

Influence of Trainers' Based Factors about E-Learning Adoption and Trainees' Performance in Selected Engineering Programmes in TVET Institutions in Kenya.

¹ Wamalwa Peter Wekesa

Department of Curriculum and Teaching
Kibabii University

² Prof. Patrick Acleus Kafu

Department of Curriculum, Instruction and Educational Media,
University of Eldoret

². Dr. Edwin Nyongesa Masibo

Department of Curriculum and Teaching
Kibabii University

³. Dr. Wambeye Kimweli Marakia

Department of education management and planning
Kibabii University

IJASR 2021

VOLUME 4

ISSUE 6 NOVEMBER – DECEMBER

ISSN: 2581-7876

Abstract: The rapid pace of economic development in the world has initiated and demand for technological growth in education and training system as a global yard stick for continuous improvement. As internet connectivity expands, online education and training content becomes readily available. This, therefore, calls for broader networking opportunities and adoption of Information Communication Technology (ICT) to improve access and performance in education and training for lifelong learning. There is a marked improvement by the government investment in e-learning in tertiary institutions in Kenya while trainees' performance in national tests is declining. The specific objectives of this study were: to determine the influence of trainers' based individual factors about e-learning adoption and trainees' performance in selected engineering programmes in TVET institutions in Kenya, to examine the influence of technological based factors in the adoption of e-learning paradigm and trainees' performance in selected engineering programmes of TVET institutions in Kenya, to evaluate the extent to which institutional based factors about e-learning adoption influenced trainees' performance in the selected engineering programmes of TVET institutions in Kenya and, to determine the influence of trainers' demographic factors in adoption of e-learning paradigm and trainees' performance in the selected engineering programmes of TVET institutions in Kenya. The target population for the study was 5544 comprising of the principals, trainers, technicians and trainees from 14 technical institutions that were implementing e-learning between 2016 and 2020. This research study used a sample size of 568 people from four technical institutions. Standard multiple linear regressions at $\alpha = .05$ was used to test the determinants of trainers' adoption (individual, technological and institution) of e-learning have significant statistical influence on trainees' performance in national examinations in TVET institutions in Kenya. The study therefore recommends that: the Ministry of Education should train TVET trainers and equip them with e learning competences.

Keywords: Trainers' e-learning adoption Trainees' performance,

Introduction

1.1. Background to the Study

Information Communication and Technology (ICT) is an increasing source of innovation and efficiency improvement for numerous industries across the world (Kafu, 2010). Outside and inside the classroom, the use of ICT in the education and training sector has become a crucial element of the teaching and learning process at higher institutions (Kafu, 2010). In this study, ICT adoption is defined as a progressive paradigm shift toward automation of the educational process, including not only administrative operations but also the development of a customized Learning Management System (LMS) and the transfer of programs and related data onto it (Filippetti & Savona,

2017). Engineering is one of the most priority sector components in the global development agenda, and as a result, educational and training institutions must support students' learning accomplishment in engineering-related disciplines, among other programs. Research reports reveal that the integration of Information Communication and Technology (ICT) is the in-thing development impacting performance in education and training sector worldwide (Kafu 2019).

According to Oketch (2003), integrating ICT into education and training improves access to high-quality education and training. This has enabled TVET institutions reach many of their trainees to access education and training in tandem with developmental changes (Beerepoot, 2004). The Chinese government has emphasized the engagement of learning technology in their curriculum to enhance a new age of digital natives (Talbot, 2015). ICT integration in education and training is a key strength in Indians education and training system attracts students and trained into creative brain thinkers (Salmi, 2009). The Ministry of Education in Singapore has created four ICT Masterplans with the goal of enhancing and changing students' learning environments and providing them with the key competences and dispositions for lifelong learning and a linked ICT Ecosystem (Singapore Ministry of Education, 2016). To ensure that ICT is adequately incorporated at the design and development stages of the curriculum, the focus is on greater end-to-end ICT integration into curriculum, pedagogy, and assessment (Wurst, 2017). There is significant relationship between teachers' integration of ICT in teaching and students' performance in higher institutions in Singapore (Wurst, 2017).

