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KJ-TVET

The Kenya Journal of Technical and Vocational Education and Training (KJ-TVET), ISSN 2227–5088 is a peer reviewed Journal published by TVET Authority. Technical and Vocational Education and Training Authority is a state corporation established by TVET Act, 2013 to regulate and coordinate Technical and Vocational Training in Kenya. The Authority was established to address evolving trends and reforms in the TVET sector and provide overall regulatory services for all TVET providers by promoting access, equity, quality and relevance. The mandate of TVET Authority includes *inter alia,* advising and making recommendations to the Cabinet Secretary on matters related to training; Promoting access and relevance of training programmes within the framework of overall national socio-economic development plans and policies; Establishing training system which meets the needs of formal and informal sectors; Collecting, examining and publishing information relating to training; Assuring quality and relevance in programmes of training; Liaising with the national and county governments, public and private subsector on matters relating to training. In order to achieve these mandates, the Authority requires analysed reliable research data to make informed decisions and recommendations. The Authority plans to promote TVET research and dissemination of findings through knowledge sharing and annual publication of KJ-TVET.

EDITORIAL TEAM

MESSAGE FROM THE CHIEF EDITOR

On Behalf of the KJ-TVET Editorial Board and TVETA Secretariat, I am sincerely grateful to all the authors whose papers met the conditions set by the Editorial Board for publication in Vol. 5 of this Journal. Special congratulations are also expressed to authors and reviewers for working tirelessly to accomplish the work within the set timelines.'

The KJ-TVET is a journal of TVET applied research, policy and data published by Technical and Vocational Education and Training Authority. The Vol. 5 of the KJ-TVET is the second edition of the journal under Technical and Vocational Education and training Authority, the first three volumes of the journal having been published by the Rift Valley Technical Training Institute.

The theme of this publication is **Kenyan TVET and the Digital Revolution**, while the sub-themes were online training: Challenges and opportunities; Empowering youth through CBET, Entrepreneurship and industrial linkages; Role of TVET in reconciling skill supply and demand; and Theory, policy and practice in TVET. Fourteen papers were recommended by reviewers for publication in the current volume of the journal.

The findings, recommendations and conclusions from papers published in this Journal are expected to provide reliable information that can be used for decision making and policy formulation on various issues in TVET. I, hereby, encourage all researchers and stakeholders in TVET to read the journal and consider sending their research papers to be considered for publication in the subsequent volume of the journal.

PROF. BONAVENTURE W. KERRE, PhD
CHIEF EDITOR, KENYA JOURNAL OF TVET

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ONLINE TRAINING: CHALLENGES AND OPPORTUNITIES

An investigation into effectiveness of e-learning in Technical and Vocational Education and Training (TVET) Institutions in Western Kenya

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Abstract

The disruption of face to face learning programs caused by the emergence of Covid-19 presented extraordinary challenges to education and training sector globally. The Kenyan institutions were worst hit since they mainly relied on conventional face to face mode of curriculum delivery. Due to the importance of education and training, its disruption could not be allowed to continue for long. The e-learning was immediately identified as the best way for restoring normalcy in the learning institutions. Although e-learning provided opportunity for continuity, it could also lead to many challenges, if not effectively implemented. The study determined the effects of digital infrastructure, Trainees' home environment and, attitude on effectiveness of e-learning . The data used in this study was collected from 10 selected Public TVET institutions in Western Kenya. The respondents were 100 trainers, 400 Trainees and 10 academic registrars. Respondents were selected using simple random, purposive and convenient sampling techniques. The data collected using questionnaires and interview schedule was analysed using both descriptive and inferential statistics. The study established that though e-learning provided the greatest opportunity for ensuring continuity of Learning amidst Covid-19 pandemic, inadequate digital infrastructure, negative attitude among majority of trainees and trainers and unsupportive home environment for majority of trainees impacted adversely on effectiveness of e-learning . The study recommended the improvement of digital infrastructure, capacity building of both trainers and trainees to promote acceptability of e-learning and sensitisation of various stakeholders to support e-learning programs.

Keywords: Effectiveness of e-learning , Digital infrastructure, Attitude

Introduction

The emergence of the highly infectious Covid-19 towards the end of 2019 sent global shock waves in history of mankind. The outbreak triggered crisis in all sectors of the economy with all eyes set on health sector for solution to the problem. The speed at which Covid-19 was spreading, associated human suffering, deaths as well as lack of effective treatment of the pandemic led to lockdown of the economic sector and imposition of constraints on movement as the best remedy

for curbing the spread of the pandemic (UNESCO, 2020). The global lockdown had adverse impacts on all sectors, with varied magnitude. The education and training sector was one of the worst affected by the pandemic.

According to the World Bank Group report on Education (2020), by 8th April 2020, Covid-19 pandemic had brought the entire education sector in over 175 countries to a standstill with over 220 million students unable to attend classes. The disruption of tertiary education by Covid-19 in various regions was as follows; Europe and Central Asia (97%), East Asia and Pacific (98%); Europe and Central Asia (100%), Latin America and Caribbean (100%), North America (100%); South Asia (100%) and Sub-Saharan Africa (98%). In Kenya, the first reported case of Covid-19 in March 2020 led to closure of all education and training institutions for six months before partial, staggered reopening was done.

The outbreak of Covid-19 affected the education Sector in two major ways; total stoppage of learning for the majority of institutions that relied on traditional face-face mode of curriculum delivery and reduction in budgetary allocation to education. According to Adelodun et al., (2020), Covid-19 had disastrous effects on the learning structures of low- and middle-income countries. The resources that had been devoted to education were diverted to healthcare sector to fight the pandemic. Governments were also forced to raise additional funds through other avenues due to reduction in taxes revenues as a result of reduced economic activities. Additionally, the Centre for Disease Control and Prevention (2020) observed that Covid-19 was a deadly respiratory disease which was spread through contact with infected surface or person (UNPF, 2020). The lockdown of various sectors of the economy including closure of schools was recommended as a measure for curbing the spread of the pandemic.

The disruption of education has negative implications on the socio-economic development since it plays an important role in all sectors. Education and training sector is critical in production of trained staff for various sectors of the economy, a critical constituent on labour markets and their effectiveness. Kawar (2011) observed that skills improvement programs form a core component of the International Labour Organisation's (ILO) Global Occupation Program, the ILO's policy outline for the engagement and advancement goal for Decent Work Agenda. The Human Capital Improvement Recommendation, 2004 (No. 195), offers direction for effective skills, occupation policies and quality Technical and Vocational Education and Training (TVET) has been identified as a crucial tool for improving individuals' capacity for employability, increased occupational productivity and poverty reduction (Bajracharya & Badal, 2021). Education has, therefore, been identified as the greatest industry and highest consumer of public revenue as shown by the huge budgetary allocations globally (Lumuli, 2009).

The interruption of education by the outbreak of Covid-19 pandemic provided

governments with two critical situations that needed urgent decisions; how to contain Covid-19 pandemic and ensure continuity of learning as well as mobilise adequate resources to meet the cost of education and increased health budget amidst shrinking sources of revenue. The e-learning platform was identified as the best fallback position, even for countries that mainly relied on conventional face-face mode of curriculum delivery such as Kenya (Bakare et al, 2021). According to Morgan (2000), learning involves teacher and learner engagement through online platform devices such as computers and other electrical devices.

Some of the benefits of e-learning include reduced of cost of learning and continuity of learning in situations where face to face interaction is prohibited (Conkova, 2013). However, Zhang and Burry-Stock (2003) observed that education supports the future success of all societies. It is therefore essential to undertake scientific evaluation on both curriculum and its delivery. Kumar, et al., (2017) observed that effective building of e-learning requires competent staff, adequate Information Communication Technology (ICT) infrastructure for implementing e-Teaching as well as positive attitude of both learners and trainers. Though e-learning and related studies are not new phenomena, the circumstance under which it was introduced in TVET institutions was unique, mass introduction through policy pronouncement in constrained socio-economic environment triggered by Covid-19 pandemic. It was, therefore, necessary to establish the effectiveness of e-learning in the Kenyan TVET institutions to inform future policy decisions for continual improvement.

Research Questions
The study sought answers to address the following questions:-

(i)   How did the state of digital infrastructure influence effectiveness of e-learning programs?

(ii)   To what extent did socio-economic status of trainees' home environment influence effectiveness of e-learning ?

(iii)   What was the trainees' attitude towards e-learning programs?

Additionally, the study sought to validate the following hypothesis:-

Ho: There is no significant difference between independent study variables and effectiveness of e-learning among trainees in public TVET institutions in Western Kenya.

Theoretical Framework
The study was guided by Theory of Constraint (ToC) as advanced by Bauer et al., (2019). According to this theory, pre-determined goals can be accomplished if all constraints are identified and mitigation measures are put in place for removal of

the constraint(s) to promote smooth undertaking of activities of any Organisation. The e-learning was introduced in most countries during the Covid-19 pandemic as a mitigation measure to counter its hazards and minimise the disruption in learning. Evaluating the effectiveness of e-learning could, therefore, unearth challenges faced by trainees and trainers for purpose of developing intervention measures. The effectiveness of e-learning programs was evaluated in terms of environmental support and attitude of both trainers and trainees towards e-learning to identify any obstacles that may hinder its effective implementation in TVET institutions. Hence, its success should be pegged on constant monitoring and establishment of corrective measures to promote its workability.

Methodology

Correlation research design was used in this study. Various researchers such as Moore (1983), Lumuli and Makokha (2020) and Saunders et al., (2007) noted that correlation research design is suitable for studies where random assignment of subjects to treatment and manipulative control of independent variable is not possible. This design made it possible for the researchers to determine the relationship between e-learning and effectiveness of curriculum delivery among trainees at the institutions. The respondents were 400 trainees, 100 lecturers and 10 registrars from the institutions selected for this study. Respondents were selected using proportionate, simple random and purposive sampling techniques. Trainees and trainers were selected using proportionate and simple random sampling while Registrars were selected using purposive sampling techniques.

Proportionate and simple random sampling were used to promote equity in representation while purposive sampling was used in selection of respondents who are deemed to have critical information for addressing the objectives of the study (Selina, 2021). A questionnaire, was used to capture data from trainees and trainers while interviews were used to collect data from registrars. The trainees' questionnaire sought information on interaction with the trainers, state of digital infrastructure in home environment and their attitude towards e-learning . The trainers' questionnaire sought information on their preparedness, attitude and administrative support for e-learning program in the institutions. However, information from Registrars was for triangulation purposes. The use of data from variety of sources as in this study is a widely acceptable technique in research (Baridoma, 2021). Data was analysed quantitatively and qualitatively using Statistical Package for Social Sciences (SPSS). The instruments were tested for reliability while the sample was tested for adequacy. The two tests were critical for dependability of findings. The results obtained were as shown in table 1 and 2

Table 1: *Reliability Statistics*

Cronbach's Alpha	Part 1	Value	.760
		N of Items	4[a]
	Part 2	Value	.940
		N of Items	3[b]
	Total N of Items		7
Correlation Between Forms			.779
Spearman-Brown Coefficient	Equal Length		.833
	Unequal Length		.816
Guttman Split-Half Coefficient			.834

Table 1 shows that Cronbach's Alpha Co-efficient (r) was .940. Charles (1988) observed that any correlated reliability that is less than 0.7 makes the instrument unreliable to make accurate predictions. The value of correlation coefficient obtained was 0.75 for trainers' questionnaire, which implied that the instrument was reliable for use in this study.

Table 2: *Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sampling Adequacy and Correlation among Variables on e-learning*

Kaiser-Meyer-Olkin of Measure Adequacy of Sampling		.639
Bartlett's Test of Sphericity	Approx. Chi-Square	
	Df	3
	Significance	.000

Keiser-Meyer-Olkin measure of sampling adequacy is a guide of matching the scales of the witnessed relationship quantities to the partial corresponding constant. The test offers a least standard that should be reached before principal component analysis is conducted. The values run from 0-1, with the nearer the values to 1 the superior the sign that a factor analysis of the variable is good. Ford et al, (1986) suggested a value of 0.6 as minimum. Table 2, showed that the KMO for the sample was 0.639. This implied that the sample chosen was adequate for use for statistical analysis.

Bartlett's test of sphericity tests the null hypothesis that postulates that the variables in the populace relationship matrix are uncorrelated. Table shows observed significant level was .000 which was small enough to reject the hypothesis. This demonstrates that the strength of the affiliation among the variables is substantial.

Results

Effects of Independent Variables towards Effectiveness of e-learning

The influence of independent study variables namely; digital infrastructure; socio-economic set up trainees, and trainers' and trainees' attitude towards e-learning in promoting effectiveness of e-learning . Positive statements relating to these variables were given to trainers' respondents and scored using Likert scale running from 1 (Strongly Disagree, SD) to 5 (Strongly Agree, SA). Data on responses were used to run regression and regression model summary whose findings were as shown in tables 3 and 4.

Table 3: Regression Model Showing Relationship between Study Variables

Model		Unstandardised Coefficients		Standard Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.729	.427		.647	0.000
	Adequate digital infrastructure promotes effective e-learning	.223	.075	.271	2.980	.004
	Trainees from well of social economic background are likely to have adequate support for promotion of effective E-Learning	.240	.104	.210	2.300	.024
	Positive attitude of towards E-Learning is more likely to promote effective learning	.826	.203	.373	4.076	.000

(a.) Dependent Variable: e-learning can be an effective tool in promotion of curriculum delivery.

Findings from Table 3 revealed that all study variables had significant influence on dependent variable, effectiveness of e-Leaning. This is evidenced through examination of value in significance column (p value) with value being less than 0.05 signifying that the variable had significant influence. All the variables had significance value of less than 0.05, hence the confirmation**.**

Table 4: Regression Model Summary Showing Relationship between Independent Study Variables and Effectiveness of E-Learning under Ideal Situation

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.639[a]	.590	.566	1.01947

a. Predictors: (Constant), Positive attitude of trainees and trainers towards E-Learning is more likely to promote effective Learning, Adequate digital infrastructure promotes effective e-learning , trainees from well of social economic background are likely to have adequate support for promotion of effective E-Learning

Table 4 shows the values of R and R^2 that were used to determine the proportion of independent variables in dependent variable in the given expression. The value of R^2 represented the dependent variables that could be accounted by the independent variable. The value taken by R ranged from -1 to 1, with the closer the absolute value of R to 1 indicating stronger correlation among the variables. Therefore, the value R showed how much dependent variable "effective learning" can be attributed to study variables. The value of R obtained in this study of 0.639, suggested Multiple Associations, revealing high correlation. The adjusted R2 was for stabilization of R2 so that it assumed best fit model. From the table, the adjusted R Square was 0.566. This suggested that 56.6 percent of dependent variable could be traced to independent variables in a given expression.

Effects of Digital Infrastructure in Facilitating Effective e-learning

Positive statements relating to the study variables were given to trainee respondents and scored using Likert scale running from 1 for Strongly Disagreed (SD) up to 5 for Strongly Agree (SA). The descriptive statistics on responses are presented in Table 5

Table 5: Descriptive statistics on trainees' responses on state of digital infrastructure

Variable Statement	N	Min	Maxi	Mean	Std D
I had a computer or telephone which could enable me access e-learning without any problem	374	1.00	5.00	3.6778	1.26160
Our home is adequately supplied with adequate and uninterrupted power which enabled me access e-learning without any challenge	374	1.00	5.00	3.2667	1.44409
My home area has no challenge of network coverage which enabled me to access e-learning without any challenge	374	1.00	5.00	2.7222	1.39846

My institution had adequate digital infrastructure and competent trainers that that enables promotion e-learning without any challenge	374	1.00	5.00	3.8111	1.16979
Valid N (listwise)	374				

Results in Table 5 revealed that majority of trainees did not have computers or relevant mobile equipment to access e-learning without a challenge, with a mean of 3.6778 and S.D of 1.26160. Inadequate supply and interruption of power had a mean of 3.2667 and S.D of 1.44409 and challenge of digital infrastructure in institutions and competent trainers was rated at a mean of 3.8111 and S.D of 1.32027. Adequacy of teaching and learning resources had a mean of 2.817 and S.D of 1.16979. However, network coverage was fairly rated at a mean of 2.7222 and an S.D of 1.39846:-

Through interview to establish challenges faced by trainees relating to infrastructure one registrar stated.

-----*Introduction of e-learning has come with its own demands right from empowerment of trainers and trainees as well as putting up necessary infrastructure. The Ministry took some initiative to empower trainers online. However, culture change takes time as majority of trainers have not positively embraced e-learning since it comes with its own demands. Personally, I feel even without COVID, e-learning should be embraced by our institutions since it would address some of the challenges that have been caused by increased enrolment in our institutions.*

The findings indicated inadequacy of digital infrastructure for promotion of effective e-learning . Bastola, et al., (2019) established that digital infrastructure is very critical in implementation of effective e-learning . This finding agreed with earlier finding from a survey at Sydney, University in Australia which found that that poor technological infrastructure was one of the key reasons why adoption of distance education was a challenge (El Zein et al., 2021). Therefore, inadequate digital infrastructure compromises the effectiveness of e-learning programs. The provision of adequate digital infrastructure is therefore one of the ways through which the benefits that accrue from e-learning can be tapped.

Contribution of Trainees' Home Environment towards e-learning

Positive statements relating to home environment and e-learning were given to trainee respondents and analysed. The findings were as shown in Table 6.

