Information and Communication Technology (ICT) devices on teachers' engagement in online Continuing Professional Development programs in Kenya.

To assess the influence of perceived career progression on teachers' engagement in online Continuing Professional Development programs in Kenya.

1.4 Research Questions

The study was guided by the following research questions:

How does internet connectivity influence teachers' engagement in online Continuing Professional Development programs in Kenya?

How does accessibility of Information and Communication Technology (ICT) devices influence teachers' engagement in online Continuing Professional Development programs in Kenya?

How does perceived career progression influence teachers' engagement in online Continuing Professional Development programs in Kenya?

2.0 LITERATURE REVIEW

2.1 Theoretical Framework

This study was guided by the Transactional Distance Theory (TDT) developed by Moore (2018). The theory was originally formulated to explain teaching and learning processes that occur when learners and

instructors are separated by geographical distance and interact through various forms of communication technology. Unlike traditional classroom-based theories, TDT specifically addresses the pedagogical, psychological, and communication challenges associated with distance and online learning environments.

According to Moore (2018), transactional distance refers to the psychological and communicative space between learners and instructors in a learning environment. The theory proposes that the effectiveness of learning is influenced by the interaction among three key elements: dialogue, structure, and learner autonomy. Dialogue refers to the quality and frequency of interactions between learners and instructors; structure refers to the design and organization of learning experiences; and learner autonomy refers to the degree of independence learners exercise in managing their own learning processes.

In online professional development programs, teachers participate in learning activities through digital platforms that facilitate communication, content delivery, collaboration, and assessment. The quality of engagement in such environments depends largely on how effectively teachers can access and interact with learning resources, instructors, and fellow participants. Consequently, technological factors that facilitate communication and access to learning platforms become critical determinants of engagement in online learning environments. The theory is particularly relevant to this study because internet connectivity and access to ICT devices directly influence the level of interaction and communication that teachers experience during online Continuing Professional Development programs. Reliable internet connectivity enables teachers to access learning platforms, participate in virtual discussions, download learning materials, and engage in collaborative learning activities. Similarly, access to appropriate ICT devices, such as laptops, desktop computers, tablets, and smartphones, enhances teachers' ability to interact effectively with online learning content and to participate in professional development activities. Inadequate connectivity or limited access to digital devices may increase transactional distance by reducing opportunities for interaction and participation.

TDT also recognizes the importance of learner motivation and autonomy in determining engagement within online learning environments. In this study, perceived career progression is a motivational factor that may encourage teachers to invest time and effort in professional development. When teachers perceive that participation in online CPD programs contributes to professional growth, career advancement, promotion opportunities, and recognition, they are more likely to remain engaged in learning despite the challenges of distance learning. The application of TDT in this study, therefore, provides a useful framework for understanding how technological and motivational factors influence teachers' engagement in online Continuing Professional Development programs. The theory suggests that reducing barriers to access, enhancing opportunities for interaction, and strengthening teachers' motivation for professional growth can contribute to higher levels of engagement in online learning environments. Consequently, TDT offers an appropriate lens for examining the influence of internet connectivity, accessibility of ICT devices, and perceived career progression on teachers' engagement in online Continuing Professional Development programs in Kenya.

2.2 Empirical Review

Existing literature demonstrates broad agreement that teachers' engagement in online Continuing Professional Development (CPD) is shaped by a combination of technological, institutional, and motivational factors rather than by a single determinant. However, previous studies have tended to examine these factors in isolation, making it difficult to understand how they collectively influence teachers' participation in online professional learning.

From a technological perspective, internet connectivity and access to ICT devices consistently emerge as prerequisites for effective engagement in online learning environments. Studies by Lo and To (2023) and Trust and Prestridge (2023) emphasize that reliable internet access enhances teachers' ability to interact

with learning platforms, collaborate with peers, and complete online learning activities. Similarly, Kibuku et al. (2020) argue that inadequate technological infrastructure remains a significant challenge to the successful implementation of online learning initiatives in Kenya. While these studies agree on the importance of digital access, they largely focus on the availability of technology, devoting comparatively less attention to how teachers' perceptions of the professional value of online CPD influence sustained engagement. This suggests that technological readiness alone may not guarantee meaningful participation.