UNESCO report indicated that the African continent needs to embrace ICT to bridge the continental education and training mismatch gap (Stewart, 2013). Several studies in the literature support the use of technology in the classroom; nevertheless, they do not assess the influence of technological innovation on student performance (Johnson, 1995). There is therefore need to integrate ICT in education and training to promote efficiency and effectiveness; universalization and/or globalization of education and; facilitation of integration of knowledge in the education curriculum to achieve the AU mission (Kafu, 2019). Malawi's government is taking considerable measures to integrate ICT into TVET institutions in order to foster a culture of lifelong learning (World Bank, 2010). This dedication is reflected in the National ICT Policy of 2013 as well as the third Malawi Growth and Development Strategy 2017-2022, which mandates computer studies beginning in primary school (Government of Malawi, 2017). According to Wamalwa, Masibo & Simiyu, (2018), the availability of a computer laboratory and system server is a proxy indication for computer and internet access. Some of the challenges limiting adoption of ICT in TVET institutions in African countries includes: Internet connectivity; lack of capacity on the part of teachers to use ICT for teaching and learning; lack of adequate ICT-supportive infrastructure; some teachers are reluctant to use technology in teaching and; there is lack of national ICT policy guidelines on ICT in education (Government of Malawi, 2019a).

E-learning implementation has been fraught with difficulties, and in order to address these difficulties, most learning institutions have adopted a mixed method of instruction. This method includes some face-to-face classrooms, event-based activities, live (synchronous) e-learning, and self-paced e-learning (asynchronous). Some of these difficulties are technical, institutional, and educational in nature (Tarus, Gichoya, Muumbo, 2015). High percentages of ICT illiteracy among students; low levels of familiarity with technology; usability difficulties with learning management systems; bad marketing tactics; inefficient maintenance plans; and insufficient user/technical support are just a few examples (Nawaz, & Kundi, 2010). These obstacles may lead trainers' adoption of e-learning to fall short, partially or completely. The following phases are involved in a successful e-learning implementation: planning, design, development, and evaluation, delivery, and maintenance. Each of these stages has its own set of problems that must be considered throughout the implementation phase (Chan, & Robbins, 2006).

Nanayakkara (2007) (brought out the problem in Kenya) researched and developed a model for e-learning user acceptability that included variables that were directly important for e-learning as well as the suitable information systems user acceptance elements. Individual and system variables had a substantial impact on users' attitudes toward system adoption, but institutional factors were the most important when it came to user acceptance of e-learning technologies, according to the study. The current study aims to study individual, technological and institutional factors about e-learning paradigm in the teaching of selected engineering programmes by TVET institutions in Kenya and the adoption factors; Individual, technological, organizational/institutional by (Nanayakkara, & Whiddett, 2005) informs this study.

1.2. Statement of the Problem

Literature available shows that many countries embrace adoption of e-learning paradigm in teaching TVET programmes with lots of challenges. Buabeng-Andoh Charles, (2012) in their study found that there was low level of e-learning adoption in TVET institution. In Kenya, like many other developing countries in the World, Engineering sector is a key pillar in the realization of the Vision 2030 and the Kenya’s ‘Big Four Agenda. Due to increased sophistication and modernization in engineering and manufacturing sector collaborated by demand for quality graduates from tertiary institutions has put much pressure on education and training institutions to adopt new and innovative teaching paradigm shift to influence trainees’ performance. This has been exacerbated by outbreak of COVID-19 pandemic that has disrupted learning in the globe. Kafu (2019) argues that e-learning as a paradigm shift is an emerging innovation that facilitates students’ learning in a technologically enabled environment. New teaching as well as learning innovations are introduced by technology, and their practical value cannot be overstated (Lagrange, 2003)

Despite the prevalence of e-learning in all aspects of modernized human experiences, and despite the fact that the modern learner lives, moves, communicates, learns, socializes, and works in a technology-driven environment, e-learning is yet to be adopted in TVET institutions that are designed to train prospective tradespeople for social and economic development (Onasanya et al, 2010). Trainees’ performance in national examinations is declining raising concern among education and training stakeholders as to what is ailing TVET sector (Onasanya et al, 2010). Despite the governments’ investment to support e-learning, trainees’ performance in engineering programmes in national examinations in TVET institutions in Kenya is declining (Rhema, & Miliszewska, 2011). This study, therefore, sought to investigate influence of trainers’ based factors about e-learning and trainees’ performance in national examinations in TVET institutions in Kenya.

