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INFLUENCE OF BLENDED LEARNING ON THE ACQUISITION OF TECHNICAL COMPETENCE AMONG TRAINEES OF PUBLIC TECHNICAL AND VOCATIONAL COLLEGES IN LAIKIPIA COUNTY, KENYA

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Abstract: Technical competence is critical for preparing a workforce capable of driving socio-economic development. This study examined the influence of blended learning on the acquisition of technical skills among trainees in public Technical and Vocational Colleges (TVCs) in Laikipia County, Kenya. Guided by Kolb's experiential learning theory, a descriptive research design was employed with a sample of 145 respondents, including principals, heads of department, trainers, and final-year trainees. Data were collected through interviews and questionnaires and analysed using descriptive statistics and thematic analysis. Findings revealed that blended learning techniques, particularly the integration of PowerPoint on websites and classroom presentations, were positively received, with 85.8% of respondents agreeing that such approaches improved graduate competence with a mean score of 4.13. Educational resources were perceived as adequate by 77% of respondents, while 75% reported that online platforms such as Google Classroom enhanced flexibility and participation. However, online teaching alone was insufficient for delivering practical, hands-on skills. Evaluation methods were found to be crucial, with 98% of respondents affirming the effectiveness of task-based assessments in reinforcing competence. The study concluded that blended learning enhances technical competence when combined with adequate resources and authentic evaluation strategies. It recommended capacity building for trainers in blended pedagogy, upgrading workshops with modern resources, and integrating immersive technologies such as virtual simulation and augmented reality to strengthen practical training. These measures could improve the pedagogical environment of TVCs, thereby enhancing graduate competence and workforce readiness.

Keywords: Blended learning, technical competence, trainees, public Technical and Vocational colleges

1.0 INTRODUCTION

Technical competence is widely recognized as a cornerstone for socio-economic development, enabling graduates to contribute effectively to industrial growth and national productivity [1]. In the 21st century, industries demand not only theoretical knowledge but also practical, job-ready skills, positioning Technical and Vocational Education and Training (TVET) institutions as critical drivers of workforce development [2]. Blended learning, defined as the integration of face-to-face instruction with online and technology-mediated approaches, has emerged globally as a promising pedagogical strategy to enhance learning outcomes. Studies show that blended learning improves flexibility, learner engagement, and access to diverse resources, while also fostering resilience in education systems [3]; [4]. In Kenya, the Technical and Vocational Education and Training Authority (TVETA) has introduced guidelines for Open, Distance, and e-Learning (ODeL), encouraging institutions to adopt blended approaches to strengthen training delivery [5].

Despite these reforms, concerns remain about the readiness of TVET graduates to meet industry expectations. Research highlights gaps in empirical evidence on how blended learning specifically affects the acquisition of technical competence in Kenyan TVET institutions [6]. In Laikipia County, public TVCs face challenges such as limited resources, uneven adoption of digital platforms, and varying levels of instructor preparedness [4]. While blended learning offers potential solutions, its effectiveness in delivering the hands-on skills needed in technical fields remains insufficiently examined.

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This study, therefore, examined the influence of blended learning on the acquisition of technical skills among trainees in public TVCs in Laikipia County, Kenya. Guided by Kolb's experiential learning theory, the research examines how blended methods influence skill acquisition, emphasising the interaction between traditional classroom approaches and online platforms. By addressing this gap, the study enhances understanding of how pedagogical innovation can improve workforce readiness in Kenya's TVET sector.

1.1. Statement of the Problem

Despite ongoing reforms in Kenya's TVET sector, concerns persist about graduates' readiness to meet industry expectations. Employers often report gaps in practical competence, especially in areas requiring hands-on technical skills [2]. While blended learning is promoted as a flexible and innovative approach to instruction, evidence regarding its effectiveness in improving technical competence in Kenyan TVET institutions remains limited [4]. In Laikipia County, public TVCs face challenges such as uneven adoption of digital platforms, limited instructor preparedness, and insufficient integration of online tools with practical training. This lack of clarity on the pedagogical impact of blended learning creates uncertainty for policymakers, trainers, and trainees, emphasising the need for focused research on its influence within local contexts.