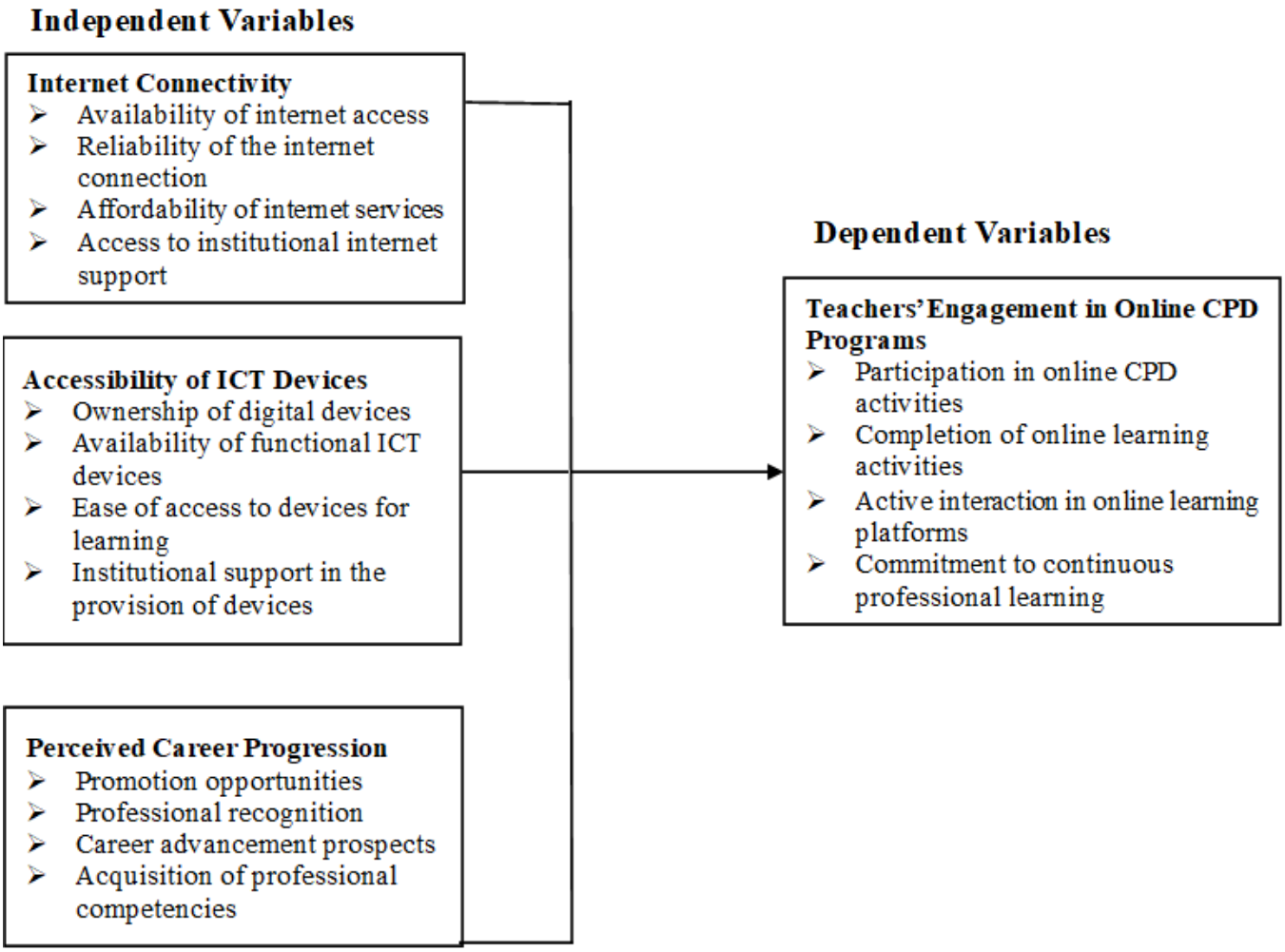
The literature also highlights motivation as a critical driver of teachers' engagement in professional development. Lee and Tillema (2022) contend that teachers are more willing to participate in online CPD when they perceive clear professional benefits such as enhanced competencies, career advancement, and recognition. Lo and To (2023) similarly observe that teachers' professional identity and perceptions of CPD influence their willingness to engage in continuous learning. Although both studies acknowledge the importance of motivation, they differ in emphasis: while Lee and Tillema (2022) focus on tangible career incentives, Lo and To (2023) underscore the role of intrinsic professional commitment. These complementary perspectives suggest that teachers' engagement is likely to be strengthened when both intrinsic and extrinsic motivations are addressed.