2.0 Methodology

The study used a cross-sectional descriptive survey strategy, in which data was gathered once over the study's period and evaluated. The target population for the study was 5544 comprising of the principals, trainers, technicians and trainees from 14 technical institutions that were implementing e-learning between 2016 and 2020. This research study used a sample size of 568 people from four technical institutions. A structured questionnaire and interview guide were used to obtain primary data. A study of records and documents was used to gather secondary data. In the data analysis, descriptive and inferential statistics were utilized.

3.0 Results

3.1 The Impact of ICT on Productivity among trainers

Technology integration nowadays has gone through innovations and transformed our societies that has totally changed the way people think, work and live (Grabe, 2007). As part of this, educational institutions which are supposed to prepare students to live in “a knowledge society” need to consider ICT integration in their curriculum (Ghavifekr, Afshari & Amla Salleh, 2012). The aim of ICT integration is to improve and increase the quality, accessibility and cost-efficiency of the delivery of instruction to students, it also refers to benefits from networking the learning communities to face the challenges of current globalization (Albirini, 2006). Process of adoption of ICT is not a single step, but it is ongoing and continuous steps that fully support teaching and learning and information resources (Young, 2003).

Table 3 1 Productivity of Trainers Using ICT.

Using ICT enhances my productivity	72.3%
Using ICT does not enhance my productivity	27.7%

When asked of the trainer’s opinion on how using ICT enhances their productivity, 72.2% of the trainers agreed that using ICT enhances their productivity while 27.2% said that ICT does not enhance their productivity as shown

in table 3.1. Productivity is an economics concept where productivity is considered as the comparative analysis of input and outputs. The proper integration of ICT with teaching/learning environment increases education and increased productivity. The problem education is facing is mainly one of productivity and efficiency. Here, efficiency means the balance between resources invested and the outcomes in terms of students' performance and equity (OECD, 2016).

3.2 E-learning System Training

From table 3.2, it was found that fifty-nine per cent (59%) respondents agreed that basic e-learning training was offered in their institutions while forty-one per cent (41%) disagreed that there was any training offered. These findings were similar with those of (Fathema & Sutton, 2013) who asserted that training trainers influenced learners' performance in examinations. The respondents proposed trainers' to be offered extensive training, workshops and awareness programs on Learning Management Systems' (LMS) features, usage and benefits to help increase the usage. Also a well-trained trainer was confident and motivated to use technology in their teaching and learning and impart the same to their trainees.

As regarding the duration of e-learning training offered, table 4.6 shows that twenty-six per cent (26%) of the respondents indicated that basic training was offered for a period of less than a week, fourteen per cent (14%) indicated that training offered was for one week, ten per cent (10%) indicated that the training was offered for a period of two weeks while, eight per cent (8%) indicated that training was offered for duration of more than two weeks. Finally, about forty-two per cent (42%) of the respondents indicated that there was no basic e-learning training offered in their institution. These finding collaborated previous studies on adoption of e-learning technology in the universities on students' performance which found out that training of the individual lecturer was a requirement for the adoption of the technology to succeed (Soydal, 2012). Further, training period can vary depending on the characteristics of users intended to be trained.

Table 3.2: Issues Pertaining to E-learning System and Training

	Yes	No
Trained e-learning support staff	68%	32%
Basic System Training	59%	41%
Motivation due to e-learning training	60%	40%

Source: (Author, 2021)

Table 3.3: Issues Pertaining to E-learning System and Training

Training Duration	Training duration	Percentage
< one week	27	26%
One week	14	14%
Two weeks	10	10%
>two weeks	8	8%
Not applicable	43	42%
Total	N 102	100%

Respondents were asked about the availability of support staff in their TVET institution that support LMS users, sixty-eight per cent (68%) agreed that there existed support staff, while thirty-two per cent (32%) answered in the negative as shown in table 3.2. Support staffs were required since any failure of technology could cause interruptions in the studies of the individual trainees (Ali, Haolader & Muhammad, 2013). Also regular repairs were necessary if ICT was to influence the teaching and learning, hence qualified and trained ICT technical staffs are required to support e-learning (Oye *et al.*, 2011). The top management was also expected to give the financial and material support necessary for the success of the teaching and learning technology that was much needed by trainers for purpose of addressing the high demand for TVET education.

