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Analyzing Trainees' Engagement with Learning Management System Across Various Modes of Study in Technical Training Institutions: A Case Study of Kenya

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Abstract

Learning Management System (LMS) are software applications designed to manage digital learning content. Their utilization in education has been steadily increasing over the past few decades. However, there is need of comprehensive research focusing specifically on the effectiveness of LMS in enhancing the instructional process in Kenyan TTIs. The current state of utilization of Learning Management System in Kenyan TTIs and their influence on the efficiency of instructional processes remains unclear, necessitating an in-depth investigation to assess their role in improving the quality of education and learning outcomes in these institutions. This paper provides an analysis on the engagement levels of trainees using LMS in different modes of study. The study was anchored on Social Constructivism Theory in understanding how trainees learn. A mixed method design was employed involving both qualitative and quantitative approaches. Questionnaires and interview schedules were used to collect data and piloted to test their reliability and validity. The target population was the 34 County Directors in the 34 Counties with approved TTIs in Kenya, 154 Principals from the 154 approved TTI's in Kenya, 3400 trainers and 132000 trainees from the 154 approved Technical Training Institutions in Kenya. Sampling involved stratified sampling where respondents were classified into their respective strata then Simple random sampling was employed to sample County directors. Principals, trainers and Trainees from the selected Technical Training Institutions. The collected data was analyzed using descriptive and inferential statistics. The study revealed varying degrees of engagement, competency levels, and challenges related to time sufficiency for LMS activities with the majority utilizing LMS on a weekly basis. Trainers expressed mixed perceptions on LMS competency and time sufficiency. The study found LMS as a framework that positively impact learner's engagement, learning, and assessment in TTIs. The regression analysis highlighted the substantial predictive power of LMS variables—utilization, effectiveness, and pedagogy and instructional process explaining (99.8%) of policy variance. However, correlation findings suggest limited direct influence on policy formulation. The study recommends exploring LMS features, addressing technical challenges, and integrating technology into curricula through policy and collaboration. The study recommends the need for exploring the factors influencing trainees' engagement and the impact of LMS on learning outcomes, skill acquisition, and knowledge retention.

Keywords: Learning Management System, modes of study, learner's engagement, Technical Training Institutions, Trainers, Trainees

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1. Introduction

The rapid change in Information and Communication Technologies (ICT) brings a lot of benefits to Higher Learning Institutions (HLIs) (Al-Emran, & Shaalan, 2017; Al-Emran, Mezhuyev & Kamaludin, 2018). One of the beneficial tools facilitated by such technologies is Learning Management Systems (LMS). LMS is an enabled web-based system that is used to facilitate the teaching and learning process using the Internet. It offers several features that allow the trainees and trainers to connect socially and makes it simple for a trainer to offer electronic information to trainees at any time. The examples of LMS include Moodle, Chisimba, Sakai, WebCT, Blackboard, and ATutor (Unwin et al., 2010).

Technical Training is defined as all forms and levels of educational process involving in addition to general knowledge the study of technologies and related sciences and the acquisition of practical skills, knowledge, attitudes and understanding relating to occupation in various sectors of economic and social life (UNESCO,

2013). According to Anley (1990) technical education also refers to the training of craftsmen, technicians, business administrators, secretaries, agriculturalists and many others. The primary purpose of teaching technical skills emerged when there arose an increasing demand for skilled man power in the job market. Developing interest for creative and constructive work in their trainees, Technical education also aims at developing positive attitude towards science and technology education and it ensures that its products develop skills and expertise among others. The success of any nation depends largely upon the quality of its citizens and hence quality of citizens depends on the quality of their education. In this regard the quality of technical education in Kenya is reflected through the acquisition of skills. This led to establishment of many technical and vocational colleges all over the world. It was followed by over enrolment of trainees. The number of enrolled trainees could not match the number of available trained qualified technical trainers. There arose need for the utilization of e-learning in technical institutions.

Learning Management System as a tool of instruction has been successfully adopted and implemented in many Technical Training Institutions in both developed and developing countries and has been credited with improving trainees learning performance, reducing dropout rates and increasing student satisfaction with courses offered (Ngandu, 2021). The adoption of LMS increased during Covid-19 pandemic period whereby 120 countries closed schools impacting almost a billion trainees across the globe that saw their schools close for varied lengths of time (Kaliope & Tigran, 2020).

Kenyan education system not being an exception from the effect of Covid-19. The first LMS was invented in 1924 in USA by Sidney Pressed. He invented the first teaching machine that resembled a type writer with a window that could administer questions. One window was used to show the question and the other one to fill the answers. Gradually, many inventors came on the market and from that time on one invention after the other invention is done. Learning Management Systems (LMS) in USA has become increasingly impressive in the past few years and technical innovations have redefined the teaching – learning process in technical institutions in the USA. The LMS commonly utilized in USA includes Blackboard Canvas, WebCT, and e-college, Moodle, Desire to learn and ANGEL. Blackboard learn peaked in 2006, controlling about 70% of the US and Canadian markets and was considered an LMS choice for US institutions including technical Institutions, until Canvas came into being.

By 2014, Blackboard Inc, the company providing blackboard learn software was used by more than 1700 schools and organizations in more than 100 countries. 75% of USA Technical Colleges and Universities utilize the products and services offered by blackboard inc. According to Higher Education Reputation Ranking, 80% of the world's top academic Institutions use the tools offered by blackboard incl. (Fusch & Ness, 2015). According to the Kabarungi, Musiimenta and Alute (2016) the e-learning business is increasing and growing in most parts of the world, the USA, Europe, Asia and Africa. Canada too has a long history of LMS. WebCT was initially made at the University of British Columnia by a Faculty member in computer sciences, Murray Goldberg. Another Canadian e-learning company, Desire 2 learn was founded by John Baker in 1999, after learning his own unfulfilled need for learning online while studying systems design engineering at the University of Water Loo. Once WebCT was introduced in the early 1996, Canadian Higher ed. Institution and Technical Institutions selected it as the defacto system to be utilized. Almost 70% of Canadian Universities and colleges, technical colleges included, were utilizing WebCT before it was bought by blackboard at the end of 2005. By then, Blackboard had just under 25% of the LMS markets share and Moodle was just 5%. Following the WebCT purchase, Institutions changed to Moodle and to a lesser degree, to Brightspace (D2L). Blackboard was not successful in retaining its new customers. Since 2003, Blackboard's Canadian Market share stayed mostly flat. There was a slight rise from 2008 to 2010 caused in part by the phasing out of the WebCT product line. Blackboards market share never rose above 20% even after it purchased ANGEL (a small player in Canadian Higher Ed.). The Canadian Migration to the open source system Moodle was part out of frustration of being imposed to the change. Blackboard was seen as the big bad company and the majority of our professors did not want to give in. Contrary to the market shares that is dominated by Canvas and Blackboard, Canada has a strong preference for Moodle and Brightspace, Moodle's large market share is in part because of the CEGEP system. Fifty or so institutions selected to utilize Moodle as its default system like the US market however, the Canadian Blackboard and Moodle shares keep falling.