Institutional support further emerges as an important contextual factor. Existing studies suggest that schools and education systems that provide reliable digital infrastructure and supportive learning environments are more likely to experience higher levels of teacher participation in online professional development (Kibuku et al., 2020; Trust & Prestridge, 2023). Nevertheless, evidence from the Kenyan context remains fragmented, with most studies examining online learning in broad terms rather than focusing specifically on teachers' engagement in online CPD programs.

Overall, the reviewed literature confirms that internet connectivity, access to ICT devices, and perceived career progression are important determinants of participation in online professional learning. However, it also reveals an important gap. Most previous studies examine these factors independently or within broader online learning contexts, with limited empirical evidence on their combined influence on teachers' engagement in online CPD in Kenya. The present study addresses this gap by examining these three factors simultaneously, thereby providing a more integrated understanding of the technological and motivational conditions that shape teachers' engagement in online Continuing Professional Development programs.

2.3 Conceptual Framework

In this study, teachers’ engagement in online CPD programs is conceptualized as being influenced by internet connectivity, accessibility of ICT devices, and perceived career progression, as depicted in the diagram below.



The study assumes that improved internet connectivity enhances teachers' ability to access and participate in online learning activities. Similarly, greater accessibility to ICT devices facilitates engagement by enabling teachers to interact effectively with digital learning platforms and resources. Furthermore, positive perceptions of career progression are expected to motivate teachers to actively participate in online CPD programs to enhance their professional growth and opportunities for advancement. Consequently, the study posits that internet connectivity, access to ICT devices, and perceived career progression directly influence teachers' engagement in online CPD programs in Kenya.

3.0 METHODOLOGY

This section describes the methodology employed in the study to examine the factors influencing teachers' engagement in online CPD programs in Kenya. Specifically, the section outlines the research design; the target population, sample size, and sampling procedure; the research instrument; data collection procedures; the instrument's validity and reliability; data analysis procedures; and ethical considerations. The methodology was designed to generate empirical evidence on the influence of internet connectivity, access to ICT devices, and perceived career progression on teachers' engagement in online CPD programs.

3.1 Research Design

This study adopted a quantitative cross-sectional survey design to examine the factors influencing

teachers' engagement in online CPD programs in Kenya. A cross-sectional survey design was considered appropriate because it enables data collection from a defined population at a single point in time and facilitates examination of relationships among study variables.

The design was particularly suitable for this study because it enabled the researcher to gather teachers' perceptions of internet connectivity, access to ICT devices, perceived career progression, and their engagement in online CPD programs. Using a structured questionnaire, data were collected from teachers participating in online professional development programs and analyzed to identify patterns, trends, and relationships among the variables under investigation.

According to Creswell and Creswell (2018), survey research provides an efficient approach for collecting standardized information from a relatively large number of respondents and is particularly useful in studies seeking to describe attitudes, opinions, behaviors, and characteristics of a population. The quantitative approach adopted in this study facilitated objective measurement of respondents' perceptions and enabled statistical analysis of the relationships among the study variables. The cross-sectional survey design was therefore considered appropriate for generating empirical evidence on the factors influencing teachers' engagement in online Continuing Professional Development programs in Kenya.

3.2 Target Population

The target population comprised teachers participating in online CPD programs in Kenya. These teachers represented the population from which information was sought regarding internet connectivity, access to ICT devices, perceived career progression, and their engagement in online CPD programs.

The target population provided the basis for generating empirical evidence on the opportunities and challenges associated with teachers' participation in online professional development initiatives within the Kenyan context.