As regards motivation of users arising from being trained in the use of the e-learning LMS, sixty per cent (60 %) of the respondents agreed that the system motivated the users while forty per cent (40%) disagreed as shown in table 3.3, in which the findings were in line with Shimadas', (2017) findings in which the study of Japanese English as a Lingua Franca (EFL) learners' attitude towards textbooks and web-based materials in a blended learning context was studied. The findings indicated, that a simpler e-learning interface designs can motivate users. However, despite the interface having such characteristics the satisfaction with material and course content was paramount for overall motivation of the LMS user. Additionally, motivation of the user depends on how the e-learning content meets the needs of the particular user.

3.3 Multiple linear regression on trainers based factors and student performance

Multiple regression analysis was conducted to test if Trainers' based factors about e-learning implementation have influence on trainees' performance in selected engineering.

Table 3.4 Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
				R Square Change	F Change	df1	df2	Sig. F Change
.392 ^a	.154	.119	13.902	.154	4.398	4	97	.003

Source: Field data, 2021

- a. Predictors: (Constant), Using ICT will enhance my effectiveness. I regularly Use ICT in teaching, Using ICT will enhance my productivity. , I find ICT easy to use.
- b. Dependent Variable: students passing with Credit in examination

Table 3.5 ANOVAa

	Sum of Squares	Df	Mean Square	F	Sig.
Regression	3399.888	4	849.972	4.398	.003 ^b
Residual	18747.455	97	193.273		
Total	22147.343	102			

Source: Field data, 2021

Table 3.6 Coefficients

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	95.0% Confidence Interval for B	
	B	Std. Error				Lower Bound	Upper Bound
(Constant)	33.511	3.577		9.367	.000	26.411	40.611
I regularly Use ICT in teaching	2.842	4.321	.245	.658	.512	-5.733	11.418

Using ICT enhances my productivity.	3.055	3.935	.267	.776	.439	-4.754	10.864
I find ICT easy to use.	-4.838	4.928	-.444	-.982	.329	-14.618	4.942
Using ICT will enhance my effectiveness.	-4.459	1.614	-.413	-2.763	.007	-7.662	-1.256

Source: Field data, 2021

A Multiple regression analysis at $\alpha = .05$ was used to examine the trainers factors about ICT on the performance of students in selected courses in TVET table 3.4; 3.5 and 3.6, represents the results of regression. The independent variable in the study was Trainers use of ICT. The dependent variable was student performance. The null hypothesis was: H_0 : Trainers' based factors about e-learning implementation have no influence on trainees' performance in selected engineering programmes in TVET institutions in Kenya. Preliminary analysis was conducted to assess whether the assumption of multi collinearity, outliers, Normality, homoscedasticity and independent of residuals were met. The Model was not able to significantly predict Student drop out from schools. ($F(4, 97) = 4.398, p > .003$), with an R^2 of .154. The coefficient of determination R^2 , which is the proportion of variance in the dependent variable (Student performance) that can be explained by the independent variables (Trainers based factors in the integration of ICT in teaching), that our independent variables explain 15.4% of the variability of the dependent variable (Student performance). When ICT use in teaching is measured at a categorical nominal scale (1 = yes, I Integrate ICT in teach 2=No, I don't Integrate ICT in teaching). Trainers perception in enhancing productivity when Using ICT integration in teaching is measured on likert scale (1 = Strongly Agree, 2 = Agree, 3 = "Neutral" 4 = Disagree, 5 = Strongly Disagree). Trainers easy of Using ICT integration in teaching is measured on likert scale (1 = Strongly Agree, 2 = Agree, 3 = "Neutral" 4 = Disagree, 5 = Strongly Disagree). Finally Trainers perception in enhancing effectiveness when Using ICT integration in teaching is measured on likert scale (1 = Strongly Agree, 2 = Agree, 3 = "Neutral" 4 = Disagree, 5 = Strongly Disagree).