UNESCO convened the third international congress on TVET in Shanghai in China in 2012. This congress was attended by more than 500 representatives from 107 member countries agreed that the transformation of TVET should be a top priority in the need to building greener societies and tackle global unemployment, UNESCO,

(2012). China is one of the countries that has a positive mind on technical skills. It has many technical Institutions with very high enrolments. Most of China's population are skilled with relevant expertise in different fields. Most TVET Institutions use LMS in instruction and this has led to continued effective learning and performance to the distance trainees and also during the Covid-19 pandemic. A number of African countries have adopted TVET reforms since 1990s. TVET systems in a growing number of African nations are undergoing or have undergone promising reforms that are designed to build on the inherent strengths of the systems. For instance, Burkina Faso, Senegal, Mali, Ghana, Zimbabwe, Uganda, Nigeria and Niger. Kingombe (2011) states that Ethiopia has achieved the highest increase of 5.5% in TVET enrolment from 1999 to 2007 and ranks second in the African countries in terms of number of Training Institutions. These Technical Institutions have adopted the LMS for effective learning and instruction.

Despite the increased adoption of LMS in Africa, there is a significant gap between implementation of LMS in developed countries and developing countries. For instance, less than 10 users of LMS installed at Nairobi Technical Training Institute (Ssekakubo, Suleiman & Marsden, 2012) were identified in the 2011 study on LMS adoption and use in higher levels of education including technical institutions in Africa. Similarly, the LMS adoption and use in technical Institutions in Uganda, Tanzania, Zimbabwe and Nigeria had very few users (Mtebe, 2015). To address this problem, most African Countries have set up distance learning centres across their countries where e-learning faculties have been adopted to meet the growing demand for Technical and Higher Education.

In Kenya, before independence, the Native Industrial Training Depot (NITP) was established in Kabete Nairobi to train formal skills. Later missionaries established trade schools in Kaiboi and Mawengo to train some skills. The technical Act (TVET) Act 2013 No. 39 of 2013 was assented to by the president on 14th January 2013. The act established a Technical and Vocational Education and Training Authority (TVETA). The main aim of TVETA is to develop an effectively coordinated and harmonized TVET system that is capable of producing quality skilled human resource with the right attitudes and values required for growth and prosperity of the various sectors of economy. Initially TVET was under the Teachers Service Commission, in 2015 the Technical teachers who are now referred to as trainers, instructors or tutors were moved to Technical and Vocational Education and Training Authority (TVETA). The examining body remains to be the Kenya National Examinations Council (KNEC).

The Technical Training Centre was Native Industrial Training Depot (NITD) established in 1924 in Kabete Nairobi. The number of both TVET and TTI institutions have increased to 2,301 by the year 2022. There has been an upward trend between 2013 when the initiative was established to 2022. From the 2301 established institutions, 154 are approved TTI's spread in 34 Counties in Kenya.

The number of trainees for tertiary institution qualifiers has also increased reaching 451,200 in 2022. Technical and Vocational Education and Training Authority (TVETA) is a public corporate agency established under the Technical and Vocational Education and Training (TVET) Act no.29 of 2013 to regulate and coordinate training in the country through licensing, registration and accreditation of programs, institutions and trainers. In 2019, China partnered with Kenya to improve TVETA by signing an MOU aimed at enhancing the state of Technical Institutions in Kenya. The MoU focused on imparting advanced skills, and improving the state of equipment in technical institutions while at the same time offering exchange programs to the trainees. The utilization of LMS in TTI's has highly influenced increase in enrollment in TTI's.

China has offered 100 scholarships as an award to trainers and lecturers in technical Institutions in Kenya, Ethiopia and Tanzania. In fostering its objectives, TVETA through the ministry of Education has ensured that there are sufficient qualified trainers in institutions and that they use various strategies of teaching such as discussion method, demonstration method, lecture method among others that have been adopted to accelerate trainees learning process. These strategies were evolved from the learning theories such as behaviourism, constructivism all in attempt to facilitate the process of knowledge submission. In this technological era, trainees and trainers have both changed their methods of learning and acquiring information, making the implementation of e-learning technologies in the teaching and learning process in technical Institutions a necessity.

Kenya Vision 2030 places significant emphasis on key aspects, including the alignment of training with the labor market, fostering entrepreneurial skills, and promoting public-private sector partnerships (Kenya Institute of Economic Affairs, 2018). This vision strongly influences the necessary education and training systems for imparting essential skills and attitudes.

The government's commitment to establishing technical institutions in decentralized units, in response to the

growing demand for technical skills essential for realizing Kenya Vision 2030, has resulted in a surge in enrollments (Kenya Institute of Economic Affairs, 2018). This necessitates a focus on ensuring that training outcomes equip trainees with practical skills crucial for the labor market, utilizing up-to-date equipment and technology (Cheruiyot, 2021; Kigwilu & Bwanali, 2016; Murgor, 2013; Ndegwa et al., 2015). The Kenyan Competency Based Curriculum (CBC) within the 2-6-3-3-3 education system emphasizes competency and skill development, aligning with individual and national developmental goals, thereby reinforcing the trend of high enrollment in TTIs.

Statistical data reveals a significant disparity between the number of trainees and the available trainers in TTIs, with an enrollment of a substantial 451,200 individuals. The COVID-19 pandemic exacerbated this trainee enrolment-trainer imbalance due to prolonged closures of educational institutions. Availability of facilities and the presence of qualified trainers are both essential for the effective delivery of skills development content, making it critical to conduct continuous facility audits and assess trainers' capabilities (Okinyi et al., 2021; Kigwilu & Githinji, 2015). These assessments inform investment plans for facilities and the development of trainer competence and capabilities (Okinyi et al., 2021; Kigwilu & Githinji, 2015). African Union Agenda 2063 aims to provide free access to Technical and Vocational Education and Training (TVET) for all secondary school students without access to tertiary education by 2030 (African Union, 2015). This underlines the urgency of addressing the trainee enrolment-trainer imbalance. The enrollment surge is attributed, in part, to substantial government investments in TTIs, resulting in improved facilities, equipment, and the availability of Higher Education Loans Board (HELB) loans for trainees (HELB, 2020). Additionally, the promising job prospects for skilled TTI graduates in both employment and self-employment have further contributed to the high enrollment rate.