1.2. Theoretical Framework

This research draws upon Kolb's experiential learning theory (1984), which underpins the widely recognised Kolb Learning Style Inventory (LSI). The LSI has become a prominent tool for identifying and evaluating individual learning preferences within the framework of experiential learning [7]. Despite ongoing scrutiny, Kolb's model remains a foundational approach for classifying how learners absorb and interpret information [8]. The selection of Kolb's theory and the LSI for this study is informed by their emphasis on the dynamic relationship between learners and their educational context [9]. This framework was particularly relevant for assessing how blended learning techniques integrate practical and digital experiences to shape technical competence.

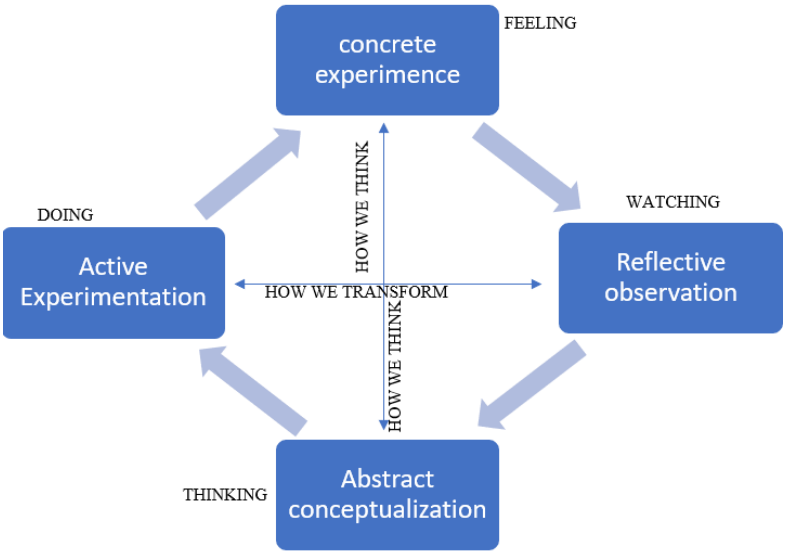


Figure 1 Theoretical Framework of Kolb's Learning Theory

2.0 LITERATURE REVIEW

Blended learning is broadly defined as the integration of face-to-face instruction with online and technology-mediated approaches, designed to combine the strengths of traditional classroom teaching with the flexibility of digital platforms [3]. It has emerged as a transformative pedagogical model in both higher education and vocational training, offering learners opportunities to engage actively, access diverse resources, and develop competencies through multiple modes of delivery.

Blended learning has been globally associated with improved learner engagement, enhanced retention of knowledge, and greater adaptability to diverse learning needs [1]. Studies in vocational education highlight its potential to bridge the gap between theoretical knowledge and practical application, especially when digital tools are integrated with hands-on training [10]. However, challenges such as digital divides, limited infrastructure, and instructor preparedness remain significant barriers to effective implementation.

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In Kenya, the Technical and Vocational Education and Training Authority (TVETA) has introduced guidelines for Open, Distance, and e-Learning (ODeL), encouraging institutions to adopt blended approaches to strengthen training delivery [5]. Empirical studies show that blended learning enhances flexibility and participation among trainees, while also providing access to online platforms such as Google Classroom [6]. Maundu and Oloo [4] emphasize that the success of blended learning in TVET depends largely on instructor readiness and the effective integration of digital tools into practical lessons.

Blended learning has been shown to positively influence technical competence by combining structured classroom experiences with digital resources that reinforce understanding and retention of practical concepts [2]. For example, integrating PowerPoint presentations on websites alongside classroom lectures has been reported to improve comprehension and memory for technical tasks. Nevertheless, online delivery alone remains insufficient for practical skill acquisition, highlighting the need for blended approaches that incorporate immersive technologies such as virtual simulation and augmented reality [1].

Although blended learning is increasingly promoted within Kenyan TVET institutions, limited empirical evidence exists on its direct influence on technical competence acquisition, particularly at the county level. This study addresses this gap by examining how blended learning practices shape competence outcomes among trainees in public TVCs in Laikipia County.