Table 6: *Students Response influence Home Environment and E-Learning*

Variable Statement	N	Minimum	Maximum	Mean	Std. Deviation
I always had private room specifically meant for attending of online classes	374	2.00	5.00	4.0444	.91075
My level of concentration for online lessons was same as the level of concentration for face to face classes or even higher		2.00	5.00	4.3889	.80301
Domestic chores never interfered with my attendance of e-learning lessons	374	1.00	5.00	4.0778	1.19199
I was always facilitated to at home obtain bundles that enabled me attend all e-learning lessons without a challenge	374	1.00	5.00	3.7111	1.21085
Valid N (listwise)	374				

Table 6 revealed that majority of trainees did not have private rooms for attending online classes with mean of 4.0444 and S.D of 0.91075. The responses showed that the trainees had lower levels of concentration during online classes as compared to face-face with mean of 4.3889 and S.D of 0.80301. Interference from assignment of domestic chores had mean of 4.0778 and an S.D of 1.19199 and lack of bundles to facilitate access to online classes had mean of 3.7111 and an S.D of 1.21085. During an interview, one registrar stated that:

-----*Majority of our trainees have challenge in concentrating during online learning activities. Sometimes a student logs in a class and leave shortly, some just log in as a formality and concentrate on other activities for the sake of being marked present. Such activities negatively impact on online learning.*

The findings agreed with responses from most trainers (92%) who confirmed that on many occasions, less than 35 percent of trainees logged in for lessons, indicating poor online lesson attendance. This could be attributed to less supportive home environment in promoting effective e-learning . Singh and Mathew (2018) stated that stimulating home environment is critical for trainees' intellectual capacity development. This was affirmed by Isa (2021) who noted that family resources are critical in enhancing trainees' learning attainment and acquisition of more learning opportunities. Economically empowered parents can provide support of learning activities of the students through provision of supplementary learning material to enable their children to effectively undertake their studies. This

support help learners to acquire positive attitude towards learning activities at home since sometimes negative attitude towards learning develops when studnets lack necessary resources.

Trainees' and Trainers' Attitude towards e-learning at institutions

Trainers' and trainees' personal factors determine the willingness to teach and learn by engaging in various tasks. Positive statements relating to e-learning were given to trainees' respondents and scored to form a basis for evaluating of their attitude. The results were as shown in figure 1.
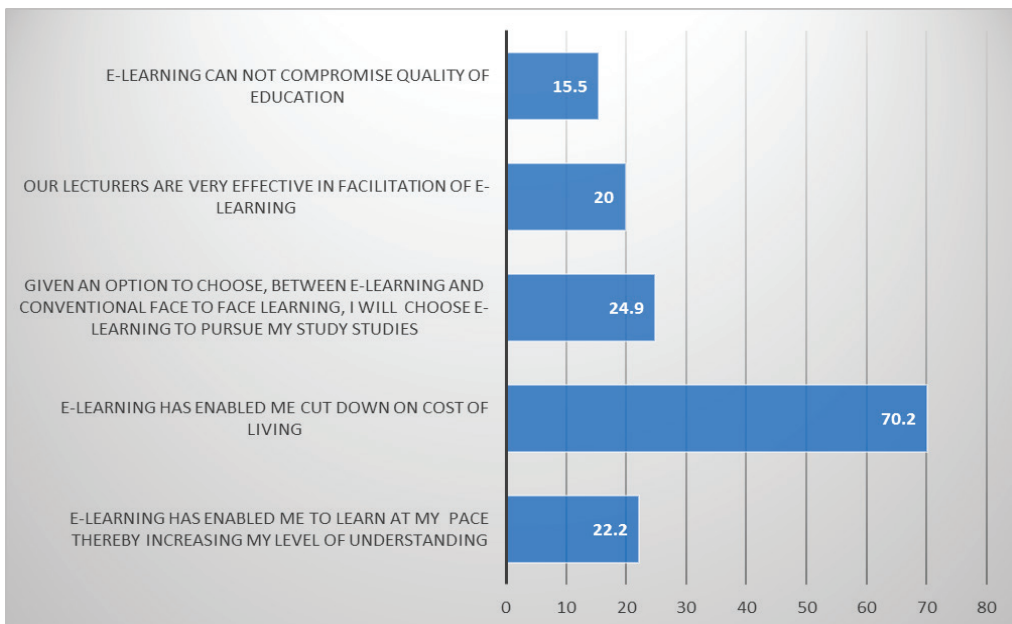
Figure 1: *Trainees Percentage Response on Agreement To Positive Statements Relating to e-learning*

Figure 1 showed that most trainees disagreed with the positive statements relating to attitude towards e-learning with their level of agreement falling below 25 percent on 5-Point Likert scale with strongly disagree being a worst score of 5 for all variables that were under investigation except on cutting down the cost of living which had an agreement rate of 70.2 percent.

Similar response was obtained from trainers, with only 26% preferring e-learning to conventional face-face learning while level of agreement on ability e-learning to cut down on cost of education had had highest positive rating with an acceptance level of 87%. This was a clear pointer that despite the ability of e-learning to cutm down the cost of education, majority of both trainers and trainees had negative attitude towards it. All the registrars' academic registrars (10) agreed that e-learning if well-handled had a high potential to contain the cost of education both to all

stakeholders. However, the registrars also noted that majority of both trainees and trainers had negative attitude towards e-learning . Their responses could be well summarised by one registrar's who had this to say:-

---- *Our own staff who were used to conventional teaching methods, were not ready to embrace e-learning . Even when we were mounting training sessions, the trainers' level of concentration and eagerness to learn was low as if to suggest that they were being bothered to learn new method of curriculum delivery yet they were soon reverting to the face-face as soon as COVID goes away. Trainees also felt that their pride of being at college which come along with "social benefits" such as access to friends was being eroded by operating in controlled home environment.*

The findings showed that reluctance of trainees and trainers to embrace e-learning had a negative impact on its effectiveness. Previous studies confirmed that the success and effectiveness to learn depend on trainees' attitudes, which influences their ability and willingness to learn, the level of engagement, interest, and their personal effort (Al-Hoorie, 2017). Burhendi, et al., (2020) noted that where trainer centred approaches were the custom, there was an inclination to work towards strict assessment requirements with a strict curriculum that needed to be followed in a step-by step fashion, making trainers to have limited or no time to develop ICT skills necessary for embracing new types of teaching methodology, hence, the negative attitude towards e-learning .

Similarly, Guillén, et al., (2021), observed that negative dispositions induce tendencies of fear, anxiety and stress where one resorts to other non-productive practices which finally prevents them from experiencing the richness that accrue from learning and many alternative ways that could be used to enhance competencies in the subject. Consequently, trainees end up exhibiting low motivation, decreased level of participation, boredom and behaviour problems including class or lesson avoidance.

Inferential Statistics

Responses of trainees on adequacy of digital infrastructure, supportive home environment and attitude towards e-learning were used to run regression analysis against their rating on effectiveness of e-learning . This was used to test the hypothesis:-

Ho: There is no significant difference between independent study variables and Effective learning among trainees in Public TVET institutions in Western Kenya

The findings of the regression analysis were as presented in Table 7.

Table 7: *Regression Analysis on Adequacy of Digital Infrastructure, Home Environment, Attitude and Effective Learning*

Model		Unstandardised Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.952	.130		14.991	.000
	digital infrastructure is adequate	.272	.059	.388	4.590	.000
	Home environment has been supportive	.167	.055	.206	3.053	.002
	I support with e-learning	.143	.052	.184	2.753	.006
a. Dependent Variable: Effective Learning						

The findings from table 7 revealed that all variables had critical influence in promoting e-learning since they all had their p-values less than 0.05. From the table, the following regression was derived;

$Y = 1.952 + aX_1 + bX_2 + cX_3$

Where a= 0.388   b= 0.206   c=0.184 Y=Effective e-learning

X_1=Adequacy of digital infrastructure; X_2=Supportive Home Environment; X_3=Trainees Attitude

Therefore $Y = 1.952 + 0.388X_1 + 0.206X_2 + 0.184 X_3$

From regression equation, adequacy of infrastructure contributed 15.1% to the effectiveness of e-learning , home environment 4.2% while attitude contributed to 3.4%. As such, increase by one unit in; state of digital infrastructure, improvement in supportive home environment and attitude will lead to increase in effectiveness in learning by 0.388; 0.206 and 0.184 respectively. Adequate digital infrastructure is therefore, the greatest determinant of e-learning . On the basis of these findings. The hypothesis:-

Ho: There is no significant difference between independent study variables and Effective learning among trainees in Public TVET institutions in Western Kenya was upheld.

The findings were consistent with those from earlier studies. Bastola, et al., (2019) noted that digital infrastructure was a critical ingredient in implementation of effective e-learning . Other researchers Singh, Mathew (2018) and Isa, (2021) established that supportive home environment and attitude is key in e-learning process while (Al-Hoorie, 2017); Burhendi, Abdurrozak, and Soenarto (2020) established that any program such as e-learning can only succeed if there is positive attitude of participants.

Conclusions and Recommendations
Conclusions
The authors concluded that there was no significant difference between the state of digital infrastructure, home environment and trainees' attitude and effectiveness of e-learning . However, the prevailing state of digital infrastructure at the institutions had significant influence in promoting effectiveness e-learning . The authors also concluded that adequate digital infrastructure, trainers' and trainees' attitude towards e-learning and home environment plays an important role in determining the effectiveness of e-learning.

Recommendations
The study Recommended increased sensitisation of all stakeholders on the importance and benefits of e-learning to improve its acceptability as an important mode of curriculum delivery. Creation of such understanding and acceptability will enable all stakeholders to deliver the necessary support in provision of adequate digital infrastructure well as develop positive attitude of in both trainers and trainees to promote effectiveness of e-learning in Kenyan TVET institutions.

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The Efficacy of Distance and On-line Learning in TVET Institutions in Kenya

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Abstract

The novel Corona virus disease that broke out in Wuhan China led to closure of businesses, vast majority of learning institutions and suspension of sports activities worldwide. In Kenya, the government responded to the pandemic by minimising face-face interactions through closure of schools, colleges and universities. While majority of institutions around the world adopted e-learning as a remedy to mitigate the spread of the pandemic, in Kenya the embracing of e-learning was basically slow in the education and training sector. In particular, the adoption was much slower within the Technical Vocational Education and Training (TVET) institutions due to inadequate infrastructure, training materials and absence of clear framework and ideals to guide the roll-out. This study aimed at assessing the efficacy of Open, Distance and e-learning in TVET institutions in Kenya. The study objectives were to; assess the readiness of TVET institutions to adopt online learning as a strategy to mitigate against the Covid-19 pandemic; and examine the challenges TVET institutions faced in adopting Open and Distance Learning (ODeL) and On-line learning. The Unified Theory of Acceptance and use of Technology (UTAUT) guided the study. Primary data on infrastructural e-learning readiness of TVET institutions was collected from principals of 164 institutions using a questionnaire. The data received from the administrators was triangulated by collecting data using from a purposive sample of 364 trainers from the three categories of TVET institutions. The primary data collected was analysed using descriptive statistics. Bivariate Correlation Analysis was employed to determine the relationship between Information Communication and Technology (ICT) Equipment and ICT Infrastructure using a two tailed test. The Pearson correlation coefficient was used to measure the degree of relationship between issuance of ICT Equipment and ICT Infrastructure The key recommendations and way forward are discussed. In this study ODeL, Online learning and e-learning were used synonymously.

Keywords: ODeL, Online learning, TVETs, Challenges,

Introduction

The novel corona virus that broke out in Wuhan China led to physical closure of businesses, vast majority of learning institutions and suspension of sports activities worldwide. As at 30th April over 1.2 billion students all over the world were affected by closure of schools due to the lockdowns (World Bank, 2020a). Similarly, data from UNESCO estimated that 205 countries had fully or partially closed schools, colleges and universities (UNESCO, 2021; UNESCO, 2020). Additionally, a joint global survey on TVET and skills development established that as at 15th May 2020, 114 out of 126 countries surveyed reported complete closure of TVET institutions as a result of the pandemic. A World Bank publication indicated that the challenge that Covid-19 pandemic posed on Sub-Saharan countries was profound, with approximately 98% of tertiary students having their studies disrupted by the lockdowns and closure of schools and colleges (World Bank, 2020b). In Kenya, the government responded to the pandemic by closing all schools, colleges and universities. The abrupt closure of learning institutions affected approximately 17 million learners all over the country (Lugonzo, 2020; Ngwacho, 2020). The closure of institutions led to disruption in the provision of training, affected practical lessons and apprenticeships (ILO-UNESCO, 2020). The pandemic brought significant shift in the education sector and radically changed the way education will be delivered across the globe forever (Apidech, 2021).

While majority of institutions in China, the epicenter of the pandemic, adopted e-learning as a remedy to overcome the deadly virus, the transition to e-learning laid bare the digital divide within the African continent (World Bank, 2020a). Even though Hondonga *et* al., (2021) singled the Covid-19 pandemic as a major global driver of the push towards e-learning in Higher Education Institutions in Sub-Saharan Africa, a survey by the International Association of Universities (IAU) conducted in April 2020, indicated that tertiary education institutes in Africa were unprepared for transition to online teaching (World Bank, 2020a). Some scholars have argued that e-learning in developing countries was still at its infancy stage and therefore on shaky ground (Kigwilu *et* al., 2016; Kyari *et* al., 2018). In Kenya, the adoption of online learning was slow in the entire education sector.

E-Learning has been defined by various scholars as methods of education that make use of electronic technologies to facilitate and enhance formal and informal learning (Engelbrecht, 2005; Fry, 2001; Gilbert, 2015; Kyari *et* al., 2018; Munyi *et* al., 2021). This type of learning might be web-based, computer based or virtual learning or virtual classrooms where content is delivered via different electronic media (Kyari *et* al., 2018). Other substitutes for e-learning include Internet based training (IBT), Web-based Learning (WBL), Open Flexible Learning (OFL), Online Learning (OL), Distance Learning, Technology Enhanced Learning (TEL) and Virtual learning (VL) (Munyi *et* al., 2021). In this study ODeL, Online learning and e-learning were used synonymously. Online and blended learning allows

increased flexibility for trainers and learners to undertake the learning process whenever they can access the internet (Rasmidatila *et* al., 2020).

Apidech (2021) explained that many trainers have not been 'officially' trained on online training delivering since it was not part of initial training curricula for TVET tutors. For developing countries, the transition to online learning environment posed challenges regarding the delivery of TVET courses in terms of availability of digital technologies for online teaching and preparedness of the training systems (Hondonga *et* al., 2021). This paper examined the readiness of TVET institutions and tutors in Kenya to use online teaching platforms.

According to Kamau (2013), TVET institutions are critical instrument of development in several developed countries unlike in Africa where the institutions have been sidelined and their importance not fully embraced. The TVET institutions play a fundamental role in the skills infrastructure development and are therefore vital for socio-economic advancement (Afeti, 2009; British Council, 2021;). Afeti (2009) recommended that for Kenya to modernize her technical workforce for rapid industrialization and national development the country should embrace emphasis in development of TVET institutions. According to Wanyeki *et* al., (2012) TVET in Kenya is provided by both government and private providers. This include for-profit and non-profit institutions; NGOs and faith-based institutions. The institutions categorized into National Polytechnics, Technical and Vocational Colleges and Vocational Training Centres (VTCs).

The Kenya's Vision 2030 placed special demands on TVET to produce adequate numbers of qualified middle level manpower required to drive the economy towards the realisation of the vision (GOK, 2007). The Vision further guides the strategic direction with regard to adoption of e-learning . Obwoge and Kwamboka (2016) in their study recommended the undertaking of e-readiness surveys in TVET institutions in developing countries to determine their status. This study aimed at assessing the efficacy of Distance and On-line Learning in TVET institutions in Kenya.

Objectives of the Study
The study aimed at assessing the efficacy of Distance and On-line Learning in TVET institutions in Kenya. The study was guided by the following objectives:

  (i)   To assess the readiness of TVET institutions in adoption of online learning as a strategy to mitigate against the Covid-19 pandemic;
  (ii) To examine the challenges TVET institutions face in adopting ODeL and On-line learning; and
  (iii) To propose appropriate policy recommendations on effective implementation of ODeL and online learning in TVET institutions.

Methodology

Quantitative research design was used to gather primary data from 164 out of 194 TVET institutions that participated in the study, giving a response rate of 85%. An online questionnaire was administered to the Principals of the 164 TVET institutions that participated in the study between 2nd to 22nd September 2021. The data received from the administrators was triangulated by collecting data from a purposive sample of 364 tutors using a questionnaire. According to Punch (2009) and Patton (2002) instrument triangulation strengthens a study by offering the possibility of the strengths of the combined instruments and compensating for the weaknesses of either instrument. Stratified sampling technique and purposive sampling technique was used to select tutors from the three categories of TVET institutions. Fisher's method was used to determine the total number of tutors to be sampled, while simple random sampling technique was used to select the 364 tutors. An online questionnaire was administered to the tutors in October 2021. A total of 177 questionnaires were received from the tutors, giving a response rate of 49%. The questionnaires were administered through the So-Go online survey tool.

To ensure anonymity, respondents were not required to indicate their names on the questionnaires. They were also assured of confidentiality and that their responses would only be used for purposes of the study. The study was guided by the following research questions: Do TVET institutions have adequate infrastructure and resources to facilitate on-line teaching and learning of TVET courses? and, what are the challenges faced by TVET institutions in embracing online learning? Descriptive statistics such as frequencies, percentages, mean, mode and standard deviation was used to analyse quantitative data. Qualitative data was summarised and presented thematically. Bivariate Correlation Analysis was employed to determine the relationship between ICT Equipment and ICT Infrastructure using a two tailed test. The Pearson correlation coefficient was used to measure the degree of the relationship between issuance of ICT Equipment and ICT Infrastructure in the TVET institutions at 0.05 significance level. The study was based on the Unified Theory of Acceptance and Use of Technology (UTAUT). The goal of this theory was to gauge the acceptance level of users towards adoption of a given technology.

Findings and Discussions

The ability of TVET institutions to implement e-learning depends on the availability of infrastructure and equipment such as internet connectivity, computers, devices or media, e-learning platforms and the readiness of trainers and teachers for online learning (UNESCO-UNEVOC International Centre, 2020). To gauge the readiness of TVET institutions in embracing e-learning , respondents were asked to indicate the number of ICT equipment available in the institutions for use by the trainers. The findings revealed that the 164 TVETs surveyed had a total of

3,346 (72.3%) desk top computers, 897 (19.4%) laptops, 99 (2.1%) I-pads and 289 (6.2%) smart phones. The findings are presented in Table 1.