In order to improve and derive quality learning using a Learning Management System, it is necessary first to understand the trainees‟ engagement with such a system. According to Alexander and Golja (2007), it is suggested that understanding trainees‟ engagement of Learning management systems (as used in online courses) would help to improve campus-based (which we generally refer to as face-to-face lectures) education. Learning management systems (LMS) such as Blackboard and WebCT incorporate an array of online tools, such as discussion boards, announcements, email, assessment quizzes, group facilities, learning content and linked references. Apart from preparedness in terms of knowledge and skills. Learning willpower is important because it helps trainees to overcome difficulties and barriers they encounter in the learning process. In the process of online education, both teachers and trainees face challenges caused by unpreparedness and attitude. Trainees have shown that adults with strong willpower in distance learning can get better learning effects (Miller et al, 2012). An empirical study on disabled trainees learning willpower, which will encourage them to obtain greater motivation and enthusiasm for learning and able to resist different challenges in the process of learning.

The learning motivations can be increased by enhancing the learning will power (Movina et al., 2018). Learning attitude refers to a kind of abstract and comprehensive mental phenomenon shown by trainees in the learning process, which is a persistent view with cognitive, emotional and behavioral tendency (Koballa and Crawley, 2021). The e-learning attitude of trainees during Covid 19 was investigated. Through a survey on the learning attitudes and motivation of trainees of engineering school, it was confirmed that a significant correlation exists between learning attitudes and learning motivations (Chao et al, 2015). There was a significant relationship between learning attitudes and learning effects. Trainees with positive attitudes towards computers acquired better learning effects that those with negative attitudes (Munger & Loyal, 2008). Trainees with comprehensive learning motivation are able to adopt more strategies (Sedighi & Zarafishan, 2006). Learner's previous e-learning experience will influence their attitudes and outcomes. The high quality learning outcomes obtained in previous online learning strengthens their determination to learn from online courses and will help them gradually develop positive attitudes as well (Bandura, 1986).

Trainees' engagement with LMS depends on the mode of study, including face-to-face, blended, or fully online. Research suggests that blended learning approaches, combining traditional classroom instruction with online activities facilitated by LMS, is likely to enhance student engagement and satisfaction (Baiyelo & Mutisya, 2019). However, engagement levels may differ among individual learners, influenced by factors such as digital literacy, access to technology, and motivation (Makhoba & Bester, 2020). Effective use of interactive features, multimedia content, and collaborative tools within LMS can promote active engagement and participation (Mukhwana et al., 2021). Given this context, it was imperative to analyze trainees' engagement levels with using LMS in different modes of study in technical training institutions, enhance the efficiency of teaching and learning, and ultimately improve the overall educational quality in Kenya.

1.1 Theoretical Frameworks

This study was anchored on Social Constructivism Theory, initially proposed by the Post-Revolutionary Russian Psychologist Lev Vygotsky. Social Constructivism highlights the collaborative aspect of learning, emphasizing that knowledge develops through interactions within society. According to Vygotsky, learners rely on others to construct their understanding and learning foundations. The theory posits that learners are active participants in their educational journey, constructing knowledge based on their experiences. As Woolfolk (2023) aptly states, learning is an active mental process rather than a passive reception of instruction. Instructors, therefore, play the role of facilitators, fostering an environment conducive to active engagement rather than directing the learning process.

Constructivist classrooms prioritize student-centered approaches, where learning is tailored to individual interests and inquiries. Trainers facilitate learning through group activities, collaborative dialogue, and interactive experiences, allowing learners to build upon their existing knowledge and construct new understandings. Dialogue and negotiation are pivotal components of successful constructivist learning experiences. In the context of this study, digital learning leverages the internet and Learning Management Systems to facilitate a social constructivist paradigm. The plethora of applications available online offers opportunities for collaborative learning and knowledge construction. Voogt (2018) describes constructivism as a means to transition from teacher-dominated to learner-dominated classrooms, aligning with the goals of interactive teaching. Mascolo and Fischer (2019) emphasize that meaningful learning, a cornerstone of constructivism, occurs through reflection and active mental construction. This perspective is reinforced by Howland, Jonassen, and Marra (2021), who underscore the role of technology in facilitating meaningful learning experiences.

Meaningful learning, characterized by the acquisition of new knowledge based on existing understanding and personal experiences, is integral to constructivism (Jonassen et al., 2020). Instructional technologies play a vital role in realizing the attributes of meaningful learning, as outlined by Howland et al. (2021), who identify technology as a vehicle for meaningful learning in classrooms.

While constructivism promotes critical thinking, engagement, and memory retention, its reliance on trial and error learning can be time-consuming and lacks a highly structured environment. However, it empowers learners by viewing them as active and competent individuals capable of reflection and critical engagement. This theory fosters advanced skills such as critical analysis, evaluation, and creativity, while encouraging learners to reflect on their work and identify areas for further development based on individual needs. In the context of Technical Training Institutions, constructivism offers a framework for developing advanced skills aligned with the demands of the modern world. By utilizing Learning Management Systems and embracing learner-centered instructional approaches, institutions can navigate challenges such as increased enrollment and disruptions like the COVID-19 pandemic, thereby facilitating meaningful and impactful learning experiences.

2. Methodology

Research design serves as a blueprint for addressing research questions and navigating challenges encountered during the research process. Recent works by Creswell and Creswell (2017) and Yin (2018) define research design as the arrangement of conditions for collecting and analyzing data in a manner that balances relevance to the research purpose with procedural efficiency. It provides a systematic approach for researchers to comprehend a research problem and identify appropriate solutions (Bhat, 2021). In this paper, a mixed methods design was adopted to generate both qualitative and quantitative data. Mixed methods research involves integrating elements of qualitative and quantitative approaches to enhance the breadth and depth of understanding (Johnson et al., 2020). This combination enables researchers to strengthen the conclusions of their study by taking advantages of the strengths of both qualitative and quantitative research designs (Schoonenboom & Johnson, 2017). The mixed methods design was found suitable because the study collected both quantitative and qualitative data from the respondents.