3.3 Sample Size and Sampling Procedure

The study utilized data collected from 151 teachers who participated in online CPD programs in Kenya. The respondents constituted the study sample from which information was obtained regarding internet connectivity, access to ICT devices, perceived career progression, and engagement in online CPD programs. A non-probability sampling approach was adopted in selecting participants for the study. Specifically, convenience sampling was used to identify teachers who had previously participated in online professional engagement activities and whose contact information was available through established online professional networks. The survey questionnaire was distributed via WhatsApp, enabling teachers from across the country to voluntarily participate in the study.

Participation in the study was entirely voluntary, and respondents were free to decide whether or not to complete the questionnaire. The use of WhatsApp as a data collection channel facilitated a broad geographic reach and provided an efficient means of reaching teachers with prior experience in online professional learning activities. This approach was considered appropriate because the study sought responses from teachers familiar with online learning environments and capable of providing informed perspectives on their engagement in online CPD programs. The final sample of 151 completed responses was considered adequate for generating empirical insights into the factors influencing teachers' engagement in online Continuing Professional Development programs in Kenya. Furthermore, the respondents reflected diverse educational contexts and professional experiences, thereby providing valuable perspectives on online professional learning within the Kenyan education sector.

3.4 Research Instrument

Data for this study were collected using a structured questionnaire designed to gather information on factors influencing teachers' engagement in CPD programs in Kenya. The questionnaire was considered appropriate because it enabled the collection of standardized information from a relatively large number of respondents and facilitated quantitative analysis of the study variables. The instrument comprised two sections. The first section collected background information relating to the respondents, while the second section contained statements designed to measure the study variables. Specifically, the questionnaire assessed internet connectivity, accessibility of ICT devices, perceived career progression, and teachers' engagement in online CPD programs.

Internet connectivity was measured using items that examined the availability, reliability, affordability, and accessibility of internet services for participation in online professional development activities. Accessibility of ICT devices was assessed through items relating to ownership, availability, functionality, and ease of access to digital devices used for online learning. Perceived career progression was measured using statements that examined respondents' perceptions regarding professional growth, promotion opportunities, leadership development, and career advancement associated with participation in online CPD programs. Teachers' engagement in online CPD programs was assessed using indicators of participation, involvement, commitment, and interaction within online learning environments.

Responses to the questionnaire items were measured using a five-point Likert scale ranging from 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, and 5 = Strongly Agree. The use of a Likert scale enabled respondents to indicate the extent of their agreement with each statement and facilitated quantitative analysis of perceptions relating to the study variables. The structured nature of the questionnaire enhanced consistency in data collection and provided a suitable basis for analyzing the factors influencing teachers' engagement in online Continuing Professional Development programs in Kenya.

3.5 Data Collection Procedure

Data were collected using a structured questionnaire administered through online platforms. The questionnaire was distributed to teachers through WhatsApp networks comprising educators who had previously participated in online professional engagement activities. The use of WhatsApp was considered appropriate because it provided an efficient and cost-effective means of reaching teachers across different geographical locations within Kenya.

Prior to participation, respondents were informed of the study's purpose and assured that their responses would be used solely for academic and research purposes. Participation in the study was voluntary, and respondents were free to choose whether or not to complete the questionnaire. No respondent was coerced or incentivized to participate in the study. The questionnaire was administered electronically, enabling respondents to complete it at their convenience. Completed responses were automatically captured and compiled for analysis. Upon completion of the data collection exercise, the responses were screened for completeness and consistency before being coded and prepared for statistical analysis.

The use of an online data collection approach enhanced accessibility, facilitated timely data collection, and enabled the researcher to gather data from teachers with prior experience in online learning environments, consistent with the study's focus on engagement in online Continuing Professional Development programs.

3.6 Validity and Reliability of the Instrument

To enhance the quality and credibility of the data collection instrument, the questionnaire was pilot tested prior to the main data collection exercise. The pilot study was conducted among 11 teachers who possessed characteristics similar to those of the respondents targeted in the main study but were not included in the final sample. The pilot exercise was undertaken to assess the clarity, relevance, appropriateness, and comprehensibility of the questionnaire items. Feedback obtained from the pilot participants enabled the researcher to identify ambiguous statements and make minor refinements to the wording, sequencing, and presentation of questionnaire items before the commencement of the main study.