Table 1: *Distribution of ICT Equipment by Category of Institution*

ICT Equipment Type N=164	National Polytechnic		Technical & Vocational College		Technical Training Institutes		Total	% of Total
	No	%	No	%	No	%		
Desktop Computers	1,099	32.8	615	18.4	1,632	48.8	3,346	**72.3**
Laptops	225	25.1	146	16.3	526	58.6	897	**19.4**
I-pads	39	39.4	8	8.1	52	52.5	99	**2.1**
Smart Phones	16	5.5	155	53.6	118	40.8	289	**6.2**
Totals	**1,379**	**29.8**	**924**	**20.0**	**2,328**	**50.2**	**4,631**	**100.0**

The findings further revealed that 90 (55%) of the institutions surveyed had between 1 to 20 desk top computers for use by tutors and students, 28 (17%) had between 21 and 40 computers while 10 (6%) had between 41-60 computers. Only 4 institutions had over 100 computers, these were Thika Technical Training Institute 100, Kisii National Polytechnic 123, Kenya Coast National Polytechnic, with 260 and Meru National Polytechnic with 482 computers. This was a clear indication that the e-readiness of the TVET institutions was still low.

The findings revealed that majority of the institutions (84%) had desk top computers and only 16% did not have. The 164 institutions had a total of 3,346 desk top computers against a population of 10,272 trainers, providing trainer to computer ration of 0.3. The trainer to computer ratio was 0.5, 0.4 and 0.2 for the National Polytechnics, Technical and Vocational Colleges and Vocational Training Centres respectively. Only 17 (10%) of the TVET institutions had a trainer to computer ratio of 1:1. Consequently, the number of ICT equipment available in the TVET institutions was still relatively low in most institutions. This finding was confirmed by majority of the trainers who indicated that the greatest challenge to e-learning was inadequate ICT equipment in the institutions. Table 2 shows the staff to computer ratio in the three categories of the institutions.

Table 2: *Staff to Computer Ratio*

Category	Total No. of Institutions	No. of Institutions		No. of Staff in Institution	Total No of Computers	Computer to No. of Staff Ratios	No. of Officers Sharing 1 Computer
		Without Computers	With Computers				
National Polytechnics	10	1	9	2,018	1,099	0.5	1.8
Technical and Vocational Colleges	71	21	50	1,442	634	0.4	2.3
Vocational Training Centres	83	5	78	6,812	1,613	0.2	4.2
Total	**164**	**27 (16%)**	**137 (84%)**	**10,272**	**3,346**	**0.3**	3.1

Majority, 123 (75%) of the surveyed institutions had internet connectivity, with 99 (60%) having well established computer network (LAN and WAN) to support e-learning. However, only 58 (35%) of the institutions had teleconferencing applications and software to support virtual learning. Majority (98%) of the institutions indicated that they did not have MATLAB software to support e-learning. The distribution of ICT infrastructure in the categories of the institutions is presented in Table 3. This finding agreed with Kashorda & Waema (2014) report which established that Higher Education Institutions (HEIs) had not made remarkable improvements towards their e-readiness from the initial investments made in internet infrastructure when broadband internet became available.

Table 3: *Distribution of ICT Infrastructure by Category of TVET Institutions*

ICT Infrastructure Type	National Polytechnic				Technical & Vocational Colleges				Vocational Training Centres				Grand Total
N=164	Yes	%	No	%	Yes	%	No	%	Yes	%	No	%	Yes
Internet Connectivity	10	6.1	0	0.0	45	27.4	20	12.2	68	41.5	21	12.8	**123 (75%)**
Computer Network (Local Area Network & Wide-area Network)	10	6.1	0	0.0	29	17.7	36	22.0	60	36.6	29	17.7	**99 (60%)**
Projectors	10	6.1	0	0.0	56	34.1	9	5.5	80	48.8	9	5.5	**146 (89%)**
Teleconferencing Applications and software	10	6.1	0	0.0	18	11.0	47	28.7	30	18.3	59	36.0	**58 (35%)**
Student and Tutor's Portal	10	6.1	0	0.0	19	11.6	46	28.0	36	22.0	53	32.3	**65 (40%)**
MATLAB software.	1	0.6	9	5.5	1	0.6	64	39.0	1	0.6	88	53.7	**3 (2%)**

N=164

However, this finding contradicted the observation from the trainers who cited lack of internet connectivity as the greatest challenge facing majority of TVET institutions in terms of embracing e-learning . The trainers further indicated that in cases where there was internet connectivity, it was unstable in most cases. The finding by the trainers was supported by Muriki (2020), Mbugua (2014) and Kibata (213) identified inadequate technological facilities as one of the greatest impediments facing TVET institutions in Kenya.

Majority (80%) of trainers indicated that they used e-learning as part of their teaching activity while 20% had not embraced e-learning. On whether the institutions had a platform to support e-learning, 72% responded in the affirmative. The most prominently used e-learning platform was Learning Management System-Moodle platform at 33%, Microsoft Teams at 10%, e-learning portal and Google classrooms at 9%, Google Meet at 8.5%, Zoom at 5% and Ding Talk at 2%. The rest of the platforms such as Campuscura, Otti E-Masomo, Big Blue Button, What's App, Microsoft 365 Education, Smart Boards, Word Press and Ultimate e-learning system were at 1% each.

Majority (84%) of the trainers stated that most of the e-learning materials were shared and stored in Microsoft Office tools such as word, excel, PowerPoint, Access and Publisher while Portable Document Format (PDF) ranked second at 74% and Joint Photographic Experts Group (JPEG) ranked third at 25% as shown in Table 4.

Table 4: Format for Storing and Sharing Materials in Electronic Format

Category	National Polytechnic	Technical & Vocational Colleges	Technical Training Institute	Total	% of Total
Microsoft Office (Word, Excel, Power Point, Access & Publisher).	20	38	90	148	83.6
Portable Document Format (PDF)	21	32	78	131	74.0
Joint Photographic Experts Group (JPEG)	8	16	20	44	24.9
WhatsApp			1	1	0.6
Videos	3	2	2	7	4.0
STP		1		1	0.6
DNG		1		1	0.6

A large number of trainers (62%) had attended training on e-content creation while 38% had not attended any training on development of e-content. The training was conducted by the Ministry of Education in collaboration with TVET Authority, TVET-CDACC and private sector. Some trainers cited inadequate training on ODeL and lack of skills in content development as some of the challenges facing the sector. The finding is supported by ESSA (2020) that cited limited digital and pedagogical skills of instructors for online teaching in Africa's higher institutions of learning as one of the drawbacks to the sector embracing e-learning. The finding was further supported by Dumbiri and Nwadiani (2020) and ILO-UNESCO (2020) which established that some instructors lacked the necessary skills and therefore required training on e-learning and remote training.

Only 34% of the trainers stated that the institutional management offered incentives for professional development and training on e-learning while the other institutions did not offer any incentives. The lack of incentives for trainers could result to some sponsored trainers failing to attend the training sessions. Table 5 shows the level of support for trainers on professional development on content creation.

Table 5: Support for Professional Development and Content Creation

Category	Professional Development and Training In E-Learning Offered By Tvet Institutions		Attended e-Content Creation Course	
	No	Yes	No	Yes
National Polytechnic	19	8	7	20
Technical & Vocational Colleges	28	15	21	22
Technical Training Institute	70	37	40	67
Total	**117**	**60**	**68**	**109**
Percentage (%)	**66.1**	**33.9**	**38.4**	**61.6**

Analysis of the Likert questions

The study further sought to find out from the tutors on the level of agreement on the various aspects of institution's preparedness on e-learning. The responses were recorded on a 5-point scale ranging from "Very often"/ "strongly agree" (5), "Often"/ "Agree" (4), "Never"/ "Neutral" (3), "Rarely"/ "Disagree" (2) and "Very rarely"/ "Strongly disagree" (1). Tables 6 and 7 present the results of the Likert-scale on the various aspects of institution's preparedness to undertake e-learning.

The findings revealed that 71.7% of the trainers often used the e-learning platform to give assignments to students, compared to 65.6% who used the platform to make presentations and 42.9% who used it to present difficult ideas clearly. The data yielded a mean of 3.6, 3.5 and 3.0 respectively and a mode of 4 and 2. Very few tutors (14.7%) used the e-platform to conduct practical lessons. This yielded a mean of 2.6 and a mode of 3. The finding is in consonance with Yeap et al.,

(2021) and Hoftijzer et al., (2020) who argued that the practical nature of TVET courses rendered e-learning only useful for theory subjects, and thus making e-learning approaches a weak substitute to conventional methods of teaching.

Table 6: *Extent to which Tutors Used e-learning Platform*

Statements The extent to which e-learning platform is used	Rating (N=177)					Mean	Mode	Standard Deviation (n-1)
	Very often	**Often**	**Never**	**Rarely**	**Very rarely**			
Facilitate students with Assignments/notes	28(15.8%)	99(55.9%)	5(2.8%)	38(21.5%)	7(4.0%)	3.6	4	1.1
Present difficult ideas clearly	14(7.9%)	62(35.0%)	23(13.0%)	66(37.3%)	12(6.8%)	3.0	2	1.1
Make a well-organised presentation	27(15.3%)	89(50.3%)	12(6.8%)	42(23.7%)	7(4.0%)	3.5	4	1.1
Conduct practical lessons	5(2.8%)	21(11.9%)	69(39.0%)	61(34.5%)	21(11.9%)	2.6	3	0.9

The study sought to determine whether the institution had internet connectivity and computer network (LAN & WAN) to support e-learning, 74.5% of tutors agreed with the statement. The data yielded a mean of 3.8 and a mode of 4. The finding is in consonance with the finding in Table 3 on availability of internet connectivity, and established computer network (LAN and WAN) to support e-learning in TVET institutions.

With regard to the statements that senior management and Heads of Department were supporting the tutors on adoption of e-learning in teaching, learning and research, 71% and 58% of the respondents agreed/strongly agreed with the statements. The data yielded a mean of 3.7 and 3.4 respectively and a mode of 4.

On the adequacy, availability and use of e-learning resources such as desk top computers and laptops only 26% of the tutors agreed/strongly agreed with the statements. The data yielded a mean of 2.6 and 2.4 respectively and a mode of 2 and 1. This finding was in consonance with finding in Table 2 that established that the computer to staff ratio was very low.

About half of the tutors (54%) strongly agreed/agreed with the statement that the institutions had a software to support e-learning. The data yielded a mean of 3.3 and a mode of 4. Similarly, about 49% of the tutors agreed/strongly agreed with the statement that TVETs had acquired adequate e-learning technology for teaching and learning. The data yielded a mean of 3.2 and a mode of 4.

The study further sought to find out whether the Institution had teleconferencing applications and software to support e-learning. Findings revealed that 25% of the respondents agreed/strongly agreed with the statement. The data yielded a mean of 2.5 and a mode of 2. The statement was in consonance with findings in table 3 where only 35% of the institutions were found to have teleconferencing applications and software to support virtual learning.

As to whether e-learning platforms in TVETs were used to conduct practical lessons, very few tutors (10%) agreed/strongly agreed with the statement. The data yielded a mean of 2.2 and a mode of 2. The findings are in consonance with results in Table 6 on the extent to which the tutors used e-learning platforms to conduct practical sessions.

Table 7: *Availability of e-learning Resources in the Institution*

Statements	Rating (N= 177)					Mean	Mode	Standard Deviation (n-1)
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree			
e-learning resources are adequate for all the students and tutors to use in teaching and learning and are available when needed	7(4.0%)	37(20.9%)	45(25.4%)	58(32.8%)	30(16.9%)	2.6	2	1.1
e-learning platforms in TVETs are used to conduct practical lessons	1(0.6%)	17(9.6%)	38(21.5%)	75(42.4%)	46(26.0%)	2.2	2	0.9
The Senior management in TVETs are supporting tutors on using e-learning resources in teaching and learning	26(14.7%)	76(42.9%)	37(20.9%)	25(14.1%)	13(7.3%)	3.4	4	1.1
The Institution has internet connectivity and computer network (LAN and WAN) to support e-learning	50(28.2%)	82(46.3%)	17(9.6%)	15(8.5%)	13(7.3%)	3.8	4	1.2
The Institution has a software to support e-learning.	29(16.4%)	66(37.3%)	28(15.8%)	36(20.3%)	18(10.2%)	3.3	4	1.2
Issuance of desktop/laptop for use by Staff	15(8.5%)	32(18.1%)	19(10.7%)	52(29.4%)	59(33.3%)	2.4	1	1.3
The Institution has teleconferencing applications and software to support e-learning.	12(6.8%)	32(18.1%)	29(16.4%)	61(34.5%)	43(24.3%)	2.5	2	1.2

Bivariate Correlation Analysis on the Relationship between ICT Equipment and ICT Infrastructure

Bivariate correlation analysis was conducted to establish the relationship between issuance of various ICT equipment to staff and availability of ICT Infrastructure at the institution. Findings revealed a significant positive relationship between the number of desktop computers issued to staff at the institution and availability of internet connectivity in the institutions with $r = 0.192$ and p value $= 0.014$. Therefore, the computed p values is less than 0.05 at 2 tailed test, hence, implying that there exists a significant relationship between issuance of desktop computers and internet connectivity in the institutions. Similarly, on issuance of desktops to staff and availability of computer network (LAN/WAN) in the institutions, findings revealed that $r = 0.230$ and p value $= 0.003$ which is less than 0.01 at 2-tailed test. This implied existence of a significant relationship between desktop computers issued and existence of computer network (LAN/WAN) at the institutions.

On issuance of laptops to staff and availability of internet connectivity, existence of computer networks (LAN/WAN) and availability of students' and tutors' portal in the institutions, findings revealed a positive significant relationship with $r = 0.237$, 0.420 and 0.496 and p values of 0.002, 0.000 and 0.000 respectively at 0.01 significance level at 2-tailed test. Issuance of I-Pads to staff and availability of projectors revealed a positive significant relationship with $r = 0.216$ and p value $= 0.003$ which is less than 0.05 at 0.01 significance level at 2-tailed test.

Conclusion

The TVET institutions need to shift from conventional teaching methods to online learning. The study concludes that though TVET readiness for online teaching remains underachieved, despite e-learning being the new normal. The low rate was attributed to low tutor to computer ratio and lack of teleconferencing facilities and software to support e-learning in majority of institutions. It is important that TVETs prepare adequately to embrace the new normal. Therefore, e-learning presents the best alternative to solve the problem of access to TVET education in Kenya. Consequently, TVET stakeholders should endeavor to entrench e-learning within the TVET system in order to reap the many benefits of ICT. The study concluded that the success of Distance and On-line Learning, in the 21st Century requires strong infrastructural and efficient technical support for the institutions, faculty and students.

Recommendations

The government should allocate adequate funds to the TVET sector to facilitate acquisition and installation of requisite ICT infrastructure. This will enable TVET institutions to establish appropriate digital infrastructure to support e-learning such as internet connectivity, computer network, teleconferencing applications and software and learning software.

A national platform for delivery of ODeL should be developed and integrated with institutional Learning Management Systems (LMS) to ensure harmonious delivery of instructions. The government should prioritize provision of computers and laptops to achieve a ratio of 1:1 and increased bandwidth to enable easy flow of online classes.

The State Department for Vocational and Technical Training in collaboration with stakeholders should build the capacity of trainers in development and delivery of e-learning content using various digital technologies. The resistance of trainers to change could be mitigated by introducing stimulants such as e-learning fellowships with attractive incentives to increase participation of tutors in digital creation.

Blended learning should be adopted by TVET institutions due its many advantages such as ability to use more than one venue and more than one variety in terms of content, pedagogy and learning approaches.

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Challenges and Opportunities of using Online Training on Teaching Practice in TVET Institutions in Kenya

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Abstract

As a new approach to training in most Technical and Vocational Education and Training (TVET) institutions, online training is becoming a popular mode for learners since they can combine their learning experience with advancement of information technology in mitigating the impact of Covid-19. Although many TVET institutions have embraced online training, the challenges hindering the efficient provision of online programmes by trainers have impacted negatively on its effective utilisation. On the other hand, increased educational opportunities for trainers can be achieved through online training. This study sought to identify the challenges and opportunities of using online training among Kenya Technical Trainers College (KTTC) trainees on teaching practice in TVET institutions. The study was guided by two objectives; To identify the challenges hindering the effective use of online training and To establish the opportunities attained through the use of online training in TVET institutions in Kenya. The study employed explanatory research design targeting KTTC trainees on teaching practice. The target population was 291 respondents. Google forms were designed and used for online data collection. Descriptive statistics (frequency and percentages) were used and data was presented in tabular form. The study found that the challenges that trainees face in efficient provision of online courses are either technological or Organisational. Technological challenges resulted from lack of Information Technology (IT) support, continuous technological changes, and un-optimised software for mobile devices while Organisational challenges included security issues. Educational opportunities were motivational skills development, online educational social networking and e-learning resources development. The study concluded that effective online training, which could lead to development of educational solutions could be achieved if trainee's challenges are properly addressed. The study recommended that TVET institutions should establish online training strategies to address the challenges faced by trainees and eventually increase trainees' opportunities.

Keywords: Challenges and Opportunities, Online Training, Teaching Practice

Introduction

Online training is becoming an increasingly popular new approach to teaching and learning in most institutions of higher learning worldwide since it provides

options for combining learning experience with the advancement of information technology (Tarus, et al., 2015). Online learning promotes team-learning pedagogy whose primary focus is to foster learning environment conducive to group interaction through collaboration and self-learning (Gunga & Ricketts, 2007). Majority of online-training initiatives however, tend to fail partially or entirely due to various barriers to e-learning in developing countries (Mutisya & Makokha 2016). Therefore, the success or failure of any technological system relies on the use of this system by users, both teachers and their students encounter some difficulties when using e-learning due to their shadow experience (Alodwan, 2021). This study was thus an attempt to determine the challenges and opportunities of using online training on teaching practice in Technical and vocational education and training (TVET) institutions in Kenya.