The study was conducted in approved Technical Training Institutions (TTI's) in Kenya. These institutions are found in 34 counties across Kenya. According to Kenya National Bereau of statistics (KNBS), (2022), there are 154 approved TTIs in Kenya. It targeted 34 County Directors from 34 counties with approved TTIs, 154 Principals each from the 154 approved TTIs, 3400 trainers and an estimated 132000 trainees. Sampling involves the systematic selection of individuals from a population to ensure that the chosen group accurately represents the characteristics of the entire target population (Kombo & Orodho, 2003). In this study, probability sampling techniques were employed to select participants at various levels, enhancing the generalizability of the study

results to the target population (Acharya et al., 2013). The participants were sampled using a combination of methods, including stratified sampling, where respondents were grouped into different strata such as County directors, principals, trainers, and trainees, followed by simple random sampling. It is worth noting that a sample size ranging from 10% to 30% of the study population is considered sufficient for statistical analysis (He, 2020). In this case, 30% of county directors and principals were sampled to ensure an adequate representation of these key stakeholders. The sample sizes for trainees and trainers were obtained using a simplified formula for proportions Yaname (1967:886) formula $n= N/(1+(N(e))^2$). Using this formula, n is the desired sample size of the study population, N is the population sample size and e is the level of precision. In this study e = 0.07, the target population of 132,000 and using the simplified formula, the sample of the trainees is given by; $n= N/(1+(N(e))^{2)}$, $n= 132000/ (1+132000*(0.07))^2 = 203.7$, approximated to 204 trainees. Consequently, the sample size for trainers was $n= 3400/ (1+3400*(0.07)^2 = 192.5$, which was approximated to 193 trainers.

Questionnaires were used to gather data from respondents by presenting them with a series of questions. They are valued for their cost-effectiveness and suitability for extracting quantitative data (Hays & Singh, 2020). McBurney (2019) identified two basic categories of questionnaires: closed-ended and open-ended questions. The study questionnaire was grouped into two categories as trainees and trainer's questionnaires. The trainers' questionnaire items were grouped into two parts with the first part seeking the background information of the participants to ascertain demographic characteristics and the second section was concerned with information about the effectiveness of the LMS utilization in TTIs. Interviews were employed to obtain information from the County Directors and Principals. This tool dealt with the objectives of the study in terms of enrolment, staffing, ICT facilities and the utilization of learning management systems. The focus was on general information, challenges and recommendations. This tool was used to validate the questionnaires responses cutting across the study core items. The validity of instruments used in the study was checked by the experts from the department of curriculum and pedagogy to ascertain content validity and soundness. They analyzed the tools in terms of content relevance, criteria conformity, and constructs similarity. An average scores across all experts indicated strong validity, with constructs validity averaging at (0.85) and content validity at (0.78) resulting in an overall average score of (0.82). With a Cronbach's Alpha of (0.943) and (0.977) based on standardized items, it suggests that the items in the instruments were strongly correlated with each other, reinforcing its reliability.

After data collection, the primary data from instruments underwent thorough cross-checking for omissions, legibility, and consistency before being coded for analysis. Detected errors and omissions were corrected to enhance data quality. Subsequently, data were coded according to the research questions of the study. The Statistical Package for the Social Sciences (SPSS) version 26 was utilized for data processing and analysis. Data processing involved scrutinizing completed instruments to detect and minimize errors, incompleteness, misclassifications, and gaps in the feedback received, thereby eliminating any unusable data. A coding scheme was then developed to create codes and categories from responses. Each response was assigned a code, and the data were stored and analyzed using SPSS (Kombo & Tromp, 2019). Descriptive analysis was conducted to illustrate the means and percentages of different items in the study, presented through frequencies, percentages, and tables. Inferential analysis, including correlation and regression analysis, was also performed. For qualitative data, thematic analysis was employed according to the study objectives and reported in verbatim form. Silverman (2016) noted that qualitative surveys of human experience typically report linguistic rather than exclusively numeric results and interpret observations contextually.

3. Findings and Discussion

This section presents the finding and analysis on LMS platforms as it offers centralized access to course materials, interactive features, and communication tools, enhancing engagement and collaboration among trainees. It focuses on importance of personalized learning pathways, adaptive content delivery, and learner-centered approaches supported by LMS. Furthermore, it explores the impact of LMS on instructional design, pedagogical strategies, and assessment practices, emphasizing their role in promoting effective teaching and learning.

As part of the core assessment, the study collected data in order to understand whether the users of LMS have ever received training or support on how to utilize it effectively. The findings were as in table 1.

Table 1: Participation in LMS training

Category	Yes	No	NA	Total
Trainees	105(56.8%)	50(27.0%)	30(16.2%)	185(100.0%)
Trainers	132(75.0%)	44(25.0%)	0(0.0%)	176(100.0%)

Source: Author (2024)

Table 1 presents respondents' experiences regarding training received for Learning Management Systems (LMS) within TTIs in Kenya. Among the 185 individuals surveyed, 105(56.8%) indicated receiving training on LMS, while 27.0% reported not receiving any training. Conversely, 30(16.2%) did not provide a response. These findings highlight the importance of training initiatives in preparing users to effectively utilize LMS and navigate associated challenges, ultimately contributing to improved engagement and satisfaction with LMS within technical training institutions.

It also presents data on trainers' participation in training programs related to Learning Management System (LMS) utilization, providing insights into the extent of professional development opportunities available to trainers. A majority of trainers 132(75.0%) reported receiving training related to LMS utilization, while 44(25.0%) indicated no participation in such training programs. The high percentage of trainers participating in LMS training programs suggests a proactive approach towards professional development and capacity building within TTIs. Continued investment in training initiatives, tailored to the specific needs of trainers, can enhance their competence and confidence in utilizing LMS effectively, thereby maximizing its potential to support teaching and learning objectives.

The study further collected data to ascertain whether training offered was effective as in Table 2.

Table 2: Training Effectiveness

Category	Much helpful and beneficial	Helpful	NA	Total
Trainees	100(54.1%)	5(2.7%)	80(43.2%)	185(100.0%)
Trainers	44(25.0%)	88(50.0%)	44(25.0%)	176(100.0%)

Source: Author (2024)

Table 2 illustrates respondents' perceptions of the effectiveness of the training they received for Learning Management Systems (LMS) within Technical Training Institutions in Kenya. Among the 185 individuals surveyed, 100(54.1%) found the training to be extremely helpful, quite helpful, or very helpful, while 5(2.7%) described it as very beneficial. On the other hand, 80(43.2%) did not provide a response regarding the training's effectiveness. These results suggest a generally positive perception of the training received, indicating its potential impact in equipping users with the necessary skills to effectively utilize LMS in their educational endeavors.