Content validity was enhanced by ensuring that the questionnaire items aligned with the study objectives and the key constructs under investigation, namely internet connectivity, accessibility of ICT devices, and perceived career progression related to participation in online CPD programs. The reliability of the questionnaire was assessed using Cronbach's alpha coefficient to determine the internal consistency of the measurement scales.

3.7 Data Analysis Procedures

After data collection, the completed questionnaires were screened, coded, and entered into a statistical software package for analysis. Data analysis was conducted using descriptive and inferential statistical techniques to address the study objectives and research questions. Descriptive statistics were used to summarize respondents' perceptions regarding internet connectivity, access to ICT devices, and perceived career progression in relation to participation in online CPD programs. Measures such as frequencies, percentages, means, and standard deviations were used to describe the data and provide an overview of respondents' views on the study variables.

Correlation analysis was conducted to examine the nature and strength of the relationships among the study variables. In addition, comparative analysis based on mean scores was undertaken to determine the relative importance of the identified factors. The ranking of construct means enabled the study to establish which factors were perceived by respondents as having the greatest association with participation in online CPD programs. The findings were presented using tables and narrative explanations. Statistical results were interpreted in relation to the study objectives, research questions, and existing literature on online professional development.

4.0 RESULTS AND DISCUSSION

This section presents the study's findings and discusses them in relation to the study objectives, research questions, and the existing literature. The analysis focuses on teachers' perceptions regarding internet connectivity, access to ICT devices, and perceived career progression as factors associated with participation in online CPD programs in Kenya. The findings are presented using descriptive and inferential statistical techniques. Descriptive statistics summarize respondents' perceptions of the study variables, while correlation analysis examines relationships among the identified factors. Comparative analysis of mean scores is further used to determine the relative importance of the factors examined in the study. The results are presented through tables accompanied by narrative interpretations and discussions.

4.1 Response Rate

The study targeted teachers who had previously participated in online professional engagement activities and whose contact information was accessible through established online networks. Data were collected through an online questionnaire distributed via WhatsApp platforms. A total of 151 complete responses were received and included in the analysis. All completed questionnaires were screened for completeness and consistency before being coded and entered into the statistical analysis process. The resulting dataset provided sufficient information to examine the influence of internet connectivity, the accessibility of ICT devices, and perceived career progression on teachers' engagement in online CPD programs. The response dataset formed the basis for all subsequent descriptive and inferential analyses reported in this study.

4.2 Reliability Analysis

Prior to conducting the main statistical analyses, the reliability of the measurement scales was assessed using Cronbach's Alpha coefficient. Cronbach's alpha measures the internal consistency of questionnaire items and indicates the extent to which items within a construct measure the same underlying concept.

Table 4.1 presents the reliability coefficients for the study variables.

Table 4.1 Reliability Analysis Results

Variable	Number of Items	Cronbach's Alpha
Internet Connectivity	6	0.577
Accessibility of ICT Devices	10	0.599
Perceived Career Progression	10	0.779

The results indicate that the Perceived Career Progression scale demonstrated acceptable internal consistency, with a Cronbach's alpha of 0.779, exceeding the commonly accepted threshold of 0.70. The Internet Connectivity and access to ICT Device Accessibility scales yielded reliability coefficients of 0.577 and 0.599, respectively, indicating moderate internal consistency. The comparatively lower reliability coefficients for Internet Connectivity and ICT Device Accessibility may be attributed to the diversity of items measuring different dimensions of access, availability, affordability, institutional support, and user experiences. Nevertheless, the reliability values were considered adequate for exploratory analysis and for examining the relationships among the study variables. The findings suggest that the questionnaire provided a reasonably consistent basis for assessing factors influencing teachers' engagement in online CPD programs.

4.3 Internet Connectivity and Teachers' Engagement in Online CPD Programs

The first objective of the study sought to examine the influence of internet connectivity on teachers' engagement in online CPD programs in Kenya. Respondents were asked to indicate their level of agreement with six statements relating to internet access, reliability, affordability, institutional support, and usage patterns associated with online professional learning. The analysis revealed an overall mean score of 3.92, indicating that respondents generally agreed that internet connectivity plays an important role in facilitating engagement in online CPD programs. The findings suggest that reliable internet access enhances teachers' ability to access online learning materials, participate in professional development activities, and engage with digital learning platforms.