Online learning involves the adoption of technology to enhance teaching and learning activities with the main purpose of increasing accessibility of education, cost reduction, productivity equality and inclusivity (Thomas, 2016). Salomon (1994) explains better in his symbol system theory that different media symbol systems impact information delivery and learning effectiveness. The core of the symbol systems theory is that whether a media can effectively help effective learning depends on the degree of matching between the symbol systems and learners' learning contents and activities. Online learning is covered under a larger term of technology-based learning through websites, learning portals, video conferencing, YouTube, mobile apps, and a thousand types of free available websites (Shahzad et al., 2020).

One of the advantages of e-learning in education is its focus on the needs of individual learners as an important factor in the process of education rather than on the instructors or institutions' needs (Marc, 2002). Holmes and Gardner (2006) noted that the ability of e-learning to assess the students or learners as they learn and at the same time increase their experiences in education, by way of eradicating boundaries of place and time. The opportunities of using online teaching practice can be determined through online educational social networking that can be achieved by being able to be compensated for putting content on moodle, the motivational skills development, the e-learning resources development and the transformational virtual learning (Valverde-Berrocoso et al., 2021).

Despite the claims that e-learning can improve the education quality, it requires a very strong inspiration as well as skills with to the management of time to reduce such effects (Valentina & Nelly, 2014). Furthermore, the instructors are facing individual challenges in terms of the amount of time needed to deal with e-learning requirements and the need for financial support for both the instructors and students (Aldowah, Ghazal & Umar, 2018). The challenges of using online teaching practice can be determined through; lack of IT support, continuous

technological changes, unequal access for all students, un-optimised software for mobile devices and security issues (Moralista & Oducado, 2020).

TVET refers to those aspects of the educational process which include the study of related technologies and sciences, as well as the acquisition of practical skills, attitudes and knowledge relating to professions in various fields of economic and social life (UNESCO, 2002). Viewed as learning, TVET aims to develop skills in specific trade applications where the programme provides students with the skills, knowledge and competencies that will enable them to be productive to rapidly adapt to the changing labour markets and economies (UNESCO-UNEVOC, 2009). Indeed, TVET is a powerful tool for the rapid advancement of technologies, citizen capacities, economic growth in economies and national development (Akhuemonkhan and Raimi, 2013).

Statement of the Problem
As a new approach to training in most TVET institutions, online training is becoming a more popular mode of training for learners as they can combine their learning experience with the continuous advancement of information technology. Despite the claims that online learning is becoming a more popular mode of training for learners, it could be considered as a method of education makes the learners undergo contemplation, remoteness, as well as lack of interaction or relation. Valentina and Nelly (2014) study on the role of e-learning, the advantages and disadvantages of its adoption in higher education. The main objective of the study was to identify the role of e-learning, the advantages and disadvantages of its adoption in higher education but not to determine the challenges and opportunities of using online training on teaching practice in TVET institutions. Mutisya and Makokha (2016) did a study to determine the challenges affecting the adoption of e-learning in public universities in Kenya. The objective of this study was to rank challenges affecting the adoption and utilisation of e-learning in public universities in Kenya in order of seriousness but not to determine the challenges and opportunities of using online training on teaching practice in TVET institutions in Kenya. Furthermore, public universities were used as the context of the study rather than TVET institutions in Kenya. However, based on the existing studies that have been carried out, none has considered to determine the challenges and opportunities of using online training by pedagogy trainees on teaching practice in TVET institutions in Kenya. To fill the gap, this research study addresses to determine the challenges and opportunities of using online training by Kenya Technical Trainers College pedagogy trainees on teaching practice in TVET institutions in Kenya.

Objectives of the Study

The study was guided by two specific objectives:

    (i)   To identify the challenges of using online training in teaching practice in TVET institutions in Kenya.

    (ii)   To established the opportunities of using online training in teaching practice in TVET institutions in Kenya.

Significance of the Study

The results from this study shall contribute to the growing knowledge on challenges and opportunities of using online training in teaching practice in TVET institutions. The information is expected to assist educational planners, educational policymakers, e-learning system designers and other interested parties in planning and making appropriate decisions in matters of the use of online training in the TVET sector. The results from the study will also help trainees and researchers to address the common challenges encountered while using online training on teaching practice in TVET institutions.

Literature Review

Zhang et al (2006) stress that e-learning permits the exploration of flexible learning ways with a much-reduced need for travel to go to classes. The interactive video facility permits learners to watch all activities that are conducted in the classroom and also listen to instructors as many times as needed. According to Standen et al (2001) and Juhadil et al. (2007) this offers teachers several ways of interacting with learners and giving them instantaneous feedback. However, according to Juhadil et al. (2007), it is essential for those who embrace the advanced technology during the process of teaching and learning to have a variety of skills in Information and Communication Technology (ICT).

Online learning aids in the preparation of the society to globally communicate and to dialogue with others (Zeitoun, 2008). Both learners and instructors can be able to accomplish and keep up with development as they obtain experience that is provided by numerous specialists in various fields of knowledge (Valentina & Nelly, 2014). Online learning aids learners or students to depend on themselves for the reason that instructors are no longer the solitary knowledge source, they instead become advisors and guides (Alsalem, 2004). According to Singh (2001), e-learning systems enable improved communication between and among students and between students and faculty or instructors. Also, it facilitates easily accessible resources for learning and experience to students who are relocated or travel to participate in their degree courses.

The introduction of technology into education (for instance, the use of online learning) encountered many challenges even in developed countries. Donnelly and

McAvinia (2012) argue that there are "many academics" who have had no training and little experience in the use of communications and information technology as an educational tool. Furthermore, administrative factors could contribute to minimising the benefit of using e-learning. Tarus, Gichoya and Muumbo (2015) investigate the challenges hindering the implementation of e-learning in Kenyan public universities. It also emerged that the implementation of e-learning in Kenya faces some challenges not limited to inconvenient ICT on e-learning.

Mohammed (2020) investigated whether using e-learning is beneficial to English as a Foreign Language (EFL) to students in learning English to the degree anticipated. It emerged that the implementation of online learning at the University of Bisha was facing many challenges which included but are not limited to academic challenges, administrative challenges, technical challenges and speaking skills challenges. Rhema and Miliszewska (2010) associated some challenges of students and instructors with their awareness and attitudes towards e-learning, such as underdeveloped technological infrastructure and the cost of educational technologies. A pedagogical challenge is introducing digital tools in formal education when teachers have limited experience of online teaching and pupils have limited digital competence (Hansson, 2015).

Methodology

A descriptive survey research design was used to conduct the study, as it was appropriate and enabled the researcher to gather facts and generalise the findings to a population. It allows analysis and determines the challenges and opportunities of using online training on teaching practice in TVET institutions in Kenya.

Kenya Technical Trainers College pedagogy trainees on teaching practice in TVET institutions formed the study target population for this study. Therefore, enrolled 291 trainees form the target population of the study. For the study, a simple random sampling technique was used to collect data. Sampling is a procedure, process, or technique used to select a sub-group from a population to participate in a study (Ogula, 2005). A sample is a smaller group or sub-group obtained from the accessible population (Mugenda and Mugenda, 2003), therefore, a sample of 165 respondents from a total population of 291 forms the sample size population of the study (Krejcie and Morgan, 1970).

Questionnaires were used for the study. According to Owens (2002), questionnaires have the potential to reach a large number of respondents in a short time, give respondents sufficient time to answer the questions, respondents give a sense of security, as an objective method there is no bias due to personal characteristics. Descriptive statistics were calculated and the study results were presented using tables, percentages and interpretations made.

Results and Discussions

Findings of the study to determine the challenges and opportunities of using online training on teaching practice in TVET institutions in Kenya were presented with the respondents requested to rate their responses according to YES, UNSURE and NO. Data collected were presented in tabular form, percentages were computed on the data and interpretations were made as shown in the table below.

Table 1: Challenges and opportunities of using online training on teaching practice in TVET institution in Kenya.

Analysis to determine the challenges and opportunities of using online training on teaching practice in TVET institutions in Kenya					
Challenges		**Yes**	**Unsure**	**No**	**Total**
Lack of adequate information technology support for trainers when using Moodle in the institutes	N	71	37	57	165
	%	0.43	0.23	0.34	1
Lack of interest and commitment to adopted to continuous technological changes on pedagogical skills on online and content development	N	97	27	41	165
	%	0.59	0.17	0.24	1
Difficulty in laying out/structuring course material for Moodle due to un-optimised software for mobile devices	N	107	22	36	165
	%	0.65	0.13	0.22	1
Opportunities		**Yes**	**Unsure**	**No**	**Total**
Being able to enhance motivational skills development is important me	N	81	52	32	165
	%	0.49	0.32	0.19	1
Using Moodle makes it easier for trainers to enhance online educational social networking	N	87	26	52	165
	%	0.53	0.15	0.32	1
Online learning enables e-learning resources development	N	72	51	42	165
	%	0.43	0.31	0.26	1

Lack of Adequate Information Technology Support for Trainers when using Moodle in the institutes

From Table 1, a large proportion of respondents, 43% confirmed that there was lack of adequate support information technology support for trainers when using Moodle. 23% of the respondents are not sure while 34% of the respondents confirmed the implicit information technology support for trainers when using Moodle. The study argued that there is a lack of adequate information technology support for trainers when using Moodle in the institutes. Findings from this study are similar to Donnelly and McAvinia (2012) whose study concluded that many academics have had no training and little experience in the use of communications and information technology as an educational tool.

From the findings shown in Table 1, 59% of respondents agreed that lack of interest and commitment to adopt to continuous technological changes on pedagogical skills on online and content development affected the effective use of online training while 24% were negative. between 'negative'

and 17% were not sure. The majority of the respondents, 59% confirm the importance of interest and commitment to adopt continuous technological changes on pedagogical skills on online and content development. The findings from this study compared very well with those of Hansson (2015) who observed a pedagogical challenge in introducing digital tools in formal education when teachers have limited experience of online teaching and pupils have limited digital competence.

Difficulty in Laying Out/Structuring Course Material for Moodle Due To Un-Optimised Software for Mobile Devices

Results showed that 65% of respondents were positive of the difficulty in laying out/structuring course material for Moodle due to un-optimised software for mobile devices. 13% of the respondents are not sure while 22% of the respondents did not confirm the difficulty in laying out/structuring course material for Moodle due to un-optimised software for mobile devices. This high percentage of respondents, 65% confirms the difficulty in laying out/structuring course material for Moodle due to un-optimised software for mobile devices (see Table 1). Findings from this study were consistent with those of Donnelly and McAvinia (2012) who studied the academic development perspectives of blended learning. Many academics have had no training and little experience in the use of communications and information technology as educational tools.

Being Able to Enhance Motivational Skills Development is Important To Me

The analysis presented in Table 1 showed that 81% of the respondents confirmed that being able to enhance motivational skills development is important. 52% of the respondents are not sure while 32% of the respondents confirmed that being able to enhance motivational skills development is important. This high percentage, 81% of respondents confirms the importance of being able to enhance motivational skills development. These findings collaborate with Hansson (2015) who found that moving from teacher-centered to learner-centered approaches through online training, engages the student and encourages active participation in learning to enhance motivational skills development.

Using Moodle Makes it Easier for Trainers to Enhance Online Educational Social Networking

From Table 1, 87% of the respondents confirmed that using Moodle makes it easier for trainers to enhance online educational social networking. 52% of the respondents are not sure while 26% of the respondent did not confirm that using Moodle makes it easier for trainers to enhance online educational social networking. The study agrees with the findings by Zeitoun (2008) that e-learning aids in the preparation of the society to globally communicate and to dialogue with others.

Online Learning Enables E-Learning Resources Development

The data showed that 72% of the respondents confirmed that online learning enabled e-learning resources development. 51% of the respondents were not sure while 42% of the respondents did not confirm that online learning enables e-learning resources development. This high percentage of respondents, 72% confirms the importance of online learning in enabling e-learning resources development (see Table 1). Findings from this study are similar to Valverde-Berrocoso et al., (2021) whose study found that the opportunities of using online teaching practice can be determined through online educational social networking that can be achieved by being able to be compensated for putting content on moodle, the motivational skills development, the e-learning resources development and the transformational virtual learning.

Conclusion

According to the findings of the study trainers were ready and motivated to implement adapted online training, however, they needed more training related to e-learning technology. This study concluded that successful adaptation of e-learning could be achieved if these challenges were addressed properly. An awareness of any challenge that instructors faced could lead to the development of solutions for overcoming these challenges. This research will help the decision-makers of the TVET institutions to recognise the challenges faced by the instructors and recommend the necessary actions to reduce or eliminate those challenges. Thus, effective online training can be achieved if trainee's challenges are addressed properly which could lead to the development of solutions thus increasing educational opportunities.

Recommendations

Based on the findings and the conclusion from this study, the following recommendations were made:

(a) Expansion of ICT and e-learning infrastructure, internet provision not an exception to facilitate access to e-learning by trainees, trainers and other stakeholders through the allocation of more resources towards ICT and e-learning infrastructure development.

(b) Prioritization of ICT and e-learning in budgetary allocations just like other core activities of the TVET institute.

(c) Formulation of appropriate and operational e-learning policies to guide the TVET institutions towards successful implementation of e-learning.

(d) Comprehensive training of trainers on e-learning skills. Training of trainers on e-learning skills is among critical determinants of successful implementation of e-learning.

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Status of Implementation of Online Training in Kenyan TVET Institutions

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Abstract

The outbreak of Covid-19 pandemic affected the health of over 400 million and led to the death of nearly six million people all over the world. In order to mitigate the spread of the highly infectious viral disease, several countries around the world ordered the closure of their education and training institutions and various sectors of the economy. This study investigated the extent to which the Kenyan Technical and Vocational Education and Training (TVET) institutions have integrated online training systems in their programmes to mitigate against the effects of Covid-19 and any other future pandemic that may disrupt the conventional face-face education and training. The survey also identified challenges faced in the implementation of online training systems. Both qualitative and quantitative research designs were used. The target population was administrators and trainers in 1929 registered TVET institutions. A sample of 283 (14.68%) institutions was used in this study. An online questionnaire was administered to the administrators and two trainers from different departments in each of the sampled institutions. The responses from the survey were analysed using descriptive statistics mainly frequencies and percentages. Findings from the study revealed that most of the TVET institutions had not embraced Open Distance and e-learning (ODeL) as an important mode of training delivery. It was recommended that the government should support the TVET institutions to enhance their online training capacity by providing funds for construction and equipping Information Communication and Technology (ICT) laboratories as well as establishment of online training infrastructure.

Keywords: Covid-19, partnership, ODeL, online learning.

Introduction

Open, Distance and e-learning (ODeL) is the delivery of training to those who are separated mostly by time and space from those who are training. The training is done with a variety of mediating processes used to transmit content, provide tuition and conduct assessment or measure outcomes. Delivery modes may include traditional distance education by correspondence courses, e-learning and blended learning to open learning centres and face-to-face provision where a significant element of flexibility, self-study and learning support is an integral

part (Technical and Vocational Education and Training Authority, TVETA, 2019).

E- learning in the modern sense of the term is a relatively new concept whose first instances in the world can be traced back to 1960 at the University of Illinois, USA. The university of Toronto offered its first fully online courses in 1984. The Open University in Britain was one of the first universities in the world to begin online distance learning, in the early 1990s. Prior to the emergence of distance learning in Africa, many Africans obtained qualifications through providers in Europe and North America. The University of South Africa (UNISA) was the first to offer ODeL in Africa (Nyerere et al., 2012). UNISA's success spurred the establishment of other ODeL providers in the African continent. Examples of these are the open universities in Nigeria, Tanzania, and Zimbabwe, which started out as providers of residential programmes and have now diversified into providing ODeL as well (Juma, 2003). Sessional Paper No. 1 of 2005 recommended the establishment of a National Open University in Kenya. This, however, has not been implemented to date but a number of both public and private institutions in Kenya have embraced ODeL (Nyerere, 2016).

The Kenyan Government has endeavoured to develop online training in all sectors of education and training through various knowledge sharing platforms. The integration of technology to promote skills development is envisaged to address new challenges and ensure that no one is excluded from new forms of learning and training. ICT has the potential to improve access to, and quality of learning, increase efficiency, reduce costs, foster innovation, make teaching and learning more relevant to people's work and lives and prepare individuals to become lifelong learners (UNESCO & COL, 2017).

Due to the increased access to high speed internet and advances in information and communication technologies (ICTs) in the past two decades, online learning is expected to grow by leaps and bounds in the foreseeable future. Online learning has evolved far beyond its original capabilities. It is no longer limited to a didactic method, which had a one-way monologue from the teacher to the student. Current advances in online learning enable the student to play an active role in the learning process, with regular feedback and assessments. This has greatly improved the effectiveness of the teaching system, bringing it at par with classroom-based learning (Soumik, 2020).

Effective implementation of online/blended training delivery needs appropriate investment in technical capacity to support the training system. The measures to be taken training institutions to achieve an acceptable level of online training delivery should include fulfilling the minimal regulatory requirements for each study program. Accreditation and licensing of online programmes is one of the functions assigned to TVETA. Other functions include assuring quality and relevance in programmes of training, undertaking or causing to be undertaken

regular monitoring and evaluation of institutions to ensure compliance with set standards, approving the process of introduction of new training programmes and reviewing existing programmes (Government of Kenya, 2013). The main issues in ODeL have been the lack of efficient monitoring and evaluation of learners, the lack of interactive tasks and limited learner engagement (Gregory et al., 2016). The purpose of this study was to determine the availability of online resources and the extent to which the Kenyan TVET institutions were employing technology to reach their trainees before and during the Covid-19 pandemic.