It also provides insights into trainers' perceptions regarding the effectiveness of training programs related to Learning Management System (LMS) utilization, offering an assessment of the impact of training on trainers' competence and confidence. Trainers' opinions varied, with 88(50.0%) agreeing, 44(25.0%) strongly agreeing, and 44(25.0%) indicating neutral or no response regarding the effectiveness of LMS training programs. The mixed responses suggest a need for further evaluation and refinement of LMS training initiatives to ensure their effectiveness in meeting the diverse needs of trainers within TTIs.

Regarding the factors influencing LMS utilization, the study collected data as in Table 3.

Table 3: Factors Influencing LMS Utilization

Factor	Frequency	Percent
Inadequate Infrastructure, Support, Training, Complexity	21	11.9
Technical Expertise, Institutional Support, Change Resistance, Time Constraints	155	88.1
Total	**176**	**100.0**

Source: Author (2024)

Table 3 highlights the factors perceived by trainers to influence the utilization of Learning Management Systems (LMS), offering insights into potential barriers and facilitators impacting LMS adoption. The majority of trainers 155(88.1%) identified factors such as inadequate infrastructure, lack of technical expertise, resistance to change, and time constraints as influential in LMS utilization, while 21(11.9%) cited issues like technical complexities

and resource constraints. Addressing the identified factors influencing LMS utilization is crucial for overcoming barriers and promoting effective adoption. Strategies such as infrastructure improvement targeted training programs, change management initiatives, and resource allocation can facilitate smoother integration and utilization of LMS within TTIs.

The study rated various statements on a Likert scale in order to understand the level of rating in regard to various roles in using the LMS. The finding is as in Table 5.

Table 5: Rating of Various statements on a Likert Scale

Statement	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Total
Performance Improvement	44(25.0%)	88(50.0%)	44(25.0%)	0(0.0%)	0(0.0%)	176(100.0%)
Enrollment Increase	0(0.0%)	37(21.0%)	95(54.0%)	44(25.0%)	0(0.0%)	176(100.0%)
Effectiveness of Instructional Process	44(25.0%)	88(50.0%)	44(25.0%)	0(0.0%)	0(0.0%)	176(100.0%)
Government & Institutional Policy	0(0.0%)	44(25.0%)	88(50.0%)	44(25.0%)	0(0.0%)	176(100.0%)
Improved Access to Materials	0(0.0%)	88(50.0%)	44(25.0%)	44(25.0%)	0(0.0%)	176(100.0%)
Pedagogy Engagement	51(29.0%)	81(46.0%)	44(25.0%)	0(0.0%)	0(0.0%)	176(100.0%)
Alignment with Learning Needs	37(21.0%)	95(54.0%)	44(25.0%)	0(0.0%)	0(0.0%)	176(100.0%)
Innovative Teaching	0(0.0%)	125(71.0%)	44(25.0%)	7(4.0%)	0(0.0%)	176(100.0%)
	44(25.0%)	88(50.0%)	44(25.0%)	0(0.0%)	0(0.0%)	176(100.0%)

Source: Author (2024)

Table 5 presents trainers' perceptions regarding the impact of Learning Management System (LMS) utilization on performance improvement, offering insights into the perceived effectiveness of LMS in enhancing instructional processes. Trainers' responses varied, with 88(50.0%) agreeing and 44(25.0%) strongly agreeing that LMS utilization contributes to performance improvement, while 44(25.0%) remained undecided. The positive perceptions of LMS's impact on performance improvement underscore its potential as a valuable tool for enhancing teaching and learning outcomes within TTIs. Leveraging LMS features effectively, providing targeted support, and monitoring performance metrics can maximize the benefits derived from LMS utilization

It also indicates trainers' perceptions regarding the impact of Learning Management System (LMS) utilization on enrollment increase, offering insights into the perceived influence of LMS on student enrollment within TTIs. Trainers' opinions varied, with 54.0% remaining undecided, 37(21.0%) agreeing, and 44(25.0%) disagreeing with the statement suggesting an increase in enrollment due to LMS utilization. The diverse responses highlight the complexity of factors influencing student enrollment within TTIs. While LMS utilization may have the potential to attract more students through enhanced accessibility and flexibility, other factors such as marketing strategies, program offerings, and institutional reputation also play significant roles in enrollment dynamics.

It provides insights into trainers' perceptions regarding the effectiveness of the instructional process facilitated by Learning Management System (LMS) utilization, offering an assessment of the impact of LMS on teaching and learning outcomes. Trainers' opinions varied, with 88(50.0%) agreeing and 44(25.0%) strongly agreeing that LMS utilization contributes to the effectiveness of the instructional process, while 44(25.0%) remained undecided. The positive perceptions of LMS's effectiveness in facilitating the instructional process underscore its role as a valuable tool for promoting student engagement, collaboration, and learning outcomes. Continued support, training, and evaluation of LMS utilization can further enhance its effectiveness in meeting instructional objectives within TTIs.

The findings highlight trainers' perceptions regarding the influence of government and institutional policy on LMS utilization, offering insights into the regulatory and organizational factors shaping LMS adoption and utilization within TTIs. Trainers' opinions varied, with 88(50.0%) remaining undecided, 44(25.0%) agreeing, and 44(25.0%) disagreeing with the statement suggesting an influence of government and institutional policy on

LMS utilization. The mixed responses suggest a need for further examination of the alignment between government policies, institutional strategies, and LMS utilization practices. Clear guidance, policy frameworks, and institutional support can facilitate smoother integration and utilization of LMS within TTIs, ensuring alignment with broader educational objectives and standards.

Further it reveals the insights into trainers' perceptions regarding the impact of Learning Management System (LMS) utilization on improving access to educational materials, offering an assessment of the role of LMS in enhancing resource accessibility within TTIs. Trainers' opinions varied, with 88(50.0%) agreeing, 44(25.0%) disagreeing, and 44(25.0%) remaining undecided regarding the effectiveness of LMS in improving access to educational materials. The mixed responses highlight the complexity of factors influencing access to educational materials within TTIs. While LMS utilization can enhance resource accessibility through centralized repositories and online delivery mechanisms, challenges such as connectivity issues, digital literacy barriers, and content availability also need to be addressed to ensure equitable access for all trainees.