3.0 METHODOLOGY

3.1. Research Design

The study adopted a descriptive research design, appropriate for examining relationships between pedagogical practices and technical competence without manipulating variables. This design allowed for the collection of both quantitative and qualitative data to provide a comprehensive understanding of blended learning's influence on acquisition of technical competence.

3.2. Target Population and Sampling

The target population for this study comprised three principals, 15 heads of department, 50 trainers, and 100 final-year trainees in public Technical and Vocational Colleges (TVCs) in Laikipia County. Purposive sampling was applied to select the three principals, while stratified random sampling was employed to ensure adequate representation across departments and courses, resulting in 13 heads of department, 45 trainers, and 84 trainees. Altogether, the sample size consisted of 145 respondents, which was deemed sufficient for conducting descriptive analysis.

3.3. Validity and Reliability of Research Instruments

3.3.1 Validity of Research Instruments

Validity ensures that a research instrument measures the intended construct [11]. In this study, questionnaire development was guided by supervisors from the School of Education at Moi University, who reviewed and refined items to strengthen content validity. The Content Validity Index (CVI) was employed to quantify item relevance and representativeness (Yusoff, 2019). Supervisors rated each item on a four-point scale from 1 (not relevant) to 4 (highly relevant), [13]. Item-level CVI scores, calculated as the proportion of experts rating an item 3 or 4, ranged from 0.80 to 0.97, indicating strong content validity [14].

3.3.2 Reliability of Instruments

Reliability refers to the consistency of research findings under similar conditions [11]. To assess stability, the same group of respondents was re-tested after one week, as recommended by [15]. Pilot testing was conducted in public TVET institutions not included in the main sample. Internal consistency was evaluated using Cronbach's Alpha, which yielded a coefficient of 0.90, reflecting excellent reliability [16]. Additionally, a Pearson correlation coefficient of 0.85 demonstrated a strong positive association between pedagogical factors and technical competence. Reliability coefficients between 0.7 and 0.9 are considered stable, while values approaching 1 indicate robust consistency [17], affirming the dependability of the instrument.

3.3.3 Data Collection Instruments

Interview schedules were administered to principals to capture institutional perspectives, while questionnaires were distributed to heads of department, trainers, and trainees to obtain quantitative and qualitative data on blended learning practices, resource utilization, online teaching, and evaluation techniques.

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3.3.4 Data Analysis

Data were analysed using descriptive statistics, which included frequencies, percentages, means, and standard deviations, to summarise responses. Qualitative data from interviews were thematically analysed to provide contextual insights. Results were presented in tables and figures for clarity, and interpretations were linked to the study objectives.

3.3.5 Ethical Considerations

Ethical clearance for this study was obtained from the Institutional Scientific and Ethics Review Committee (ISERC) of Moi University, which is accredited by the National Commission for Science, Technology and Innovation (NACOSTI). The committee reviewed the research proposal to ensure compliance with ethical standards regarding human participants, confidentiality, and informed consent. Following ISERC approval, a research permit was issued by NACOSTI, authorizing data collection in public Technical and Vocational Colleges in Laikipia County. All participants were informed of the study's purpose, assured of confidentiality, and provided consent before participation, in line with established ethical guidelines [18].

4.0 RESULTS AND DISCUSSION

4.1. Results

The study examined several blended instructional techniques, including the use of PowerPoint presentations embedded in websites, online teaching platforms, and digital learning tools. The findings, summarised in Table 1, capture respondents' perceptions of these methods using a five-point Likert scale: Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. Mean scores were calculated to determine the average level of agreement for each item, with higher mean values indicating stronger endorsement of the respective educational approach.