Problem Statement

The outbreak of Covid-19 pandemic affected education and training institutions all over the world resulting in a prolonged disruption of learning. The extent of disruption varied from one country to the other based on the resilience of the training systems. In Kenya, the impact was extensive due to the fact the training system was largely face to face. In order to build a robust training system that is less susceptible to external shocks, sound evidence on the current status of online training in Kenyan TVET institutions is necessary.

Objective of the Study

The main objective of the study was to determine the status of online training in the Kenyan TVET institutions.

Specific Objectives

The specific objectives of the study were to:

(i) Determine the proportion of institutions that had integrated online training delivery in their programmes.
(ii) Identify the ICT Infrastructure available in TVET institutions for ODeL.
(iii) Determine the compliance status of ODeL programmes being offered .
(iv) Identify the effects of Covid-19 outbreak and challenges faced in the implementation of ODeL.

Methodology

The survey used quantitative and descriptive research design. Two sets of' questionnaires, one for the administrator and the other for the trainer, composed of both structured and open-ended questions were developed, pretested and used to collect data from trainers in NPs, TVCs and VTCs. The pretest was done to enhance the usability and clarity of items. The instruments were then reviewed to ensure alignment of data collected to the objectives of the study. This in turn enhanced the validity of the instruments and ensured that all errors were eliminated. The target population for the study was Administrators and Trainers from registered TVET institutions. By the time of the study, there were 1929 registered TVET institutions by TVETA of which 12 were National Polytechnics (NPs), 209 Public TVCs, 789 Private TVCs and 919 were VTCs.

Stratified and simple random sampling methods were employed to obtain a sample of representative respondents where institutions were classified into category, type and county. A sample of two hundred and eighty-three institutions were picked to participate in the study. This represented 14.68 per cent of all accredited TVET institutions in the Country. A maximum of three respondents were selected per institution of which one was an administrator and two were trainers randomly picked from different academic departments. The data collection tools were administered by requiring the respondents to fill in an online questionnaire. The primary data collected was sorted, edited, coded, analysed and presented in the form of tables, pie charts, bar and line graphs. Simple statistical measures such as aggregates and means were also used for easy interpretations of the study results.

Results and Discussion

The number of institutions that responded to the questionnaire from 46 out of 47 counties were 217. This represented a response rate of 76.7%. The high response rate and the coverage of nearly all the counties in Kenya implied that the results from this study were representative and could therefore be generalised for all the TVET institutions in Kenya.

Proportion of Institutions that have Integrated Online Training Delivery

Most of the institutional administrators stated that they had never or rarely used online training before the outbreak of Covid-19. From Figure 1, it is clear that only 1.03% of VTCs, 9.76% of TVCs and 20% of NPs had employed online training very often before Covid-19. Apparently, Covid-19 ignited innovativeness in content delivery by learning institutions hence the significant rise in adoption of online training. The adverse impacts of the pandemic have forced many Organisations and governments to think of innovative solutions to mitigate the effects of the current pandemic and any similar future crises that may cause similar disruptions (Majumdar & Araiztegui, 2020).
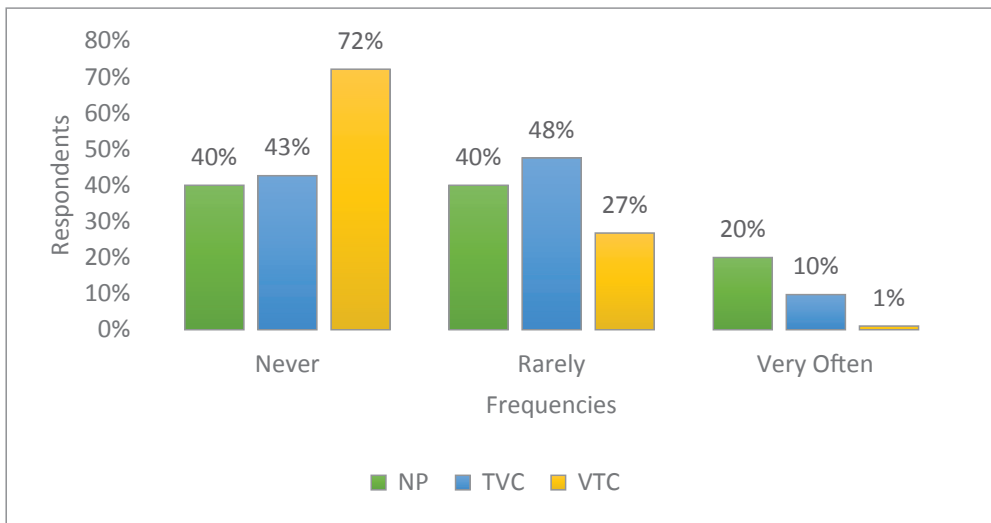
Figure 1: *Frequency of Online Training in TVET before Covid-19 outbreak*

Respondents were asked to state the commonly used mode of instructional delivery currently in use in their institutions. The results showed that 95.83% of VTCs, 55.56% of TVCs and 27.27% of NPs mainly used face to face as the main mode of instructional delivery. This finding is in line with findings of a study by Dhawan, S. (2020) that concluded that most educational institutions were still following the traditional set up of face to face lectures. The National Polytechnics had to a great extent incorporated blended which accounted for 72.73% as shown in Figure 2. The lower implementation of online training delivery by the VTCs could be attributed to unavailability of equipment and competence of personnel in offering online programs. The focus of TVET on practical skills and work-readiness made remote learning particularly challenging, particularly for courses where remote learning was a weak substitute for hands-on experience. However, in some contexts, work-based learning continued, either on-site or offline (World Bank, 2020)
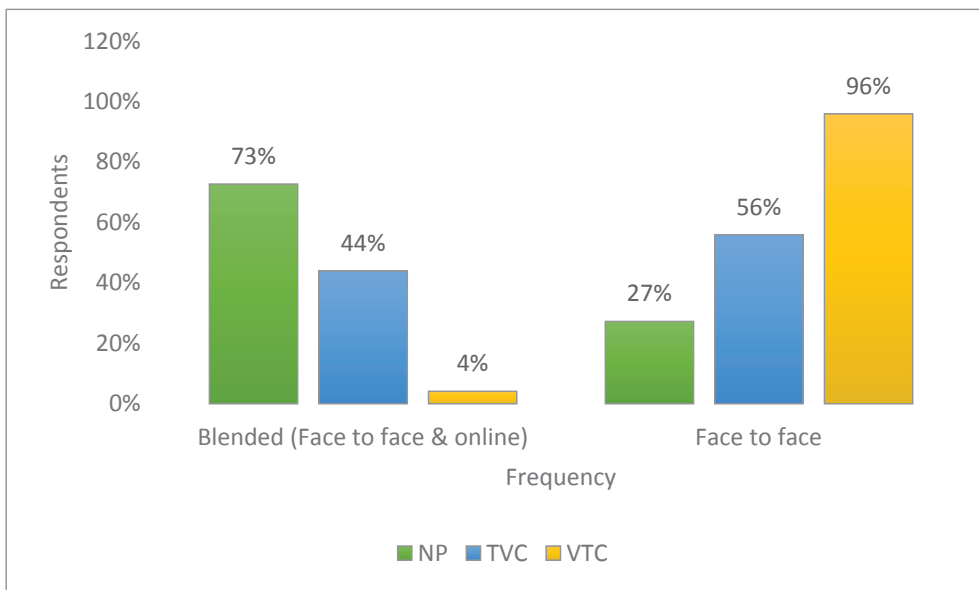
Figure 2: *Frequently Used Modes of Training in TVET*

The respondents were asked to indicate both the total number of courses offered in their institutions and those delivered through ODeL. The proportion of courses offered through ODeL was calculated as a percentage of the total courses offered in the Institutions. The summary of results was as shown in Figure 3.
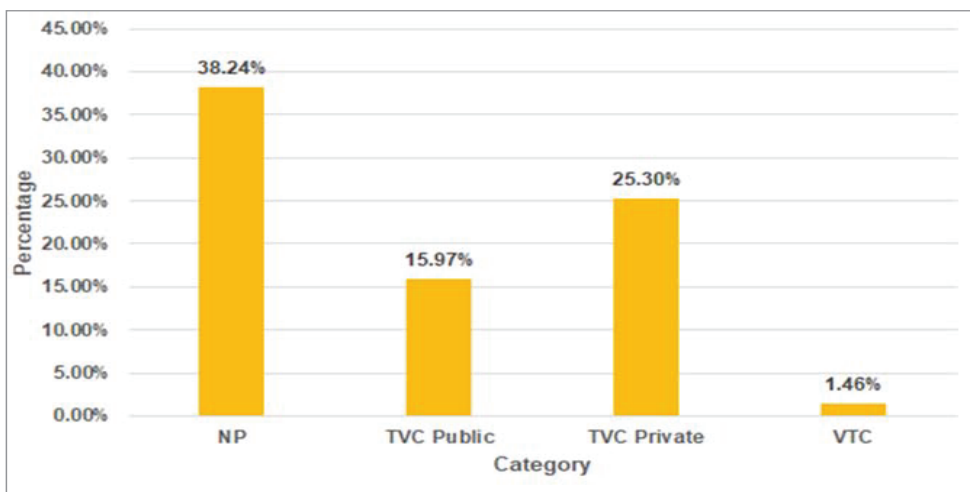
Figure 3: *Proportion of Courses Offered through ODeL in TVET Institutions*

Most of the institutions were yet to fully adopt online curriculum delivery as the main mode of training delivery. The proportion of courses that were offered through online mode ranged from 1.46% to 38.24%. The national polytechnics had the highest proportion of courses offered through online mode at 38.24%

followed by the TVCs at 25.3% and VTCs at 1.46% respectively. The private TVCs had placed more investment in online training delivery (25.3%) compared to the public TVCs which had 15.97% offering ODeL. The Vocational Training Centres had, however, done very little in implementation of online training.

ICT Infrastructure for ODeL Implementation

The infrastructure that was available for mounting ODeL in TVET institutions included computer labs, internet connectivity, learning management system, system backup and power backup. Figure 4 shows that, whereas 81.5% of institutions had computer labs, only 57.4% of them had internet connectivity. On the same note, only 35.4% had power backup. This painted a picture of unreliable infrastructure to support mounting of ODeL programs in most TVET institutions. There was no sustainability in the ODeL programs as demonstrated by availability of system backup in only 18.5% of institutions. Ghirardini, B. (2011) had similar findings in a study conducted on tertiary learning institutions in Zambia. In order to boost the utilisation of e-learning platforms, the study recommended that colleges needed to make the e-learning platforms more user friendly, invest in appropriate hardware and software and alternative sources of power and consider retraining the e-learning platforms users.
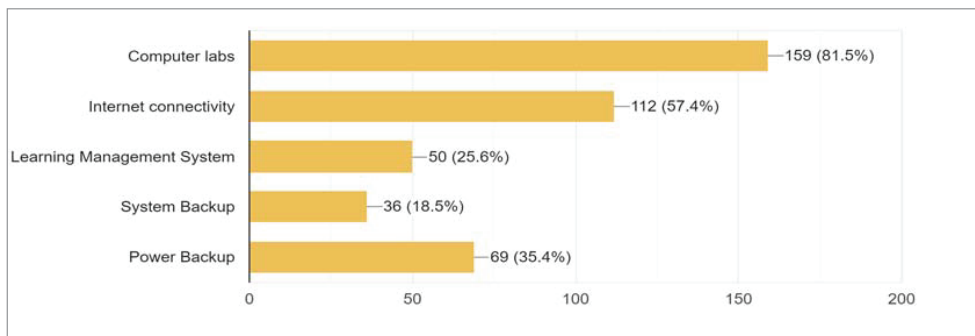
Figure 4: *Available Infrastructure for Supporting Online/ Remote Learning*

Compliance Status of ODeL Programmes being Offered

The TVET Authority considers a number of parameters in determining the compliance levels of institutions offering online training. In this study, the parameters that were considered included licensing of programs, availability of internal ODeL Policy, staff competence, delivery methods and trainee support to determine whether institutions had complied with regulation requirements before mounting online programmes.

Although a significant number of institutions indicated that they were licensed to offer ODeL programs, records at TVETA showed that no institution had been accredited to do so. The non-compliance was more prevalent in VTCs at 60% while TVCs and NPs were at 36.32% and 3.68% levels of non-compliance. The Authority is mandated to license all programs in TVET institutions including ODeL programs (GOK, 2013). It was therefore observed that some administrators were not aware of their obligations in regard to mounting ODeL programs.
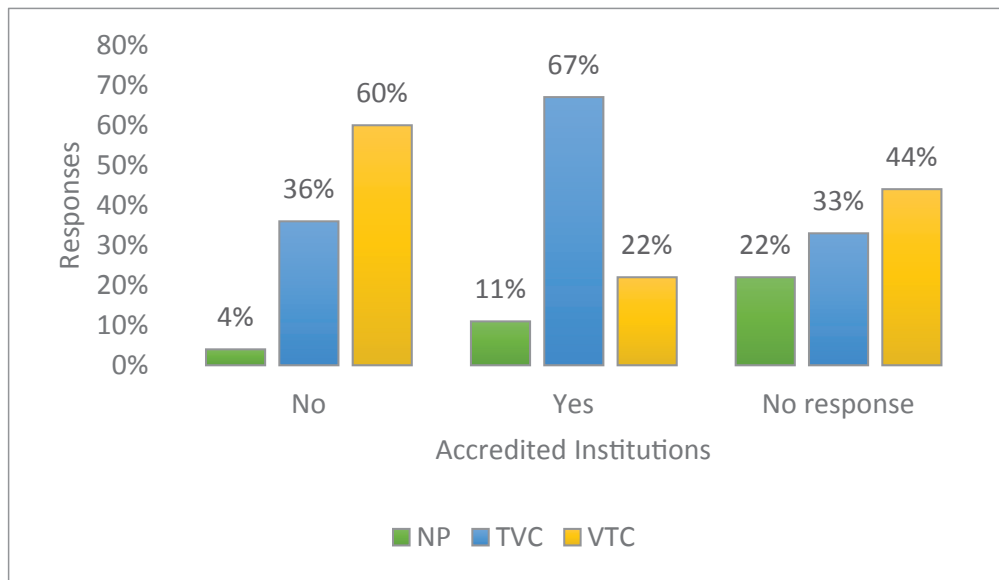
Figure 5: Institutions Accredited to Offer ODeL Programs

The study sought to establish the proportion of institutions that developed an internal ODeL policy as required by the ODeL standard. The NPs formed the highest proportion of institutions with an ODeL policy at 30%, followed by TVCs at 24% and the least was VTCs with a paltry 2.5%. For effective implementation of ODeL, institutions are required to developed and implement an internal ODeL policy (TVETA, 2019). However, the results above indicated that a majority of the TVET institutions were yet to develop an internal ODeL policy.

National Polytechnics had the highest proportion of technical staff with competence to administer ODeL (91%), followed by TVCs (79%) and VTC (43%). Private TVCs had placed more investment in online training than their public counterparts. Figure 6 shows the proportion of technical staff with appropriate qualifications to administer ODeL. It was, therefore, observed that more than 50% of VTCs felt they had no staff with technical competence to administer ODeL and this partly explained why the majority had not attempted to offer programs through ODeL when the institutions were closed due to COVID.
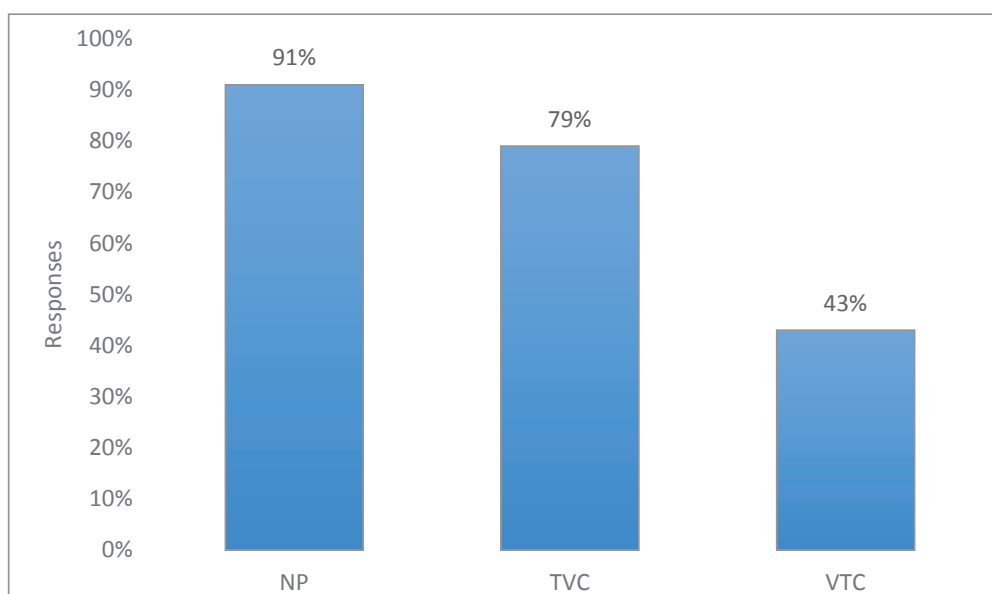
Figure 6: Proportion of Competent Staff to Administer ODeL Training

As part of compliance to requirements, institutions are required to establish ODeL implementation committees (TVETA, 2019). All National Polytechnics, 78% of TVCs and 43% of VTCs had established ODeL implementation committees. As a best practice, institutions needed to constitute ODeL implementation committees to support effective delivery of online training.