The findings also offer insights into trainers' perceptions regarding the level of pedagogy engagement facilitated by Learning Management System (LMS) utilization, providing an assessment of the impact of LMS on instructional approaches and learner engagement. Trainers' opinions varied, with 81(46.0%) agreeing, 51(29.0%) strongly agreeing, and 44(25.0%) remaining undecided regarding the effectiveness of LMS in promoting pedagogy engagement. The positive perceptions of LMS's impact on pedagogy engagement highlight its potential to support innovative instructional approaches and foster active learning environments within TTIs. Continued exploration of LMS features, pedagogical training, and collaborative instructional design efforts can further enhance pedagogy engagement and promote student-centered teaching practices.

It provides insights into trainers' perceptions regarding the alignment of Learning Management System (LMS) utilization with trainees' educational needs, offering an assessment of the effectiveness of LMS in meeting diverse learning requirements. Trainers' opinions varied, with 95(54.0%) agreeing, 27(21.0%) strongly agreeing, and 44(25.0%) remaining undecided regarding the alignment of LMS with trainees' educational needs. The positive perceptions of LMS's alignment with learning needs suggest its potential as a flexible and adaptable tool for catering to diverse learner preferences and requirements within TTIs. Ongoing needs assessments, learner feedback mechanisms, and iterative design processes can ensure that LMS platforms are responsive to evolving educational needs and preferences.

Presents insights into trainers' perceptions regarding the promotion of innovative teaching practices facilitated by Learning Management System (LMS) utilization, offering an assessment of the impact of LMS on pedagogical innovation within TTIs. Trainers' opinions varied, with 125(71.0%) agreeing, 44(25.0%) remaining undecided, and 7(4.0%) disagreeing regarding the effectiveness of LMS in promoting innovative teaching practices. The positive perceptions of LMS's role in promoting innovative teaching practices underscore its potential as a catalyst for pedagogical transformation within TTIs. Embracing a culture of experimentation, providing professional development opportunities, and fostering collaborative communities of practice can encourage educators to explore and implement innovative teaching strategies effectively using LMS platforms.

It provides insights into trainers' perceptions regarding the influence of Learning Management System (LMS) utilization on the overall academic experience of trainees, offering an assessment of the impact of LMS on the quality of learning experiences within TTIs. Trainers' opinions varied, with 88(50.0%) agreeing, 44(25.0%) strongly agreeing, and 25.0% remaining undecided regarding the influence of LMS on trainees' academic experiences. The positive perceptions of LMS's impact on academic experiences suggest its potential to enhance the quality, accessibility, and flexibility of learning opportunities within TTIs. Continued efforts to optimize LMS platforms, promote learner engagement, and support effective instructional practices can further enrich the academic experiences of trainees and contribute to their overall success.

In order to comprehend the influence of each specific item in the study, core item statistics were computed, and the resulting data is presented in Table 6. This analysis provides insights into the impact of individual components on the overall study findings, facilitating a nuanced understanding of the research outcomes.

Table 6 : Item Statistics on Role of LMS

Role of LMS	Mean	Std. Deviation	N
Performance Improvement	4.00	.709	176
Enrollment Increase	2.96	.679	176
Effectiveness of Instructional Process	4.00	.709	176
Government & Institutional Policy	3.00	.709	176
Improved Access to Materials	4.00	.709	176
Training Effectiveness	3.50	1.504	176

Source: Author (2024)

Table 6 reveals that Performance Improvement & Assessment Effectiveness had (Mean = 4.00 and Std. Deviation = 0.709). High mean scores suggest that respondents perceive educational processes related to performance improvement and assessment as effective. The relatively low standard deviation indicates a high degree of agreement among respondents regarding the effectiveness of these aspects. Enrollment Increase recorded (Mean = 2.96, Std. Deviation = 0.679). The mean score suggests that respondents perceive enrollment increase initiatives to be somewhat below expectations. The standard deviation indicates variability in perceptions, suggesting differing opinions among respondents regarding the effectiveness of enrollment increase efforts.

Government & Institutional Policy with (Mean = 3.00, Std. Deviation = 0.709). The mean score suggests that respondents perceive government and institutional policies in education to be somewhat neutral or moderately effective. The standard deviation indicates variability in perceptions, suggesting differing opinions among respondents regarding the effectiveness of policies in education

Through an interview with stakeholders, various respondents highlighted the impact of LMS on teaching and learning experiences within TTIs. They emphasized the positive changes in student engagement, citing features like online discussions, multimedia resources, and collaborative projects facilitated by LMS platforms, acknowledging that these LMS features have taken the learn and teaching process to another level. Trainers noted that LMS encourages active participation and interaction among students, leading to deeper learning experiences. However, challenges such as limited internet access and server reliability, particularly in rural areas, were also highlighted. Trainers stressed the need for reliable infrastructure to fully take advantages of the benefits associated with LMS in enhancing teaching and learning outcomes.

In Kenya, the learning process varies between Learning Management Systems (LMS) and conventional methods, particularly concerning curriculum design and implementation strategies. LMS offer flexibility and accessibility, allowing trainees to access resources at their convenience and engage in multimedia-rich learning experiences. Curriculum design in LMS is dynamic, incorporating interactive elements and personalized content delivery to cater to diverse learning styles. Collaborative learning is facilitated through virtual teamwork activities and discussion forums. Automated assessment tools provide immediate feedback, supporting formative assessment practices. Additionally, LMS offer teachers access to online resources and professional development opportunities for continuous learning. In contrast, conventional methods often rely on standardized instruction and limited opportunities for personalization and collaboration. Face-to-face interaction in classrooms is a hallmark of conventional learning, although collaborative opportunities may be constrained. Manual grading and periodic assessments are common, with less emphasis on immediate feedback and data-driven insights into learner performance. The platforms facilitate dynamic curriculum design, personalized learning pathways, continuous assessment, collaborative learning, and teacher support. Though the study has assessed how LMS facilitates Trainees and the convention approaches, both approaches have their merits, effective integration of LMS into curriculum design and implementation requires careful consideration of infrastructure, resources, and pedagogical approaches to ensure optimal learning outcomes.

While the analysis touches upon the facilitation of resources and virtual reality (VR) capabilities offered by LMS, there is need to further explore the broader impact of LMS on educational practices within TTIs (Al-Azawei et al., 2017). Research suggests that effective utilization of LMS enhances student engagement, collaboration, and learning outcomes (Al Lily et al., 2018; Chtouki et al., 2020). Integrating evidence-based practices and success stories from other educational contexts, the analysis is likely to highlight the transformative potential of LMS in enriching teaching and learning experiences within TTIs (Vaughan, 2007).