Table 1
Blended techniques on technical competence

Determinants	SA	%	A	%	N	%	D	%	SD	%	Mean
A	64	45.4%	57	40.4%	4	2.8%	6	4.3%	10	7.1%	4.13
B	41	29.1%	49	34.8%	7	5.0%	23	16.3%	21	14.9%	3.47
C	42	29.8%	32	22.7%	17	12.1%	32	22.7%	18	12.8%	3.34
D	49	34.8%	71	50.4%	13	9.2%	8	5.7%	0	0.0%	4.14
F	66	46.8%	46	32.6%	4	2.8%	8	5.7%	17	12.1%	3.97
E	64	45.4%	62	44.0%	11	7.8%	2	1.4%	2	1.4%	4.31

Key

LETTER	DETERMINANTS
A	Both PowerPoint presentations on websites and classroom lectures improve competence.
B	Lectures in the classroom are more effective in training for practical courses than blended learning.
C	Blended learning is used effectively.
D	Integration of Open digital learning and lectures
E	Blended learning on technical competence
F	Blended techniques of training on the production of competent graduates

Source: Survey data (2024)

From the results presented in **Error! Reference source not found.** above, sixty-four (64), 45.4% of the respondents strongly agreed that using PowerPoint on Websites as part of blended learning improved competence in graduates in Laikipia County. Fifty-seven (57), 40.4% of the respondents, agreed that using PowerPoint positively improved technical competence among graduates in TVET institutions. Although four (4), 2.8%, were neutral or undecided, it was clear that few respondents disagreed. This received a mean score of 4.13, indicating a positive reception among respondents.

The results show that respondents generally agreed with the value of this tool, considering it an effective way to convey information in an accessible and structured format. An interviewee emphasised the benefit of integrating PowerPoint on websites and classroom lectures, stating, "Integrating PowerPoint on websites as part of blended learning improved technical competence among graduates." Another interviewee noted, "Images and texts in both classroom presentation and PowerPoint together help in understanding and retaining memory for practical concepts" These results, therefore, support [10] assertions that blended learning enables students to acquire knowledge, technical skills, and interpersonal talents using a combination of face-to-face and virtual training.

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The results presented in **Error! Reference source not found.** on the effectiveness of classroom lectures compared to blended learning for training practical courses reveals diverse perceptions among respondents. A significant portion of the respondents, accounting for 63.90%, either strongly agree (29.10%) or agree (34.80%) that traditional classroom lectures are more effective in training practical courses than blended learning. This majority viewpoint underscores the belief that in-person instruction provides a more impactful and effective learning experience for practical skills, likely due to the hands-on nature and immediate feedback that can be facilitated in a classroom setting. One interviewee pointed out that face-to-face interaction is more effective in skill training, "Lecture in a classroom is more beneficial in cases that require more direct instruction." (interviewee A, trainer). Another interviewee stated, "Face-to-face interaction is more effective because it enables the trainer to deliver more information and guide the student on the spot, unlike PowerPoint on a website, which provides bite-sized of information and doesn't cover much." (interviewee B, Trainer). Another interviewee strongly supported face-to-face, pointing out, "Blended learning can be beneficial, but the current state of the institution is not in a position to provide digital learning objects." (interviewee C, HOD)

However, the data also indicates that a substantial minority favoured blended learning. Specifically, 16.30% of respondents disagree, and 14.90% strongly disagree with the statement, comprising 31.20% of the total respondents. This group likely appreciates the flexibility, accessibility, and diverse learning tools and resources blended learning offers. Blended learning, which integrates digital platforms with conventional in-person instruction, may prove equally, if not more, effective for these participants, particularly in addressing diverse learning preferences and flexible scheduling needs.

The mean score of 3.47 suggests a tendency towards agreement that classroom lectures are more effective, but the score does not indicate an overwhelming consensus. This mean value reflects a moderate level of agreement, signalling that while many favour traditional classroom methods, there is also a significant appreciation for the benefits of blended learning.

Moreover, the small percentage of neutral respondents (5.00%) indicates that most individuals have a clear stance on this issue. The neutrality might stem from either a balanced view of both methods or a lack of solid preference, suggesting that for some students, the mode of delivery might not be as critical as the content and quality of the instruction itself.

While the data reveals a preference for traditional classroom lectures in training practical courses, it also highlights the substantial support for blended learning. The mixed responses reflect the evolving nature of educational methodologies and the need for a balanced approach that incorporates the strengths of both traditional and blended learning environments. This diversity in opinions underscores the importance of providing flexible and varied instructional methods to cater to students' different preferences and needs, thereby enhancing the overall effectiveness of practical training.