The ODeL requirements and guidelines recommends use of interactive methods for online instruction delivery. Findings from this study indicated that the common online training methods were lecture, demonstration, practical, focused group discussions, project work and simulation respectively. The quality of training offered through ODeL and that offered through face to face should be comparable (TVETA, 2019). A large proportion of trainers (29%) indicated that they preferred lecture method followed by (19.9%) trainers who preferred demonstration method. The preference of only lecture methods may have allowed the mounting of less practical courses through ODeL as compared to STEM courses which requires a more practical approach. This corroborates with a study by World Bank (2020) that found out that the focus of TVET on practical skills and work-readiness made remote learning particularly challenging, particularly for courses where remote learning was a weak substitute for hands-on experience. Figure 7 shows the online training methods used by different TVET institutions.
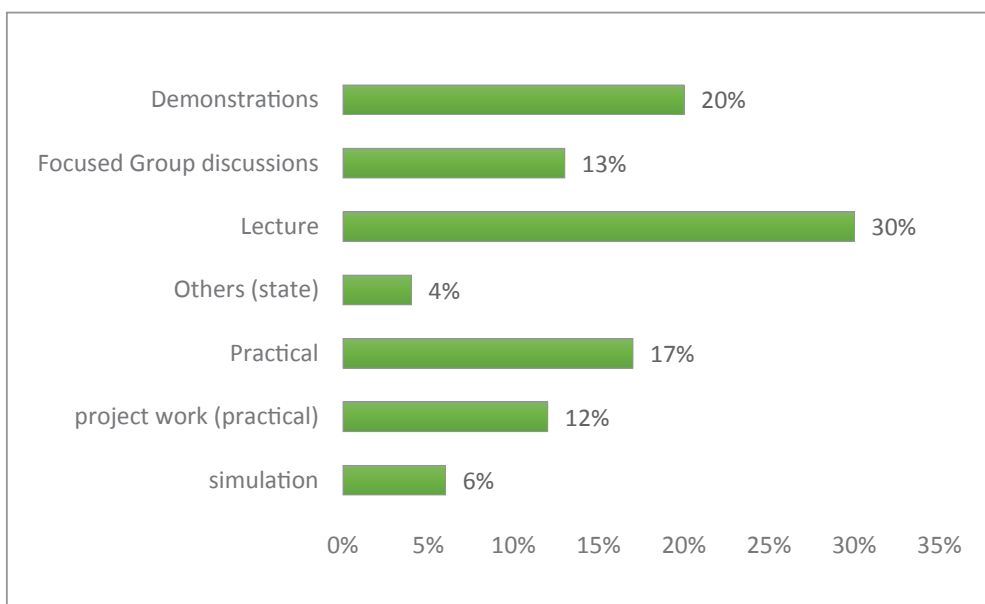
Figure 7: *Preferred Online Training Methods in TVET*

For effective ODeL delivery, institutions are expected to ensure that trainee support services are available (TVETA, 2019). Figure 8 shows the different trainee support mechanisms adopted by TVET institutions offering online training.
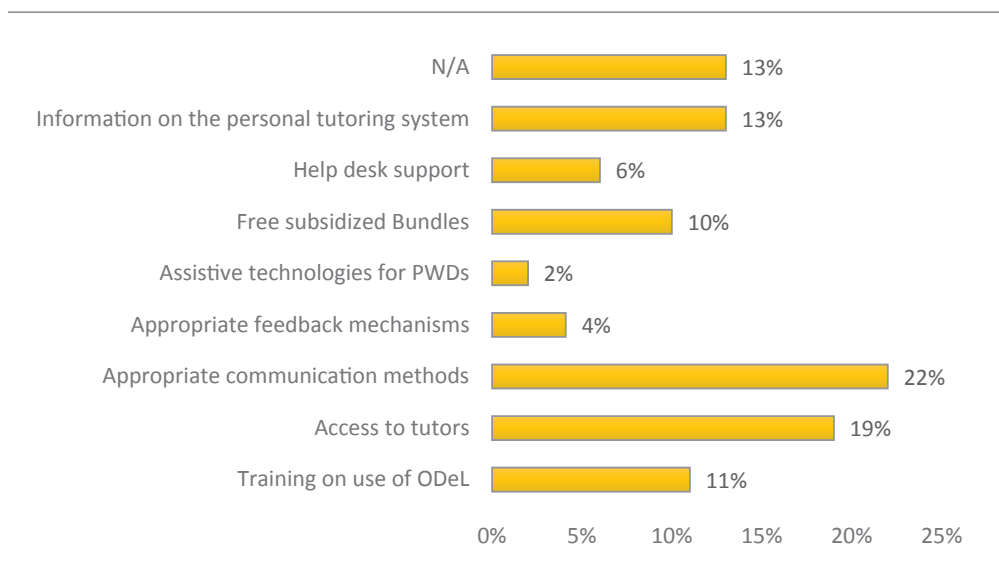
Figure 8: *Support Mechanisms Available to Trainees Studying through ODeL*

A variety of trainee support mechanisms were adopted by institution in compliance with the Kenya TVET Standard on Open, Distance and E-learning.

Effects of Covid-19 and Challenges in Implementation of ODeL

The outbreak of Covid-19 affected all sectors of the economy. Data from this study showed that all categories of TVET institutions were completely affected. This indeed corroborates the Presidential directive of 15th March 2020 to suspend learning in all education and training institutions. Respondents were asked the extent to which they had been affected by closure of institutions in country and some of the areas of training that had been greatly affected. A small number of institutions claimed not to have been affected by the closure. The institutions that had online programs prior to the onset of the Covid-19 pandemic were only partially affected by the closure. Figure 9 shows how the closure affected the different categories of institutions.
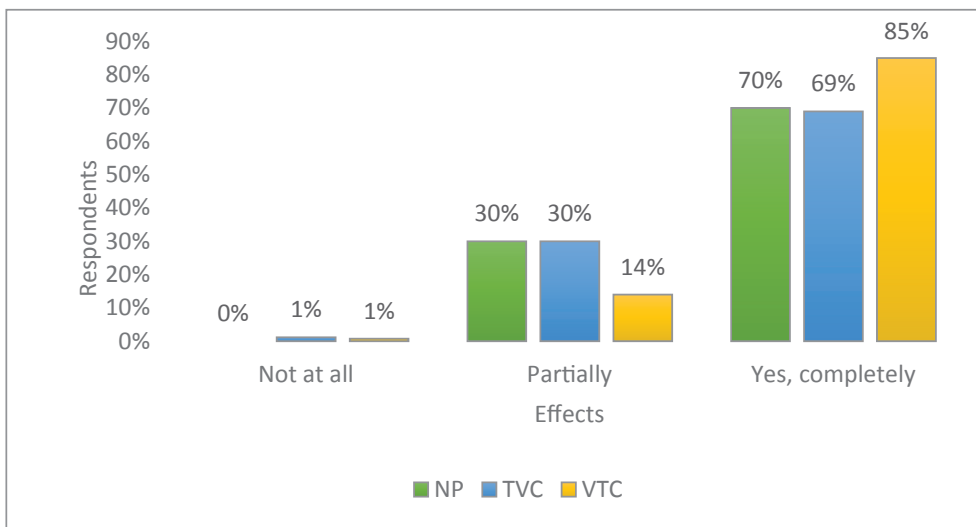
Figure 9: *Effects of closure of institutions on training due to Covid-19*

Respondents were asked to mention the aspects of training that were affected by closure of institution due to Covid-19. The responses were summarised in Figure 10.
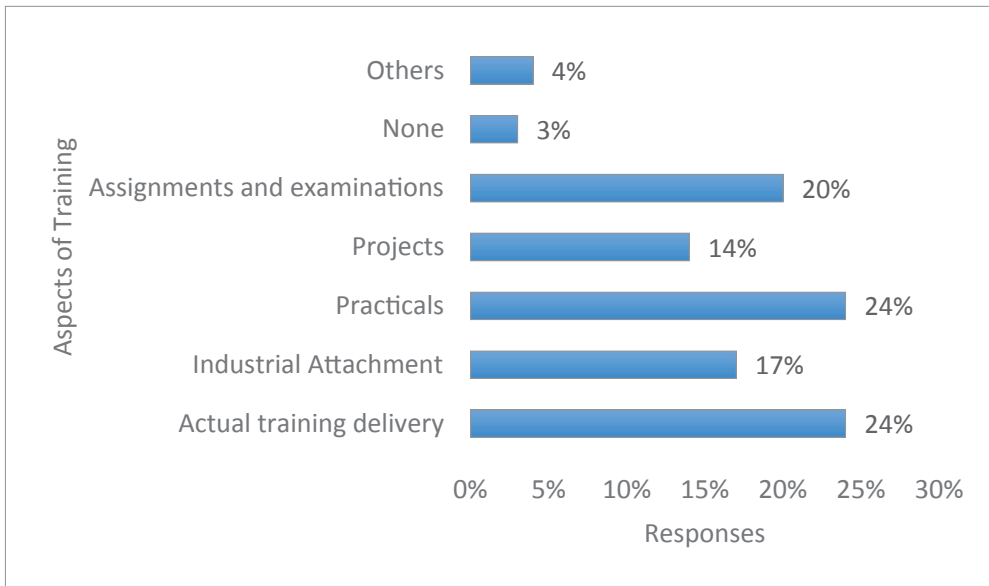
Figure 10: *Aspects of Training Affected by Closure of TVET Institutions due to Covid-19*

The respondents indicated that the aspects of training that were affected included actual training (23.88%), practicals (24.01%), industrial attachments (17.02%), assignments and exams (20.32%) and projects (14.12%). Other aspects of training that were mentioned as having been affected were trainee admissions/ trainee retention rates and the institution having been forced to totally close which led to education wastage and drop outs.

Respondents were asked to state the challenges experienced by their institutions in developing and implementing ODeL. The responses brought to the fore a myriad of issues including; cost of acquisition of related software and hardware for online training, information security, lack of appropriate technical support, lack of electricity, lack of partners to support digital learning, lack of support from institutions management, low accessibility of online training by trainees, low capacity of trainers to develop and deliver online training materials, poor or lack internet connectivity, trainers with poor digital skills, low acceptability of online training, low capacity on use of online training especially in Vocational Training Centres with trainees who have not completed primary education. This corroborates with a study conducted by Mwancha et al. (2021) who posited that distance learning in Kenya had a myriad of challenges especially in handling practical aspects of programmes.

Conclusions

Results from this study revealed that most of the TVET institutions had not embraced ODeL as an important mode of training delivery. Most of the institutions

had not established effective online training that could provide alternative avenues for continuity especially in emergencies. This could be attributed to inadequate ICT infrastructure and low capacity of trainers and staff to implement ODeL. Most of the institutions offering online training had not complied with regulation requirements as per the ODeL standard. Some of the main challenges affecting ODeL implementation included inadequate funding for procurement of appropriate hardware and software, lack of technical expertise in online delivery, poor or lack of internet connectivity, high internet costs and lack of reliable power supply.

Recommendations

TVET institutions should mobilise funds and establish online training infrastructure. Provision of mobile workshops can greatly support adoption of practical oriented online programmes. Institutions should strive to comply with all regulatory requirements before mounting ODeL programmes. Stakeholders should continuously be sensitized on the advantages of ODeL to increase access and ensure that training does not stop during emergencies. Finally, TVET institutions especially VTCs should strive to build capacity in online training delivery.

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Migration to Online Learning by Higher Education Institutions Due to Covid-19 Pandemic

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Abstract

Covid-19 pandemic disrupted almost every sector of the economy. Suspension of learning and closures of education institutions were affected in most parts of the world. Higher Education (HE) institutions adopted online learning to mitigate the effect of the crisis. This paper analyzed the effect of migration to online learning as a response to covid-19 pandemic. The study was guided by three specific objectives that included; to identify methods of migration to online learning adopted by HE stakeholders during the Covid-19 pandemic, examine challenges posed by migration to online learning, and explore opportunities of migration to online learning. A descriptive research approach was used to understand methods used for migration to online learning, challenges encountered and opportunities. This was achieved through systematic analysis of related studies. Data collected from secondary sources that included reports, research papers, and journal articles obtained through Google scholar and other academic databases was processed through content analysis. The results revealed that externally assisted and integrated migration methods were used by HE institutions in responding to the Covid-19 crisis. The three systems that were most commonly used included desktop, interactive, and web video conferencing. The challenges faced in online learning included lack of appropriate technology, poor digital literacy, weak quality assurance systems, and readiness for online learning. The opportunities that were created by online learning included increased possibilities for innovations and digital development, flexibility of learning and identification of socio-economic inequalities affecting learning. The paper recommended establishment of online platforms that are suited to the needs of institutions. The government and stakeholders to provide funds for acquisition of equipment and establishment of infrastructure. Higher education institutions to identify training gaps for faculty and trainees to be filled for effective online learning. All stakeholders to develop remote supervision mechanisms for safeguard the quality and integrity of assessments.

Keywords: Online Learning, Migration, Opportunities, Higher Education, Institutions.

Introduction

The Corona virus that causes Covid-19 was first identified in December 2019 in Wuhan, China. The World Health Organisation declared it a global pandemic in March 2020. The virus was found to be quite fatal and highly infectious through physical contact with infected persons or contaminated surfaces. Covid-19 crisis has caused disruptions in all sectors across the world. Massive or localised lockdowns and social distancing have become common to prevent or curb the spread of the coronavirus. Due to recurring waves of spread, such measures could be the "new normal" until the virus is brought into control. In the education sector, the measures have disrupted face-to-face instruction forcing education systems to seek alternatives. Covid-19 pandemic affected approximately 1.6 billion learners representing 90% of all enrolled learners across 194 countries (UNESCO, 2020).

For the learners and faculty members, their digital proficiency and access to e-learning resources significantly determine their migration process. A substantial proportion of faculty members and learners are digital natives. These were born and raised in the digital era and are expected to be technology savvy. However, migration into online learning has posed challenges to them. Areas posing most of the challenges include technology, socio-economic factors, digital competence, disruptions, workload, compatibility, assessment, and supervision. The migration into online learning also provides opportunities for research and technological innovations as well as socio-economic interventions.

Statement of the Problem

Effective online education is critical for learners, faculty members, and higher institutions of learning. It is characterised by well-developed systems and curriculum of instruction. The online education that emerged due to Covid-19 lacks well-developed systems and curriculum of instruction. While the digital transformation in response to the pandemic is a positive development, it is not equal to a sustainable education system. It focuses on the delivery media excluding other important theories and models of online education. Many higher education institutions' migration has posed challenges and opportunities to the institutions, learners, and faculty members (Gathuru, G. and Mweyeri, M, 2021). These challenges threaten to adversely affect learning while failure to utilise opportunities could limit the higher education sector's capacity to address a crisis in the future. Unless their manifestation is analysed and understood, they will continue diminishing education outcomes. It is against this backdrop that this study sought to analyse the migration to online learning by higher education institutions due to Covid-19 pandemic.

Objective

The purpose of the study was to analyse the higher education institutions' migration to online learning in response to Covid-19 pandemic.

Specific Objectives
(i)   To identify methods of migration to online learning adopted by higher education stakeholders after Covid-19
(ii) To examine challenges that migration to online learning has posed to higher education stakeholders after Covid-19
(iii) To explore opportunities that migration to online learning has presented to higher education stakeholders after Covid-19

Methodology
This study employed a descriptive research approach. It sought to understand methods used for migration to online learning, challenges encountered and opportunities presented. This was achieved through systematic analysis of previous studies on this subject. Data were collected from secondary sources that included reports, policy briefs, commentaries, research papers, and journal articles obtained from Google scholar and other academic databases. Twenty-six (26) articles were selected for analysis based on their relevance to the subject. Content analysis was used to process the data collected. *Content analysis* is a qualitative research tool or technique that is used widely to *analyse* the *content* and its features (Kimberly A. 2017). It is an analytical approach ranges from impressionistic, intuitive, interpretive analyses to systematic, strict textual analyses (Rosengren, 1981). The specific type of content analysis approach chosen by a researcher varies with the theoretical and substantive interests of the researcher and the problem being studied (Weber, 1990). The success of a content analysis depends greatly on the coding process. The basic coding process in content analysis is to organize large quantities of text into much fewer content categories (Weber, 1990).

Literature Review
Adedoyin and Soykan (2020) differentiated online learning from emergency remote teaching. The former is informed by rigorous "education theories and models" while the latter is a "crisis response" lacking proper planning and instructional designs. According to Adedoyin and Soykan (2020), emergency remote teaching has emphasised delivery media. It has several challenges that emanate from technology, social-economic factors, digital competence, disruptions, workload, compatibility, assessment, and supervision. These challenges can be transformed into opportunities to create sustainable instructional activities.

Liguori and Winkler (2020) noted the slow pace of integrating online learning that characterised higher education before the Covid-19 pandemic. This could be attributed to the availability of traditional teaching methods that were eroded by the spread of coronavirus. Liguori and Winkler (2020) observed that teaching business basics through online learning has been seamless and tools and resources used in traditional teaching are slowly emerging online. However, teaching entrepreneurial basics, entrepreneurial mindset, and competencies has posed challenges. The authors suggested that online learning is important but cannot

replace traditional teaching methods. They recommended modification of online learning techniques through innovative ways of teaching to mitigate challenges of teaching entrepreneurial basics, entrepreneurial mindset, and competencies. This requires careful and deliberate planning for effective implementation.

Adnan and Anwar (2020) established that online learning did not meet the expectations. This was attributed to the poor technology infrastructure in underdeveloped Pakistan. The vast majority of learners could not access the internet and the necessary devices to participate in online learning. Limitations in their technical capacity and their socio-economic status were significant disadvantages. This meant that with the absence of face-to-face interaction between learners and faculty, and disruption of the traditional classroom socialisation, learning outcomes for higher education learners were adversely affected.

Hodges et al. (2020) argued that quality online learning, on one hand, is a product of what they describe as "careful instructional design and planning, using a systematic model for design and development." "Emergency remote teaching" on the other hand is a hurried shift in instructional delivery occasioned by emergency circumstances. In an emergency shift, this quality is absent and could reinforce wrong perceptions that online learning is inferior to face-to-face instruction. Hodges et al. (2020) discourage the temptation of equating emergency remote teaching to online learning. These concerns emphasize the need for continuous improvement in terms of the design process to achieve quality online learning.