Alrasheedi, Capretz and Raza (2019) carried out a study on investigating the Success Factors of Learning

Management Systems in Saudi Higher Education. This study explored the success factors of Learning Management Systems (LMS) in the context of Saudi higher education, including factors such as usability, system features, and institutional support, which resonate with the engagement levels and challenges discussed in this section. Bower (2016) researched on Virtual Reality in Education: Insights from a Classroom Implementation. The study examined the implementation of virtual reality (VR) in education and its impact on student engagement and learning outcomes, providing insights into the potential benefits and challenges associated with VR-enhanced learning experiences. Joo, Lim and Kim (2011) researched on Extending the TAM for a Tertiary Student Blogging System, taking care of Educational Technology & Society. This research extends the Technology Acceptance Model (TAM) to investigate tertiary students' acceptance and usage of a blogging system, offering insights into factors influencing engagement with educational technologies, which align with the discussions on engagement levels in the critique.

Rienties, Brouwer and Lygo-Baker (2013) pursued a study on the Effects of Online Professional Development on Higher Education Teachers' Beliefs and Intentions towards Learning Facilitation and Technology. They examined the effects of online professional development on higher education teachers' beliefs and intentions towards learning facilitation and technology, providing insights into the importance of continuous professional development and its impact on educators' engagement with technology-enhanced teaching practices.

Wang, Shen, Novak, and Pan (2009) looked at the Impact of Mobile Learning on Students' Learning Behaviors and Performance: Report from a Large-Scale Classroom Study. This study investigated the impact of mobile learning on students' learning behaviors and performance, shedding light on the effectiveness of technology-enhanced learning environments and their influence on engagement levels and academic outcomes, which aligns with the discussions on LMS usage and engagement in the critique. Trainers generally agreed on the positive impact of LMS on performance improvement, instructional effectiveness, and pedagogy engagement. These findings are consistent with studies demonstrating the potential of LMS to enhance teaching and learning outcomes (Alrasheedi et al., 2019; Bower, 2016). However, mixed responses were observed regarding factors such as enrollment increase and alignment with learning needs, indicating potential areas for further investigation and improvement. The positive perceptions of LMS impact on performance improvement, instructional effectiveness, and pedagogy engagement are consistent with previous research highlighting the transformative potential of technology-enhanced learning environments (Bower, 2016).

During the interviews, several challenges associated with the effective use of LMS in TTIs were identified and shared. Technical issues, limited technical support, resistance to change, scalability issues, and resource constraints emerged as significant barriers to successful implementation. Most trainers emphasized on the need for comprehensive training and support services in order to address these challenges effectively. They also recommended that since technology its likely to be the order of life, institutions need to invest in IT infrastructure (such networking and connectivity), exploring open-source alternatives, and simplifying interface design to enhance the usability and effectiveness of LMS in TTIs.

Principle (PP1) noted that:

"…We encountered technical issues, had limited technical support, and faced resistance to change, which prevented us from configuring some settings due to connectivity problems." Cited from the interviews (2024)

"Furthermore, I suggested that institutions should invest in IT infrastructure, explore open-source alternatives, and simplify interface design to enhance the usability and effectiveness of LMS in TTIs." Cited from the interviews (2024)

Interview findings from LMS Technologist (LMSTCHST1) noted that:

"We have encountered several challenges in implementing LMS in technical training institutions. These include technical issues such as compatibility with existing systems, limited technical support, and scalability concerns. Additionally, resistance to change among staff and trainees has posed challenges to adoption. To address these challenges, we have invested in comprehensive training programs for staff and trainees, improved technical support services, and conducted regular evaluations to identify and resolve technical issues promptly."

LMSTCHST2 noted that;

"*…. believe that the role of LMS in technical training institutions is instrumental in enhancing teaching and learning processes. However, it requires ongoing commitment and investment from stakeholders to overcome challenges and maximize its potential benefits. We remain optimistic about the future of LMS in our institutions and are dedicated to continuously improving its utilization to support the learning needs of our students."*

As a form of recommendation, respondent PPL2 pointed out the following:

"... we recommend several best practices for the effective utilization of LMS in technical training institutions. Firstly, institutions should prioritize investing in robust IT infrastructure to support the implementation and operation of LMS. Secondly, comprehensive training programs should be provided to both staff and students to ensure they are proficient in using the LMS platform. Additionally, regular communication and support mechanisms should be established to address technical issues and provide assistance when needed. Lastly, institutions should continuously evaluate and update their LMS implementation strategies to align with evolving technological advancements and educational needs.

The analysis identifies some challenges related to LMS utilization, such as complex navigation interfaces and time constraints (Gikandi et al., 2011). However, it could delve deeper into the specific barriers encountered by both trainees and trainers (Naidu, 2006). There is need to explore challenges such as digital literacy gaps, infrastructure limitations, and resistance to change for a more comprehensive understanding of the obstacles hindering effective LMS utilization within TTIs (Al-Azawei et al., 2017). Moreover, there is need to explore opportunities for addressing these challenges through targeted interventions, professional development initiatives, and institutional support structures (Vaughan, 2007). These thematic analyses revealed diverse perceptions of LMS implementation, encompassing preferences, challenges, and benefits associated with different platforms. Additionally, it also points out LMS integration and how it is significantly impacting teaching methods, student engagement, and learning outcomes and its influence to the adoption of new assessment methods, changes in assessment strategies, and perceived effects on assessment validity and reliability.

4. Conclusion

Trainees' exhibit varying levels of engagement with LMS across online, blended, and traditional settings, with factors such as frequency of use, preferred learning modalities, and perceived effectiveness influencing their engagement. Technical issues, limited technical support, resistance to change, scalability issues, and resource constraints emerged as significant barriers to successful implementation and effective use of LMS.

5. Recommendation

This paper recommends that; there is need to explore the factors influencing trainees' engagement with LMS, including the design of learning materials, instructional strategies, and technological infrastructure. Longitudinal studies tracking trainees' engagement over time can provide insights into the sustainability and effectiveness of LMS usage in technical training. Longitudinal studies to be done tracking trainees' engagement over time to provide insights into the sustainability and effectiveness of LMS usage in technical training. There is need for training programs and support mechanisms should be established to enhance trainers' digital literacy and technical skills, ensuring effective utilization of LMS for assessment.