The analysis shows that Trainers' based factors about e-learning in teaching in TVETS significantly predict student performance in selected Engineering courses. Therefore, the study rejects the null hypothesis.

Stevens (2001) identified five barriers related to the implementation of ICT-mediated learning in TVET, namely: content and curriculum, appropriateness and efficacy of technologies, quality and branding of programmes, stakeholders' resistance to innovations, and the digital divide. The efficacy for distance learning in vocational education will keep improving with the upgrading and improvement of: learning technology, instructional design, adaptive learning models, simulation of workplace environment, learner's support systems, access to e-learning, and the development of intelligent tutoring. Greater emphasis on a self-directed style of learning and an increase in computer literacy among stakeholders will further enhanced the efficacy of distance learning in TVET.

An analysis of the extensive amount of research conducted by Russell (1999) to assess the effectiveness of ICT-mediated learning leads to the conclusion that there is no significant difference to be observed in performance measures between learning with and without technology. A meta-analysis of over 500 studies conducted by Kulik (1994) (as cited by Baalen and Moratis, 2001) indicated that students receiving computer-based instruction tend to learn more in less time.

According to the (The World Bank, (2013), there is not much empirical evidence on the effectiveness of ICT for targeted learning outcomes. In their 2013 report on the key issues related to ICT in education, they report that ICT is mostly used "...as tools for presentation rather than the often cited promotion of "21st century skills." Thus, it is of interest to actually see if the use of ICT in TVET is any different since this report. The relatively limited information on the current use of ICTs in TVET is making this review more relevant as even publications by UNESCO are focusing on ICT applications in general education rather than in TVET (Raihan, M. et al, 2013). Other studies indicate that existing ICT mediated or e-learning initiatives is not effective for developing occupational hands-on skills but quite effective at developing cognitive and meeting affective learning needs. It also appears that blended mode seems to be better at improving skills. These factors are highly related to the design aspect of the initiatives (Zurina et al, 2014)

There are various cost factors that must be examined when considering the adoption of ICTs for teacher education and development. These include: programme scale; media or technology used; costs of face-to-face or residential study; costs of student support; costs of teacher practice, examination and supervision; fee-charging policy, and opportunity costs of having teachers leave their schools (UNESCO, 2002a).

4 Recommendation

The study therefore recommends that: the Ministry of Education should train TVET trainers and equip them with e learning competences.