From the results presented in **Error! Reference source not found.** above, forty-two (42), 29.8% of the respondents strongly agreed, and thirty-two (32) 22.7% agreed that blended learning effectively improves competence in graduates in Laikipia County. On the other hand, thirty-two (32), 22.7%, disagreed, and eighteen (18), 12.8% of the respondents strongly disagreed that blended learning does not effectively impact technical competence among graduates in TVET institutions positively. Seventeen (17), 12.1% were neutral or undecided, highlighting uncertainty or indifference, possibly stemming from a lack of experience or unclear perceptions of blended learning's impact.

The results in **Error! Reference source not found.** above, therefore, reveal a mixed perception among respondents. The mean score of 3.34 indicates a somewhat neutral to positive view, suggesting that while most respondents (52.5%) agree or strongly agree that blended learning is effective, a substantial portion (35.5%) disagree or strongly disagree. This distribution reflects support and concern, with nearly a third of participants recognizing blended learning's potential but just under a quarter expressing dissatisfaction. The relatively neutral to positive views suggest that, despite its potential, blended learning may face challenges in its implementation, such as technological barriers, insufficient instructor training, or issues with student engagement. These mixed results indicate the need for targeted improvements to enhance its effectiveness and address the concerns of those who find it less impactful.

The results in **Error! Reference source not found.Error! Reference source not found.** also show that forty-nine (49), or 34.8% of the respondents, strongly agreed, and seventy-one (71), or 50.4%, agreed that integrating Open Digital Learning (ODL) and classroom lectures improves trainees' technical competence. This shows that 85.2% of the respondents express positive views about this integration, recognizing its value or effectiveness. The relatively large percentage of respondents who Strongly Agree (34.8%) further emphasizes the strong endorsement of open digital learning.

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A smaller proportion of respondents, 5.7%, disagree with the statement, indicating that a small group of individuals must be convinced by the benefits or effectiveness of integrating open digital learning with classroom lectures. Notably, there are no respondents who Strongly Disagree with the statement, suggesting that while there is some scepticism, it is not widespread. Only 9.2% of respondents are Neutral, implying that most respondents have a clear opinion on open digital learning, either positive or negative.

The high mean score of 4.14 and the overwhelmingly positive responses (85.2% combined for Strongly Agree and Agree) indicate a strong endorsement of open digital learning. This suggests that respondents view integrating open digital learning with classroom lectures as an effective educational method to improve trainees' technical competence.

The results in **Error! Reference source not found.** above also show that sixty-four (64) 45.4% of the respondents strongly agreed, and sixty-two (62) 44.0% agreed that blended techniques used in their institution positively influence the production of competent graduates. Only two, (2) 1.4% of the participants strongly disagreed and two, (2) 1.4% disagreed, expressing a negative opinion about the influence of blended learning in their institution. This small percentage suggests that, for the most part, participants see the benefits of blended learning in developing the competencies of graduates. Highlighting this issue, an interviewee noted,

> *"Integrating blended learning in content delivery will emphasize crucial contents and empower trainees with relevant skills and knowledge required through active face-to-face lectures and independent studies. PowerPoint on websites can be more beneficial because digital contents can be shared and accessed during independent study time."* (interviewee D, Principal)

The 7.8% of Neutral respondents might represent individuals who need clarification about the specific impact of blended learning on graduate competence or who need more experience with these methods to form a clear opinion.

The results of determinants generated an overall mean score of 3.89, reflecting a general consensus among respondents that blended techniques, encompassing lectures, PowerPoint presentations, and digital learning integration, positively influence competence and graduate outcomes. This mean value positions the collective perception between moderate agreement and strong agreement, highlighting the favourable reception of blended approaches in educational contexts. The standard deviation of 0.36 indicates relatively low variability in responses, suggesting that participants shared consistent views on the effectiveness of blended learning. While certain determinants, such as the impact on technical competence, with a mean of 4.31, attracted stronger endorsement, others, like the perceived effectiveness of blended learning in practice which had a mean of 3.34, revealed more cautious attitudes.