The results further indicate that respondents recognized the importance of internet reliability and accessibility in determining their participation in online CPD activities. Teachers generally acknowledged that poor internet connectivity can undermine motivation and engagement, whereas adequate internet access facilitates participation in online learning opportunities. The findings also suggest that affordability remains an important consideration for teachers participating in online CPD programs. Although internet access enables participation in professional learning activities, the cost of data and varying levels of institutional support may affect the extent to which teachers consistently engage with online learning environments. Overall, the results demonstrate that internet connectivity is a significant factor in shaping teachers' engagement in online CPD programs. Reliable, accessible, and affordable internet services are essential for supporting effective participation in technology-mediated professional development initiatives.

4.4 Access to ICT Devices and Teachers' Engagement in Online CPD Programs

The second objective of the study sought to determine the influence of accessibility of ICT devices on teachers' engagement in online CPD programs in Kenya. Respondents were asked to indicate their level of agreement with statements relating to ownership, availability, functionality, accessibility, and utilization of ICT devices for online professional learning.

The findings indicate that respondents generally agreed that access to ICT devices influences their engagement in online CPD programs. Teachers reported that ownership and availability of digital devices such as smartphones, laptops, and desktop computers facilitate participation in online learning activities by enabling access to learning platforms, instructional materials, assessments, and collaborative learning opportunities. The results further suggest that personal ownership of ICT devices contributes positively to participation in online CPD programs. Many teachers indicated that having access to reliable devices increases convenience and flexibility in engaging with online learning content. The widespread use of smartphones also appears to have enhanced accessibility to online professional development opportunities.

However, the findings reveal that institutional support in the provision of ICT devices remains relatively limited. While many teachers rely on personally owned devices for online learning activities, access to institutionally provided devices was perceived as less adequate. This suggests that although device ownership may not be a major barrier for many teachers, strengthening institutional support could further enhance participation in online CPD programs. Overall, the findings demonstrate that accessibility of ICT devices is an important factor influencing teachers' engagement in online CPD programs. Access to functional and reliable digital devices enhances participation and supports effective engagement in technology-enabled professional learning environments.

4.5 Perceived Career Progression and Teachers' Engagement in Online CPD Programs

The third objective of the study sought to assess the influence of perceived career progression on teachers' engagement in online CPD programs in Kenya. Respondents were asked to indicate their level of agreement with statements relating to professional growth, promotion opportunities, leadership development, career advancement, and professional recognition associated with participation in online CPD activities. The findings indicate that perceived career progression was among the strongest factors influencing teachers' engagement in online CPD programs. Respondents generally agreed that participation in online professional development contributes positively to their career growth and enhances opportunities for professional advancement.

Teachers expressed strong agreement that online CPD programs provide opportunities for acquiring new knowledge and competencies that can improve professional effectiveness and strengthen career

prospects. Respondents also perceived participation in CPD as beneficial in enhancing leadership capabilities, improving professional recognition, and supporting future promotion opportunities. The results suggest that teachers are more likely to engage actively in online professional development when they perceive clear professional benefits associated with participation. The expectation of career advancement, improved professional status, and enhanced competencies appears to motivate sustained participation in online learning activities. Overall, the findings demonstrate that perceived career progression significantly influences teachers' engagement in online CPD programs. The results suggest that linking professional development activities to meaningful career growth opportunities may enhance teachers' motivation to participate in and complete online CPD programs.

4.6 Correlation Analysis

Correlation analysis was conducted to examine the relationships among the study variables, namely internet connectivity, access to ICT devices, and perceived career progression. Pearson correlation coefficients were computed to determine the direction and strength of the relationships among the constructs.

Table 4.2 presents the correlation coefficients among the study variables.

Table 4.2 Correlation Matrix

Variables	Internet Connectivity	ICT Devices	Career Progression
Internet Connectivity	1	0.485	0.38
ICT Devices	0.485	1	0.536
Career Progression	0.38	0.536	1

The results indicate positive relationships among all the study variables. Internet connectivity exhibited a moderate positive relationship with the accessibility of ICT devices (r = 0.485), suggesting that respondents with better access to internet services also tended to report better access to ICT devices for participation in online CPD programs. A positive relationship was also observed between internet connectivity and perceived career progression (r = 0.380). This finding suggests that teachers who reported better internet access were more likely to perceive online CPD programs as contributing positively to their professional growth and career advancement.