Results and Discussions
Methods of Migration to Online Learning
Online learning is the use of internet and technologies to develop materials for instructional delivery, management of programmes as well as educational purposes (Fry, 2001). The methods of migration are determined by accessibility by learners. Although an upsurge of online learning was recorded due to Covid-19, still only a small proportion of learners have access to online learning platforms. Higher education institutions were found to use both external assisted and external integrated migration methods. For example, Big Blue Button, Google Classroom and zoom are a good example of external assisted migration while MicroSoft 360, Moodles are examples of external assisted migration. External assisted migration method entails reliance on web platforms developed by external corporates while external integrated involves the incorporation of external web platforms to higher education institutions' already existing online learning platforms for example, the methods of migration to online learning have focused on delivery media video conferencing playing a central role in instruction. Three common video conferencing systems can be identified and they include desktop, interactive, and web video conferencing. Web video conferencing is the most commonly used by higher education institutions.

Challenges

Technology is a central pillar of online learning. This has presented challenges for higher education institutions, faculty, and learners. Up-to-date technology is costly which could be prohibitive to higher education institutions, faculty, and learners without adequate resources. Another limitation associated with technology is obsolescence. Outdated devices and technology may result in technical difficulties due to compatibility issues. Socio-economic factors have a significant effect on technology infrastructure distribution. Higher education institutions, faculty, and learners that enjoy a high socio-economic status are likely to have up-to-date technology compared to counterparts in low socio-economic status. This may create and perpetuate inequalities in higher education. Higher learning institutions should ensure equality endeavour to embrace to have up-to-date technology.

Online learning requires faculty and learners to have adequate digital literacy. Although there are early adopters of technology, the level of digital illiteracy is still high among faculty and learners which means higher education institutions have to invest in training to equip them with the requisite skills for effective online learning. The inequality in digital skills and confidence among faculty and learners may create a digital divide adversely affecting education outcomes. This underscores the need for adequate preparation for online learning to ensure that it does not disadvantage some stakeholders in higher education.

Online learning has presented a challenge in the quality assurance of learning assessment and supervision. Higher education institutions have had to modify their quality assurance procedures to correspond with online learning systems. Some learners and faculty may also find online assessments and submission of assignments challenging, especially due to technical difficulties associated with technology, devices, and location. Learners and faculty in remote areas may experience internet connectivity interruptions and infrastructure challenges during assessments that may end up affecting learning outcomes. Assessment in online platforms is prone to misrepresentations and academic dishonesty that could jeopardise the integrity of the process. Internet connectivity should be ensured in every location for convenience.

Online learning requires adequate time for learners and faculty to prepare. This may create a heavy workload that could adversely affect learners' and faculty attitudes towards online learning. When working or learning from home, the need to participate in household production and assist in household chores may cause disruptions and distractions. Disruptions and distractions may erode learners' and faculty's motivation to work hard for effective online learning. In addition, learners who are not accustomed to self-directed learning may find it difficult to learn in an environment that lacks personal and physical attention. Some courses

like medicine and engineering may not be compatible with online learning as they require experiential and hands-on learning. Enough time should be allocated for online learning due to lack of physical and personal attention.

Opportunities

Online learning has created a platform for innovations and digital development. Although there were efforts to develop online learning before the Covid-19 pandemic, they have been accelerated after the pandemic due to the limitations of face-to-face instruction. Resources and attention directed towards equipping higher education institutions, faculty, and learners have the potential to hasten technology adoption and inventions in advancing online learning.

Higher education institutions can now develop flexible programs for learners and faculty. With adequate technology and connection, learners and faculty can access programs without geographical limitations. Embracing online learning can create a broader and resourceful pool of skills sourced locally and internationally. This is advantageous to the learners who can benefit from diverse competencies and skills improving their critical thinking, analytical, and problem-solving skills.

Online learning adoption has brought forth the socio-economic inequalities affecting learning in higher education institutions. This has attracted the authorities' and corporates' attention resulting in some sort of socio-economic interventions to assist learners and faculty access online learning. Some authorities and corporates, for instance, have moved to subsidize or lower the costs of the internet and devices needed to facilitate online learning. The challenges experienced as a result of Covid-19 have justified increased resource allocation to higher education institutions for facilitating response to the crisis.

Conclusions and Recommendations

The higher education institutions' methods of crisis response to Covid-19 have shown the importance of investing in technology capabilities. Higher Education Institutions with already existing online learning platforms have integrated external platforms to enhance their capacity, Higher education institutions should strive to establish online learning platforms that are suited for their unique needs.

Technology is a focal component of online learning. It can limit higher education institutions, faculty, and learners to effectively participate in online learning. The technology infrastructure can be expensive and could be a source of inequalities. The government and other higher education stakeholders should allocate adequate resources and formulate policies to promote equal distribution of technology infrastructure. Caution should be taken to ensure investment in up-to-date technology.

Quality assurance is key to the integrity of online learning. The defragmentation of faculty and learners during learning assessments makes supervision and safeguarding quality difficult. Higher education institutions should work closely with the government and other stakeholders to address quality assurance challenges. They should develop remote supervision mechanisms to safeguard the quality and integrity of learning assessments.

Higher Education institutions, faculty, and learners' readiness are critical for effective online learning. The government and other higher education stakeholders should conduct readiness assessments of higher education institutions, faculty, and learners to develop evidence-based policies and strategies to enhance their capacity for online learning. Higher education institutions should also put in place the appropriate technology infrastructure and systems to support online learning. Faculty and learners should be prepared by having the right skills, attitude, confidence, and devices to participate in online learning.

With the uncertainties in the current world, institutions of higher learning should embrace blended learning and integrate online learning to its day to day running of the institutions. This will enable continuous learning in these institutions. With this approach, migration to online learning will persist post-pandemic in institutions of higher learning in Kenya.

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Quality of Competency-Based Education and Training during Covid-19 Lockdown in Kenya: A Discussion of Open Distance and e-Learning Instructional Design

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Abstract

The quality of instructional and assessment methods affects the effectiveness of education and training. The Kenyan government has developed standards and guidelines to promote Open Distance and e-Learning (ODeL) in Competency-Based Education and Training (CBET) programs. Nevertheless, CBET stakeholders are still concerned with the training content and quality of ODeL. This study examined the quality of ODeL instructional domain and the stumbling blocks that affected its effective implementation during the Covid-19 lockdown. The paper focused on the application of ODeL in competency-based training in Technical Vocational Education and Training (TVET) institutions in Kenya. It discussed the characteristics, elements and objectives of ODeL and highlighted the gaps in its implementation on a Flexible and Blended (FaB) learning approach. The study sampled 54 out of the 2,178 accredited TVET institutions for this study. The institutions were sampled across the entire 47 counties in Kenya through a web-based survey. The sample constituted of 110 CBET trainers and 125 trainees. Data was collected through online focused group discussions, telephone interviews and document analyses. The results showed that most parts of Kenya did not have adequate internet connectivity to support ODeL. Further, most trainers did not have the necessary ICT skills and knowledge for effective ODeL curriculum delivery. Moreover, significant number of trainees did have adequate ICT equipment to undertake the ODeL programmes. The study noted that the ODeL instructional programs offered for CBET curriculum was basically of low quality. Consequently, the study recommended improved partnerships between government and private Internet Service Providers (ISP) to enhance internet connectivity within the country. It also recommended provision of subsidized ICT equipment and capacity building for trainers in ODeL content development and curriculum delivery.

Introduction

Background of the Study

The Sessional Paper Number 14 of 2012 proposed a paradigm shift to Competency-Based Education and Training (CBET) approach in TVET sector. CBET is a practical method of teaching where emphasis is made on the learners' needs to acquire the essential skills and knowledge (Curriculum Development Assessment and Certification Council, CDACC, 2020). Therefore, the implementation of competency-based system spearheaded the applications of practice rather than theory. The CBET policy framework provided the design and legislations of its implementation (RoK, 2018). This called for a new paradigm shift in the instructional strategies.

The World Health Organisation (WHO) on 11th March 2020 declared Covid-19 as an international pandemic. Further, it pointed out over 118,000 cases of the virus in over 110 countries. Additionally, WHO pointed continued hazards of more spread. The Organisation was extremely troubled with both the frightening levels of the spread and the failure to take actions by most nations. Subsequently, it advised countries to take actions in containing the virus. Consequently, learning institutions globally were shutdown indefinitely and without any notice. In Kenya, the first case of Covid-19 was reported on 13th March 2020 and in a bid to curb its spread, the President of the Republic of Kenya ordered immediate closure of all learning institutions. Subsequently, most learning institutions started grappling with the concept of Flexible and Blended (FaB) learning to ensure continuity and completion of the academic calendar.

FaB learning combines both face-to-face teaching methods and use Information Communication Technology (ICT) to deliver e-learning. It aims at catering for the individual student's needs (CDACC, 2020). Open Distance and e-learning (ODeL) is an integral component of Flexible and Blended (FaB) learning. ODeL is mostly virtual in nature and therefore face-to-face human interactions is significantly reduced. As the pandemic continued to ravage the world, a robust and inclusive digital economy was becoming a reality (CAK, 2020). Subsequently, this required relevant Information and Communication Technology (ICT) accessories with reliable broadband services. Analysis of CAK (2020) data disclosed that at the end of the 1st quarter of 2020/2021financial year, the cyberspace data markets experienced an upward growth. Additionally, there was an increased dependency on digital platforms.

To achieve quality ODeL, flexibility and availability of ICT resources are essential. The instructional materials selection criteria are also critical components for meaningful ODeL. Its adoption in supporting the dissemination of knowledge

across the globe was not a new concept in the wake of Covid-19. However, its application in Kenyan TVET sector had not been fully exploited. In Kenya, there have been many initiatives geared towards development and improvement of ODeL in institutions to enhance the instructional processes. Some of the initiatives included supply of tablets in primary schools and provision of digital content for the Economic Stimulus Program.

There are different types of ODeL depending on the degree of technology used. Technology is an inevitable factor in the ODeL instructional media as it provides an interface of trainees and trainers, integrates learning resources and methodologies. Training and technological innovation have historically transformed in both mutual and symbiotic (CERI, 2015). Online delivery of instructional contents is as essential feature in ODeL. There are various policy documents such as the national ICT policy and Sessional Papers that have given a considerable impetus to the development and dissemination of digital contents. For instance, the White Paper Number 14 of 2012 underscored the importance of ICT skills in promoting economic development of the country. Despite all the initiatives in promoting the expansion of ODeL, no studies have been conducted to examine the quality of implementation of CBET using ODeL as an instructional media.

Rationale of the Study
One of the mitigating measures to the spread of Covid-19 required reduced human interactions. Nevertheless, education and training had to continue with minimal or no interruptions of academic calendars. Therefore, the enhancement of ODeL in CBET curriculum implementation improved the instructional delivery. Though there were already developed standards and guidelines on the use of ODeL in TVET, its quality was a major concern. The CBET stakeholders thus needed to understand an ODeL system. Its characteristics, merits and potential alternatives were of significant importance in the education system. Thus, the paper empirically evaluated the extent to which the CBET curriculum had embraced ODeL in the wake of Covid-19 lockdowns. It then highlighted its features that required restructuring and enhancements.

Research Questions
(i) Is there adequate ICT infrastructure to support ODeL?
(ii) Does the country have adequate internet connectivity to support ODeL?
(iii) Do the trainers have adequate technical capacity and competency to implement ODeL?

Conceptual Framework

Predictor Variables   **Intervening Variable**   **Response Variables**
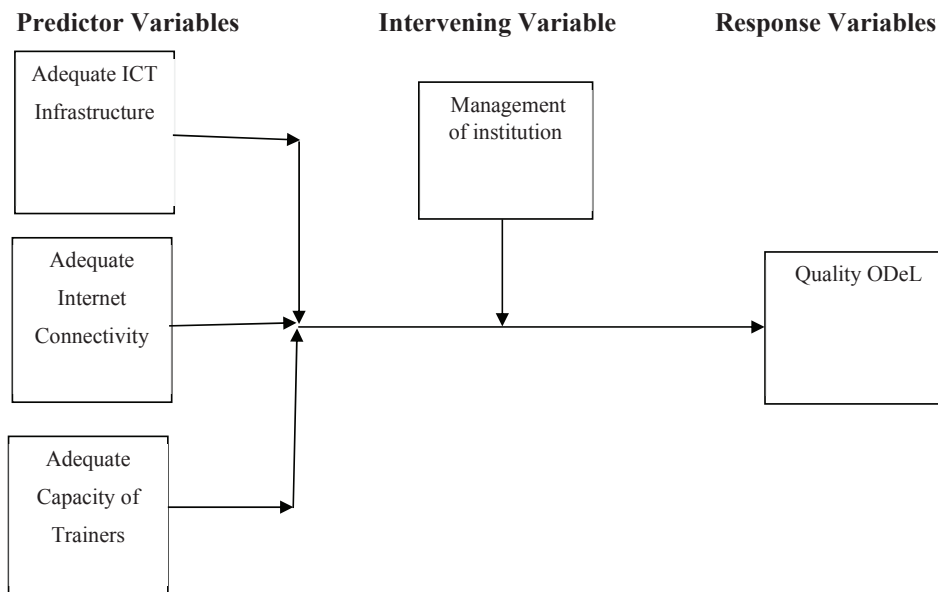
Fig 1: *Performance Indicators of a Quality ODeL*

The paper focused on quality ODeL as the measured variable. It was influenced by three predictor variables namely; ICT infrastructure, internet connectivity and capacity of trainers. The different styles of institutional management were the intervening variables.

Digital Contents as Instructional Materials in ODeL

Digital contents are important curriculum support materials used in improving the quality of ODeL. They refer to materials stored in electronic medium that can be accessed using computers over the internet (CDE, 2010). Digital contents comprise of audio-visual, text and images. Despite the physical location of trainers and trainees, they increase the access to learning materials. ODeL is a continuous lifelong instructional media where trainees seek knowledge using technologically savvy approaches (Tyagi, 2014). Its usage has improved the pedagogy in curriculum implementation. Modern educational environments require new instructional methods (CDE, 2010). Further, the current crop of students are technologically savvy and expect interactive experiences as well as desire for collaborative learning.

KICD (2013) noted that institutions needed to use e-learning approaches to enable trainees' access diversified contents in ODeL. Further, just like other learning approaches, ODeL required communication components. These included the sender, transmission media and receiver. In ODeL context, senders (trainers) use digital

equipment while transmission media are excellent internet connectivity (KICD, 2013). Additionally, receivers (trainees) must have ICT accessories. Moreover, both the sender and recipients must be technologically savvy. The paper thus built its case on the three components of ODeL communication.

Impacts of ICT Infrastructure in ODeL

ICT infrastructure are computers and its accessories that enable it to perform its functions (CAK, 2020). They include laptops, printers, projectors, smartboard amongst others. Digital economy has made the world a global village. Subsequently, globally, the digital educational contents are dynamic and interactive. Tyagi (2014) asserted that computers have accorded platforms for unique training environments that is personalised and adaptive in nature. The conveyance medium in ODeL adopt computer accessories as opposed to textbooks (CDE, 2010).

Computers are powerful instructional techniques in ODeL system. They are based on the principle of programmed instructions and combines tutorials and simulations (Stennet, 2016). They provide a means of interaction between trainer and trainees. Moreover, ICT accessories are significant instructional strategies in ODeL because they facilitate the trainees by providing personalised instructions, effective interaction and immediate feedback (Tyagi, 2014).

ICT supports both affective and cognitive dimension of training in the CBET curriculum. Cognitively, it focuses on trainees' attention in knowledge information while in affective domain, it offers trainees with emotional support through interactive platforms. This enhances creation of self-confidence amongst trainees. The availability of ICT accessories adversely affects the development of employability skills amongst learners in CBET. Studies have shown that inadequate facilities lead to low acquisition of skills hence production of unskilled and unproductive personnel (Stennet, 2016).

Implications of internet connectivity in ODeL.

ODeL utilises information networks such as the internet, i.e., the intranet or extranet wholly or in part for curriculum delivery (Olagunju, 2013). Thus, availability of adequate internet connectivity affects the quality of ODeL. Furthermore, web-based training is a subset of ODeL and refers to training using internet platforms. Additionally, the internet facilitates both formal and non-formal e-learning on the information network. During Covid-19 lockdown periods, trainers accessed the internet services from homes and TVET institutions while trainees were only limited to accessing the internet from homes.

Internet has promoted access to education and through its usage, training has become flexible (CAK, 2020). The online instructional contents for instance can be accessed 24-7. Additionally, teleconferencing internet services has enabled tutors and learners to interact on real time basis with comfort and expediency

regardless of physical distance. From ODeL, the CBET instructional methods no longer rely entirely on hard copy content but also on online demonstrations and YouTube videos. The CBET instructional delivery and assessment on digital contents should both be in online and offline formats. This is important in improving the level of access and utilisation in ODeL.

As a result of internet, digital contents can be virtually stored. This enables trainers to upload their instructional materials online and permit trainees to access them at any time. Hence, a reliable internet connectivity is required by both the trainers and trainees in a quality ODeL.

Impacts of capacity of trainers on quality ODeL

The standards and guidelines for CBET require trainers to have subject knowledge, pedagogical experience and practical skills (CDACC, 2020). The packaging and dissemination of these three requirements is essential in ODeL. The 21st century TVET trainers should not only be competent in their respective trade areas but should also effectively use ICT as an instructional media (CDACC, 2020). Thus, tutors should be well versed with designing of online CBET classes and acquiring e-learning materials in both online and offline modes. Trainers should therefore have adequate ICT skills.

The trainers should also foster electronic partnerships between TVET institutions and industries in training delivery and assessment. They should have pedagogical awareness of instructional delivery in the new digital learning paradigm. In order for digital contents to be successfully used in ODeL, trainers need to be involved in instructional design processes. This would help identify and assist in mitigating the classroom-based challenges that might be faced during the instructional delivery as well as assessments.