5 References

1. Beerepoot, N. (2004). The Contribution of Skilled workers in the diffusion of knowledge in the Philippines. In S. Mani, & H. Romijn, *Innovation, Learning, and Technology Dynamism of Developing Countries* (pp. 158-161). Japan: United Nations University Press.
2. Buabeng-Andoh, C. (2012). Factors Influencing Teachers' Adoption and Integration of Information and Communication Technology into Teaching : A Review of the Literature. *International Journal of Education and Development using Information and Communication Technology*
3. Chan, H., & Robbins, I. (2006). E-Learning Systems: Promises and Pitfalls. *Academic Psychiatry*, (December), 491–497.
4. Fathema, Shannon, & Ross (2015). Expanding the Technology Acceptance Model (TAM) to Examine Faculty Use of Learning Management Systems (LMSs) In Higher Education Institutions. *MERLOT Journal of Online Learning and Teaching*, 11(2), 210–232.
5. Filippetti, A., & Savona, M. (2017). University-Industry Linkages and Academic Engagements: Individual Behaviors and Firms' Barriers. Introduction to Special Section. *The Journal of Technology Transfer*, Doi: 10.1007/s 10961-017-9576-x.
6. Government of Malawi, (2019a): The 2018/2019 Education Sector Performance Report: Strengthening Education Management and Accountability to Improve Learning Outcomes for All. Ministry of Education, Science and Technology.
7. Government of Malawi, (2019b): The Malawi Growth and Development Strategy (III): Building a Productive, Competitive and Resilient Nation.
8. Kafu, P.A (2019). *Integration of Information Communication and Technology (ICT) in Education in Modern Africa: Is it a Blessing or Curse? The Kenyan Apprehensions of the Innovation in Education. African Journal of Education, Science and Technology*, Vol. 5 No. 2.
9. Kafu, P.A (2010). Teacher Education in Kenya. The Emerging Issues. *International Journal for Curriculum and Instruction (IJCI) on-line*, Vol.1 ISSN:
10. Nanayakkara, C. (2007). A Model of User Acceptance of Learning Management Systems: A Study Within Tertiary Institutions in New Zealand. *The International Journal of Learning*
11. Nanayakkara, C., & Whiddett, D. (2005). A Model of User Acceptance of E-learning Technologies : a Case Study of a Polytechnic in New Zealand, 180–189.
12. Nawaz, A. & Kundi, G. (2010). Demographic implications for the user-perceptions of e-learning in higher education institutions of N-W.F.P, Pakistan. *The Electronic Journal on Information Systems in Developing Countries*, 41(5).
13. OECD. (2016). *Education Indicators in Focus*. Paris: OECD.
14. Oketch, M. O. (2003). The Growth of Private University Education in Kenya: The Promise and Challenge. *Normal of Education*, 78(2), 18-40. Retrieved February 4, 2018
15. Omenyi, A. Agu, N. N. & Odimegwu, C. O. (2007). Increasing Teacher Efficiency through ICT usage in Tertiary Education. *Nigerian Journal of Educational Administration and Planning (NAEAP)*. 7 (2), 107-119.
16. Onasanya, S.A., Shehu, R.A., Oduwaiye, R.O. & Shehu, L.A. (2010) *Higher institutions lecturers' attitude towards integration of ICT into teaching and research in Nigeria*. *Research Journal of Information Technology*, 2(1): 1-10.
17. Oye, N., Salleh, M., & Iahad, N. (2010). Holistic Elearning in Nigerian Higher Education Institutions. *Journal of Computing*, 2(11), 20-26.
18. Oye, D., Salleh, M., & Iahad, A. (2011). Challenges of e-learning in Nigerian university education based on the experience of developed countries. *International Journal of Managing Information Technology*, 3(2), 39–48.

19. Oye, N., Iahad, A., Madar, M., & Rahim, A. (2012). The Impact of E-Learning on Students. *International journal of computer networks and wireless communication*, 2(2), 121–130.
20. Rhema, A., & Miliszewska, I. (2011). Reflections on a Trial Implementation of an E-Learning Solution in a Libyan University. *Issues in Informing Science and Information Technology*, 8.
21. Rogers, E.M. (2003). *Diffusion of innovations*. New York: Free Press
22. Wamalwa P.W, Masibo E.N & Simiyu C.N. *Influence of Trainers' Attributes on Teachers' Perception towards the Implementation of Strengthening Mathematics and Science in Secondary Education in Kenya (2018/9)*: Journal of Current Trends in Technology and Science. Vol. 6 pg 752-758.Publisher: *ctts.in*
23. Wurst C. (2017). Ubiquitous laptop usage in higher education: effects on student performance. *Comput Edc* 2017; 51(4): 1766-1783.
24. The World Bank, (2013) ICT and education - Key issues. [Online]. Available:
25. <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTEDUCATION/0,,contentMDK:20533883~menuPK:617610~pagePK:148956~piPK:216618~theSitePK:282386~isCURL:Y,00.html> .
26. Raihan, M. A. and Shamim, M. R. H.(2013) A Study to Explore the Practice of ICTs in TVET in Bangladesh and South Korea *Int. J. Eng. Sci. InnovTechnol.*, Vol. 2(4) pp. 351–360.
27. Zurina Yasak and Maizam Alias(2014) **ICT integrations in TVET: Is it up to expectations** <http://www.researchgate.net/publication/268078601>
28. UNESCO (2002a). *Open and distance learning, Trends, policy and strategy considerations*, Paris.
29. Zirkle, C. (2002). Distance education and career/technical education: A good match? National Research Center/ National Dissemination Center. College of Education, The Ohio State University.