These results highlight that blended techniques despite some challenges and mixed opinions, broadly regarded as beneficial, particularly in enhancing technical skills and fostering competence. However, the variation across determinants points to the importance of contextual implementation, with traditional lectures still retaining notable credibility alongside blended methods, collectively enhancing educational outcomes for TVET graduates.

4.2. Discussion

The study revealed that blended learning techniques, particularly the integration of PowerPoint on websites and classroom presentations, were positively associated with improved technical competence among trainees. With 85.8% of respondents either strongly agreeing or agreeing on its effectiveness, the findings underscore the value of combining digital tools with traditional instruction. This supports Kolb's experiential learning theory, which emphasizes the importance of varied learning experiences in reinforcing knowledge and skills.

Educational resources were perceived as adequate by a majority of respondents, suggesting that resource availability is not the primary barrier to competence acquisition in Laikipia TVCs. Instead, the challenge lies in how these resources are integrated into blended pedagogical practices. This aligns with prior studies indicating that blended learning is most effective when digital tools complement, rather than replace, hands-on training [4].

The results are consistent with global evidence that blended learning enhances flexibility and learner engagement [3], while also highlighting the limitations of purely online delivery in technical fields. Kenyan TVET reforms have emphasized competency-based training, and this study provides empirical support for blended approaches as a pathway to achieving those reforms [5].

For policymakers, the findings suggest that blended learning should be institutionalised within TVET curricula, with clear guidelines on integrating digital tools into practical training. Institutions should invest in capacity building for

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instructors, ensuring they are equipped to design and deliver blended lessons that balance theory with practice. Furthermore, the incorporation of immersive technologies such as virtual simulation and augmented reality could bridge the gap between online delivery and hands-on competence, offering trainees realistic practice environments.

4.3. Limitations and Future Research

The study was limited to three public TVCs in Laikipia County, which may constrain generalizability. Additionally, the cross-sectional design does not establish causality. Future research should employ longitudinal or experimental designs across multiple counties to assess the long-term impact of blended learning on technical competence.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusion

This study examined the influence of blended learning on the acquisition of technical competence among trainees in public Technical and Vocational Colleges (TVCs) in Laikipia County, Kenya. The findings demonstrate that blended learning, particularly the integration of digital tools such as PowerPoint and open digital learning platforms with classroom instruction, is positively received and enhances graduate competence. While conventional classroom lectures remain essential for practical courses due to their hands-on nature and immediate feedback, blended approaches offer flexibility, accessibility, and diverse learning resources that complement traditional methods.

Overall, the results highlight the importance of adopting a balanced instructional model that integrates digital and face-to-face strategies to address varied learning needs and improve technical training outcomes. Blended learning has clear potential to strengthen technical competence when supported by adequate infrastructure, instructor training, and effective assessment strategies. Future innovations should focus on overcoming technological barriers and refining blended pedagogy to fully realise its impact on practical skill development and graduate employability.

5.2. Recommendations

To enhance the effectiveness of blended learning in public TVET institutions, several measures are recommended. First, technological infrastructure should be strengthened by expanding access to digital tools and learning resources, ensuring stable internet connectivity, and providing essential devices to both learners and educators. Second, comprehensive professional development programs are needed to equip instructors with the competencies required to integrate digital technologies with conventional teaching practices. Third, routine evaluations of blended learning initiatives should be conducted, incorporating feedback from students and trainers to support continuous refinement of instructional strategies. In addition, longitudinal and multi-county studies are necessary to assess the long-term impact of blended learning on technical competence and employability outcomes. At the policy level, TVETA and institutional leaders should establish clear guidelines for blended learning implementation to ensure consistency across public TVCs. Finally, targeted training programs on blended pedagogy should be developed, focusing on the integration of online and face-to-face methods to enhance instructional flexibility, learner participation, and overall training quality.

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Conflict of interest

The authors declare that they have no financial or personal relationships that may have inappropriately influenced the authors in writing this paper.

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