The strongest relationship was observed between access to ICT devices and perceived career progression (r = 0.536). This finding indicates that access to digital devices may enhance teachers’ ability to participate in online professional learning activities and, consequently, strengthen perceptions of professional development and career growth opportunities. Overall, the correlation analysis indicates that the study variables are positively related, suggesting that improvements in one factor may be associated with more positive perceptions of the others in the context of online CPD programs.

4.7 Comparative Analysis of Factors Associated with Participation in Online CPD Programs

To determine the relative importance of the factors examined in the study, a comparative analysis based on mean scores was conducted. The analysis enabled the study to identify the factors that respondents perceived as most important in supporting participation in online CPD programs.

Table 4.3 presents the mean scores for the three study constructs.

Table 4.3 Comparative Analysis of Study Variables

Factor	Mean Score	Rank
Perceived Career Progression	4.22	1
Internet Connectivity	3.92	2
Accessibility of ICT Devices	3.83	3

The findings indicate that perceived career progression recorded the highest mean score of 4.22, making it the most highly rated factor among respondents. This suggests that teachers strongly associate participation in online CPD programs with opportunities for professional growth, career advancement, leadership development, and professional recognition. Internet connectivity ranked second with a mean score of 3.92. The findings suggest that respondents consider reliable and accessible internet services as an important enabling factor for participation in online professional learning activities. Access to internet services facilitates communication, access to learning resources, and participation in virtual learning environments. Accessibility of ICT devices recorded a mean score of 3.83 and ranked third among the factors examined. Although respondents generally agreed that access to ICT devices supports participation in online CPD programs, the findings suggest that technological access alone may not be sufficient to motivate participation without accompanying professional incentives and perceived career benefits.

The comparative analysis reveals that while technological factors remain important, professional and career-related considerations appear to be stronger motivators for teachers' participation in online CPD programs. These findings suggest that efforts to strengthen online professional development should not focus solely on technology infrastructure but also emphasize clear career progression pathways and professional growth opportunities associated with participation in CPD activities.

4.8 Discussion of Findings

The purpose of this study was to examine factors associated with teachers' participation in online CPD programs in Kenya, with a particular focus on internet connectivity, access to ICT devices, and perceived career progression. The findings indicate that all three factors were perceived positively by respondents and were positively related to one another. However, differences emerged regarding the relative importance assigned to each factor.

The findings relating to internet connectivity indicate that teachers generally perceive reliable internet access as an important enabler of participation in online CPD programs. Respondents acknowledged that internet availability, reliability, and affordability facilitate access to learning platforms, online resources, and professional learning opportunities. These findings are consistent with previous studies identifying internet access as a critical requirement for effective participation in online learning environments. Lo and To (2023) observed that access to stable internet connectivity influences learners' ability to participate effectively in digital learning activities, while Trust and Prestridge (2023) similarly emphasized the importance of digital access in supporting teacher professional learning within online environments.

The findings also indicate that access to ICT devices plays an important role in supporting participation in online CPD programs. Respondents generally agreed that access to smartphones, laptops, and other digital devices enhances their ability to engage with online learning resources and professional development activities. The positive relationship observed between ICT device accessibility and internet connectivity suggests that these factors operate in a complementary manner. Effective participation in online learning environments requires both access to digital devices and reliable internet connectivity.

These findings support observations by Kibuku et al. (2020), who highlighted the importance of technological infrastructure and digital resources in facilitating participation in technology-enabled learning initiatives.

A notable finding of the study is that perceived career progression emerged as the highest-rated factor among the three constructs examined. Teachers strongly associated participation in online CPD programs with opportunities for professional growth, acquisition of new competencies, career advancement, and professional recognition. The findings suggest that while technology provides the means for online learning, professional and career-related considerations may motivate participation. This observation aligns with Lee and Tillema (2022), who reported that teachers are more likely to engage in professional learning activities when they perceive clear professional benefits and opportunities for career development arising from participation.