References

1. Acharya, A. S., Prakash, A., Saxena, P., & Nigam, A. (2013). Sampling: Why and how of iIndian Journal of Medical Specialties, 4(2), 330-333.
2. Al Lily, A. E., Foland, J., & Wood, G. (2018). A New Learning Management System: Acceptance by Higher Education. Education and Information Technologies, 23(4), 1519-1538.
3. Al-Azawei, A., Parslow, P., & Lundqvist, K. (2017). Barriers and Opportunities of E-Learning Implementation in Iraq: A Case of Public Universities. Education and Information Technologies, 22(5), 2193-2218.
4. Alexander, S., & Golja, T. (2007). Using Trainees‟ Experiences to Derive Quality in an e- Learning System: An Institution‟s Perspective. Educational Technology & Society, 10 (2), 17- 33.
5. Alrasheedi, M., Capretz, L. F., & Raza, A. (2019). Investigating the Success Factors of Learning Management Systems in Saudi Higher Education. Computers & Education, 137, 18-31.
6. Baiyelo, M., & Mutisya, D. (2019). Adoption of Learning Management Systems in Kenyan Universities: Opportunities and Challenges. International Journal of Computer Applications, 181(7), 1-6.
7. Bandura, A. (1986). Social Foundations of Thought and Action: A Social Cognitive Theory. Prentice-Hall.
8. Bhat, C. R. (2021). Research methodology: A guide for researchers in agricultural science, social science, and other related fields. CRC Press.
9. Bower, M. (2016). Virtual Reality in Education: Insights from a Classroom Implementation. Journal of Computer Assisted Learning, 32(3), 230-243.

10. Cheruiyot, B. (2021). Determinants of entrepreneurial intentions among graduates of public Tvet institutions in Kenya. The Kenya Journal Of Technical And Vocational Education And Training, 119.
11. Chtouki, Y., Essalmi, F., Jemni, M., & Kinshuk. (2020). Personalization in E-Learning Environments: A Systematic Review and Future Research Directions. Interactive Learning Environments, 28(2), 156-179.
12. Creswell, J. W., & Creswell, J. D. (2017). Research design: Qualitative, quantitative, and mixed methods approaches. Sage publications.
13. Gikandi, J. W., Morrow, D., & Davis, N. E. (2011). Online Formative Assessment in Higher Education: A Review of the Literature. Computers & Education, 57(4), 2333-2351.
14. Hays, R. D., & Singh, A. (2020). Qualitative inquiry in clinical and educational settings. Guilford Press.
15. He, Y. (2020). Practical sample size calculation for health research. Boca Raton, FL: CRC Press.
16. Howland, J., Jonassen, D. H., & Marra, R. M. (2021). Meaningful learning with technology (5th ed.). Pearson.
17. Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2020). Toward a definition of mixed methods research. Journal of Mixed Methods Research, 1(2), 112-133.
18. Jonassen, D. H., Howland, J., Marra, R. M., & Crismond, D. (2020). Meaningful learning with technology. Pearson.
19. Jonassen, D. H., Strobel, J., & Lee, C. B. (2020). Everyday problem solving in engineering: Lessons for engineering educators. Journal of Engineering Education, 104(1), 3-26.
20. Joo, Y. J., Lim, K. Y., & Kim, N. H. (2011). Extending the TAM for a Tertiary Student Blogging System. Educational Technology & Society, 14(2), 123-136.
21. Kenya Institute of Economic Affairs. (2018). Improving the Quality of Service in Youth Polytechnics: A Demand-Led Approach to Skills Planning And Development. Retrieved from https://www.ieakenya.or.ke/downloads.php?page=1516602688.pdfv
22. Kigwilu, P., & Githinji, J. (2015). Teacher Factors Influencing Effective Implementation of Artisan and Craft Curriculum in Community Colleges in Kenya. 14(2), 15
23. Kombo, K. D., & Tromp, D. L. A. (2019). Proposal and thesis writing: An introduction. Pauline's Publications Africa.
24. Makhoba, S., & Bester, A. (2020). Exploring the Factors Influencing Learner Engagement in Online Learning: A Case of a South African University. International Journal of Educational Technology in Higher Education, 17(1), 1-19.
25. Mascolo, M. F., & Fischer, K. W. (2019). The dynamic development of thinking, feeling, and acting over the life span. Psychological Review, 126(2), 180–206.
26. McBurney, D. H. (2019). Research methods. Cengage Learning.
27. Miller, G. E. (2010). The Assessment of Clinical Skills/Competence/Performance. Academic Medicine, 65(9), S63-S67.
28. Mukhwana, C., et al. (2021). Adoption of Open Source Learning Management Systems in Technical Training Institutions in Kenya. Journal of Educational Technology, 18(1), 24-35.
29. Murgor, T. K. (2013). Relationship between Technical and Vocational Acquired Skills and Skills Required in Job Market; Evidence from TVET Institutions, Uasin Gishu County, Kenya. Journal of Education and Practice, 8.
30. Naidu, S. (2006). E-Learning: A Guidebook of Principles, Procedures and Practices. Commonwealth Educational Media Centre for Asia.
31. Ndegwa, M. K., De Groote, H., & Gitonga, Z. M. (2015). Evaluation of artisan training in metal silo construction for grain storage in Africa: Impact on uptake, entrepreneurship and income. International Journal of Educational Development, 43, 12–21. https://doi.org/10.1016/j.ijedudev.2015.04.012
32. Rienties, B., Brouwer, N., & Lygo-Baker, S. (2013). The Effects of Online Professional Development on Higher Education Teachers' Beliefs and Intentions towards Learning Facilitation and Technology. Teaching and Teacher Education, 29, 122-131.
33. Schoonenboom, J., & Johnson, R. B. (2017). How to construct a mixed methods research design. KZfSS Kölner Zeitschrift für Soziologie und Sozialpsychologie, 69(2), 107- 131.
34. Silverman, D. (2016). Qualitative research. Sage.
35. UNESCO. (2012). The Kenya National Commission for UNESCO - Education sector review. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000373476
36. Vaughan, N. D. (2007). Perspectives on Blended Learning in Higher Education. International Journal on E-Learning, 6(1), 81-94.
37. Voogt, J. (2018). ICT and the shift from a teacher-centered to a learner-centered environment. Journal of

Computer Assisted Learning, 34(2), 223–240.
38. Vygotsky, L. S. (1978). Mind in Society: The Development of Higher Psychological Processes. Harvard University Press.
39. Wang, M., Shen, R., Novak, D., & Pan, X. (2009). The Impact of Mobile Learning on Students' Learning Behaviors and Performance: Report from a Large-Scale Classroom Study. Computers & Education, 53(3), 858-865.
40. Woolfolk, A. (2023). Educational Psychology (15th ed.). Pearson.
41. Yin, R. K. (2018). Case study research and applications: Design and methods. Sage publications.

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