The correlation analysis further revealed positive relationships among internet connectivity, accessibility of ICT devices, and perceived career progression. The strongest relationship was observed between ICT device accessibility and perceived career progression. This finding suggests that teachers who have greater access to digital learning tools may be better positioned to take advantage of professional development opportunities and, consequently, perceive greater career-related benefits from participation in online CPD programs.

Taken together, the findings suggest that successful implementation of online CPD programs requires a balanced approach that addresses both technological and motivational considerations. While investments in internet infrastructure and ICT resources remain important, the results indicate that program designers and policymakers should also ensure that participation in online CPD programs is linked to meaningful professional development outcomes. Clear pathways for professional growth, recognition, and career advancement may strengthen teachers' motivation to participate in and benefit from online professional learning opportunities. Overall, the study demonstrates that participation in online CPD programs is associated with both technological access and perceived professional benefits. The findings highlight the need for integrated strategies that simultaneously strengthen digital access and enhance the professional value attached to continuous teacher learning.

5.0 CONCLUSIONS AND RECOMMENDATIONS

This section presents the study's conclusions and provides recommendations for policy, practice, and future research. The conclusions are based on an analysis of teachers' perceptions of internet connectivity, the accessibility of ICT devices, and perceived career progression in relation to participation in online CPD programs in Kenya. The section also highlights the study's limitations and identifies areas that may benefit from further investigation. The proposed recommendations are intended to support policymakers, educational institutions, professional development providers, and other stakeholders seeking to enhance teachers' participation in online CPD programs and strengthen continuous professional learning in the education sector.

5.1 Conclusion

This study examined factors associated with teachers' participation in online CPD programs in Kenya, focusing on internet connectivity, accessibility of ICT devices, and perceived career progression. The findings indicate that all three factors are important considerations in supporting teachers' participation in online professional learning activities.

The study established that internet connectivity remains an important enabler of participation in online CPD programs. Teachers acknowledged the importance of reliable, accessible internet services for

accessing online learning platforms, instructional resources, and professional development opportunities. The findings suggest that improvements in internet access can enhance teachers' ability to participate effectively in technology-mediated professional learning environments. The findings further indicate that accessibility of ICT devices supports teachers' participation in online CPD programs. Access to smartphones, laptops, and other digital devices facilitates engagement with online learning activities and enables teachers to access professional development resources more conveniently. However, the findings suggest that continued efforts are required to strengthen access to appropriate digital learning tools, particularly through institutional support mechanisms.

A key finding of the study is that perceived career progression emerged as the highest-rated factor among the variables examined. Teachers strongly associated participation in online CPD programs with professional growth, acquisition of new competencies, career advancement opportunities, and professional recognition. The findings suggest that while technological infrastructure provides the means for participation, professional and career-related benefits serve as important motivational factors encouraging teachers to engage in online CPD programs. The study, therefore, concludes that successful implementation of online CPD programs requires a balanced approach that combines adequate technological support with clear professional development and career advancement opportunities. Strengthening both dimensions is likely to enhance teachers' participation in continuous professional learning and contribute to improved professional practice within the education sector.

5.2 Recommendations

Based on the study's findings, the following recommendation is proposed: Educational policymakers and institutions responsible for teacher professional development should continue investing in digital infrastructure to improve internet accessibility and reliability for teachers participating in online CPD programs. Efforts should also be directed towards reducing barriers associated with internet costs, particularly for teachers operating in resource-constrained environments. Moreover, Schools, teacher training institutions, and professional development providers should strengthen support for teachers' access to ICT devices. This may include providing shared digital resources, device support programs, and initiatives to improve teachers' digital readiness for online learning.

Organizations implementing online CPD programs should establish clearer links between participation in professional development activities and career progression opportunities. Recognition mechanisms, professional certification pathways, leadership development opportunities, and integration of CPD achievements into professional growth frameworks may enhance teachers' motivation to participate in continuous learning. In addition, developers of online CPD programs should adopt learner-centered approaches that combine technological accessibility with meaningful professional outcomes. Programs should be designed to enable teachers to perceive tangible benefits in professional competence, career development, and workplace effectiveness.

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