Many instructional contents are currently in hard copy textbooks. These contents therefore do not have a strong potential of providing appropriate ODeL environment of interactive learning engagements (CDACC, 2020). Subsequently, they require digitization before they can be used in ODeL instructional methods. The design of digital contents thus requires trainers to possess adequate digital literacy. The capacity of trainers in application of ICT skills in ODeL significantly affects the quality of training (CDACC, 2020). Notably, the main facilitators of FaB learning in CBET system are trainers, who have not been adequately prepared to carry out their mandate. Little has been done to ensure that trainers have requisite digital literacy as an instructional media (Olagunju, 2013). The utilisation of digital curriculum contents influences the assessment and achievement of trainees.

Methodology

The study employed a mixed method design where both categorical and numerical data were collected and analysed. Data was collected in 54 TVET institutions.

The institutions were sampled across the entire 47 counties in Kenya through a web-based survey. The sample constituted of 110 trainers and 125 trainees. Purposive sampling was used. This was because the researcher had to rely on his own judgement in selecting samples that had implemented CBET curriculum. Data was collected using questionnaires, interviews and analysis of statistical data. Categorical data was investigated using content examination while numerical data was analysed using measures of central tendency, dispersion as well as variability.

Results and Discussion

Availability of ICT Accessories and Quality of ODeL

The use of ICT accessories was evaluated. This was because they were integral components in ODeL. Their usage by both trainers and trainees was analysed. The results were presented as shown.
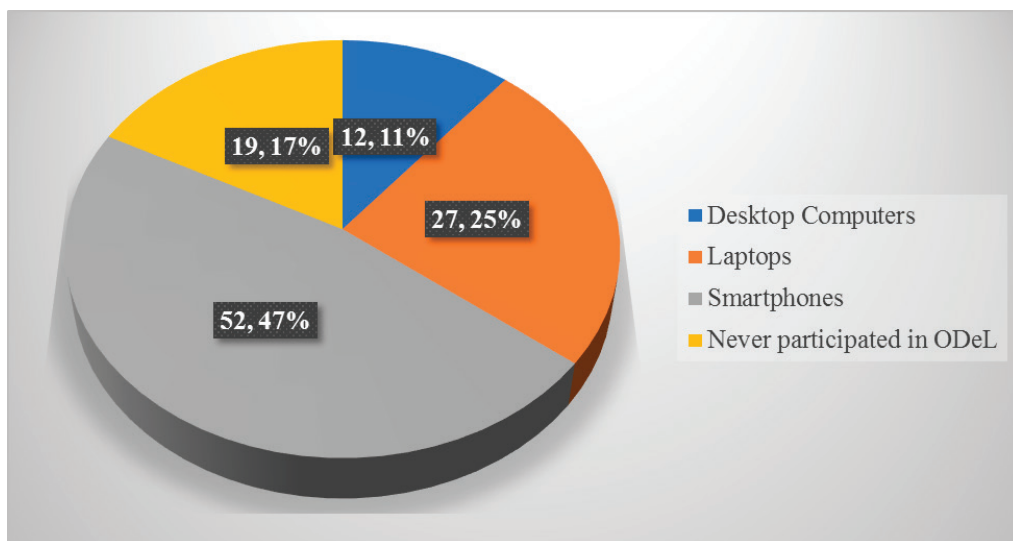
Fig 2: *Analysis of the Usage of ICT Accessories on ODeL by CBET Trainers*

Figure 2 showed that most trainers depended on their smartphones as the main instructional media for the delivery of ODeL contents. Smartphones were inadequate in the preparation of ODeL digital contents because of their small screen sizes and complex interfaces of their apps. This implied that the CBET trainers developed inadequate ODeL instructional contents. Further the ODeL instructional delivery methods and assessments were also poor as a result of over reliance on smartphones. The analysis further suggested that 17% of the CBET trainers had never participated at all in any form of ODeL. This implied weak TVET institutional policies on ODeL. Moreover, the policies were being developed in parallel to the ODeL implementation efforts.

The findings were consistent with those obtained by Stennet (2016), that teachers can only act as catalysts of ODeL integration through ICT if they had adequate ICT accessories. Subsequently, the development of ODeL instructional delivery methods would be achieved if adequate ICT accessories were available in TVET institutions. Further, the availability of ICT technological support would also enhance the implementation of quality ODeL. The responsibilities of the trainers would, therefore ,be confined to course format, creating digital assignments and arranging for online classes with the help of ICT specialists.
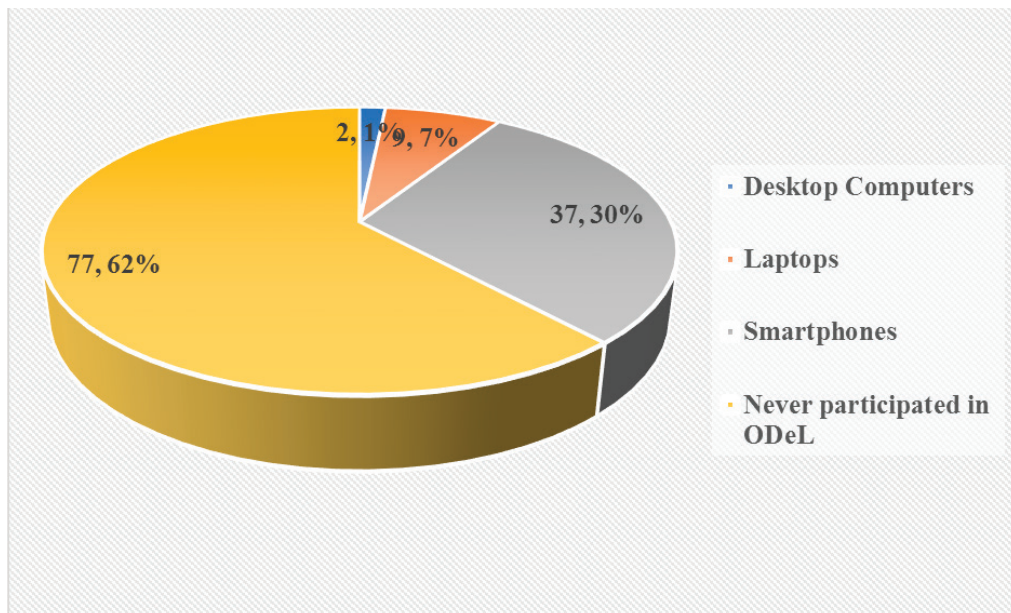
Fig 3: *Analysis of the Usage of ICT Accessories on ODeL by CBET Trainees*

The analysis showed that majority of the CBET trainees had never participated in ODeL. This was as a result of poor internet connectivity, lack on internet bundles and digital equipment. This suggested inadequate implementation of ODeL in CBET curriculum. A strategic response was thus necessary to address these complexities of employing ICT for ODeL in order to reach its full potential as a new instructional media. To address these barriers, Tyagi (2014) suggested that training institutions needed to provide appropriate ICT accessories to facilitate access to ODeL technology.

Analysis of the Availability of Internet Connectivity and the Quality of ODeL

The availability of internet connectivity was analysed using data from CAK. The study analysed the internet connectivity in all the 47 counties and summarised the findings into 8 provinces as shown.

Table 1: Analysis of Percentages of People with Access to Internet Per Province

Percentage Accessibility in Provinces	Nairobi	Nyanza	Coast	Western	North Eastern	Central	Rift Valley	Eastern
Percentage in the province	58.2%	21.3%	22.7%	18.2%	17.4%	21.8%	19.9%	7.1%
Urban	58.2%	25.5%	28.6%	33.3%	36.3%	41.6%	27.1%	18.6%
Rural	-	17.3%	18.8%	7.5%	3.8%	10.1%	11.4%	4.5%

The findings from this study showed that internet connection in all the 47 counties as summarised in the 8 provinces were less than 50% except Nairobi. Moreover, the internet connectivity was worse in rural areas where majority of the Kenyan population lived. The CAK (2020) asserted that access to internet services is limited throughout Kenya. Further the difference in access between rural and urban areas was very high. While the rate of access in urban areas was over 19%, it was less than 6% in rural areas. Accessing the internet in both urban and rural areas was crucial for implementing ODeL. Internet usage was high amongst the people who had access to it and 86% of people who had access to it used it. Thus, the main constraint of internet use is its availability.

The findings further pointed a lack of 3G and 4G internet access in most parts of Kenya to support teleconferencing facilities applied in ODeL. Compared to voice services which required 1G and 2G networks, high proportions of internet users needed to travel to specific places within their localities to access the internet due to unavailability of 3G and 4G networks. Information Communication Technology exemplified by cyberspace as well as interactive audio-visual aids are significant focus for Open Distance and Electronic Learning. The findings implied the rolling out of ODeL did not factor in the internet connectivity of the country. The findings were in contrast with the results of CERI (2015) that designing teaching models and environments should consider the pedagogical and technological perspectives.

Analysis of the Capacity of CBET trainers and the Quality of ODeL

The CBET trainers' capacity and capabilities included but not limited to general awareness, understanding, knowledge, perceptions, attitudes and training about the ODeL. Data were analysed and presented as shown.
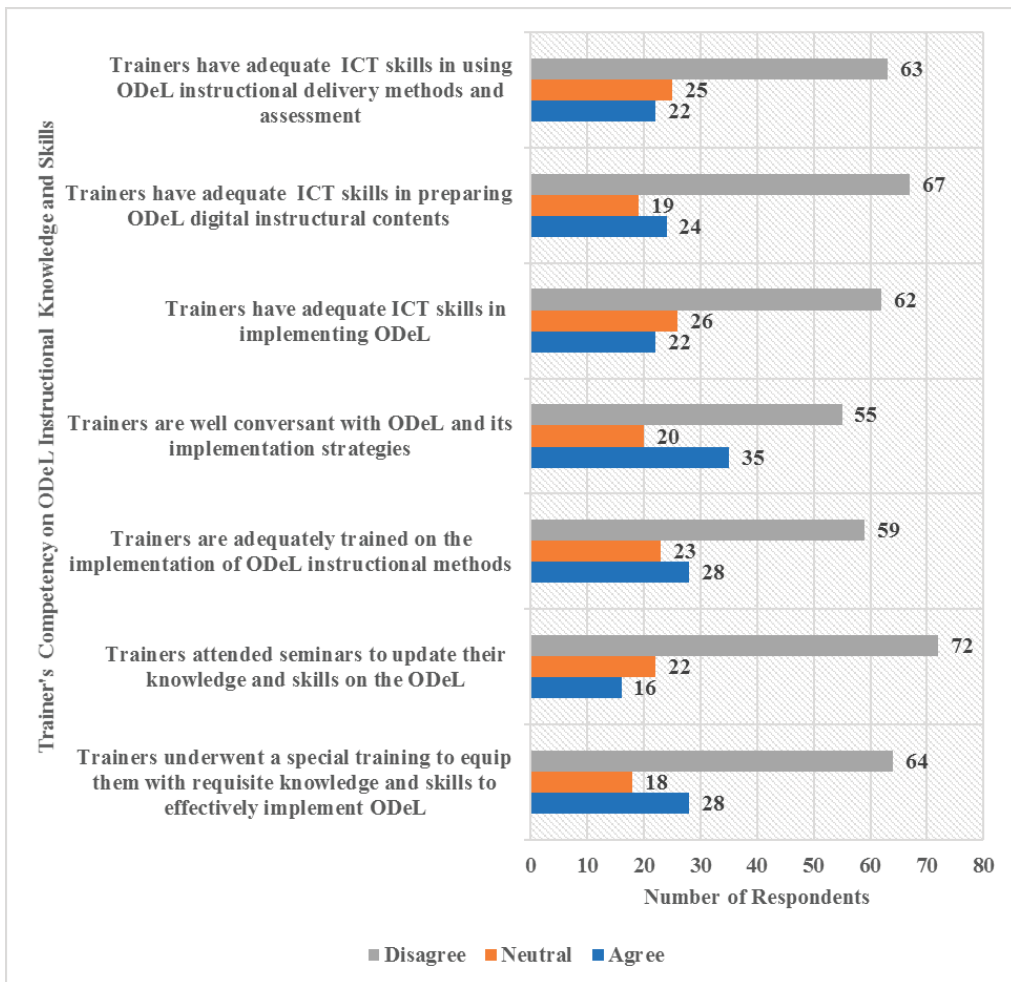
Fig 4: *Analysis of CBET Trainers Capacity and Competence on ODeL Instructional Knowledge and Skills*

Figure 4 showed that most CBET trainers disagreed with having adequate capacity and competency in implementing ODeL. The analysis further pointed out that most trainers had not attended seminars and workshops on ODeL instructional strategy. Thus, they were not conversant with development of digital learning content and instructional delivery methods. Furthermore, majority of the trainers had no prerequisite ICT knowledge and skills in enabling them effectively implement the ODeL pedagogical skills. Subsequently, the ODeL implementation of the CBET curriculum did not meet the established standards and guidelines. Knowledge acquisition and participation are the two prominent metaphors that guide the designing of ODeL instructional media. The study findings indicated that trainers were employed based primarily on possession of subject knowledge. However, most of them lacked basic ICT skills.

The findings were consistent with recommendations of CDACC (2020) that the quality of pedagogical instructional reforms depends on the training, seminars and workshops provided to the trainers. This would equip them with adequate knowledge for implementation of new instructional design used in ODeL. Competent trainers on ICT skills would subsequently contribute more effectively in quality implementation of ODeL pedagogical methods. Further, a study by Tyagi (2014) noted that the responsibility of offering on-the-job training on pedagogy and technical skills was bestowed on the employer.

Conclusion
The study concluded that there was low quality of ODeL in CBET curriculum. This was as a result of inadequate ICT infrastructure in institutions, poor internet connectivity in Kenya and inadequate ICT capacity and competency of trainers in implementing ODeL.

Recommendations
The study recommended increased collaborations and partnerships between the government and private Internet Service Providers (ISP) in improving the internet connectivity in the country. It also recommended capacity building for CBET trainers in application of ICT technical skill in ODeL training and subsidised ICT accessories for CBET trainers and trainees.

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Assessment of Technology Acceptance and Adoption in TVET institutions during the Covid-19 Pandemic

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Abstract

Technical and Vocational Education and Training (TVET) provide personnel with appropriate skills to meet the national human resource requirements in different sectors. There has been growing concern in the recent past regarding the training methods that could be employed in TVET institutions amidst COVID-19 pandemic. Most TVET institutions in Kenya have adopted e-learning to provide trainees with the necessary skills. However, acceptance of technology-enabled learning has been quite slow in the TVET subsector. This study examined the implications of Technology Acceptance, Adoption, and Sustainability among TVET Trainers. The objectives of the study were to: explore the strategies employed in technology acceptance and adoption, and establish the importance of technology in addressing the gap for 21st-century skills needs of TVET Institutions. In addition, the study focused on management's adaptability to learning approaches, including learning delivery alternatives, and expanding online learning. COVID-19 was used as a dependent variable in the study. The study adopted an exploratory research design. Simple random sampling was used to identify Deputy Principals, Registrars, Heads of Department, and Trainers from TVET Authority accredited and licensed public TVET institutions. Primary data were collected using questionnaires. A total of thirty-seven out of 61 institutions were interviewed. The data were analysed and interpreted using the analysis of variance. The study revealed a relationship between technology acceptance, adoption, and online training in TVET Institutions. The findings further indicated that learning resource strategy and relevance of learning resources affected the delivery of learning programs in most TVET institutions. The study recommended development of guidelines and approaches toward technology-enabled learning; institutions to invest in infrastructure and technology to support remote learning. Learning institutions should also embrace virtual learning platforms as an important mode of delivery in the wake of the Covid-19 Pandemic.

Introduction

TVET is a driving force behind economic growth, international competitiveness, and knowledge-intensive industries. According to UNESCO (2012), TVET includes formal, non-formal, and informal learning; thus, the informal sector is critical for job development in most developing nations. Even though TVET programs are supposed to allow trainees to gain practical, social, and personal skills, most institutions have stuck to the traditional methods of skills delivery with limited use of technology. Pieces of training are conducted using face-to-face skills delivery in walled classrooms, insufficient equipment compared to the number of students, which has a detrimental impact on TVET program quality (Ngome, 2003).

According to World Bank (2020b), "Covid-19's simulated that learning effects should be used to inform mitigation, recovery, and "rebuilding better" techniques. This comprises excellent remote learning practices that use multiple education technology solutions such as radio, television, mobile phones, digital/online tools, and print to ensure learning continues while schools are closed, with assistance for students by instructors and parents". The inadequacy of modern technological facilities in most learning institutions presented a scenario of unpreparedness in the wake of the Covid-19 pandemic. Upon the outbreak, the government undertook various measures to curb the virus's spread, including limiting movement in places and closing public places with high human traffic, such as learning institutions. This move completely halted academic and co-curriculum programs. Predominantly institutions were used to face-to-face interaction between trainers and trainees.

The Covid-19 Pandemic also resulted in significant health challenges, loss of lives, negative impacts on the global economies, and the educational and training sector. The unplanned scenario disrupted training programs, attendance of lessons, examinations and assessments of trainees, which led to delayed completion rates among TVET graduates. For several months, TVET institutions had been under a long spell of uncertainty on time for the resumption of learning and the modalities to adopt to deliver learning programs. The crisis provided an essential opportunity for educators to reconsider the status quo and consider innovative approaches to providing high-quality education. Therefore, institutional managers needed to devise technology adoption and acceptance strategies among TVET Institutions amidst Covid-19 in Western Kenya.

Purpose of the Study

The purpose of the study was to assess the level of technology acceptance and adoption within the TVET institutions during the Covid-19 pandemic.

Study objectives
The objectives of the study were to:

(i)   Explore the strategies employed in technology acceptance and adoption in TVET Institutions

(ii)   Establish the importance of technology in addressing the gap for 21st-century skills needs of TVET Institutions i*n developing countries*

Methodology
The empirical literature on the ideas and context under inquiry was reviewed. The study adopted an exploratory research design. The study population were public TVET institutions in the Western Kenya region. The Western region of Kenya comprises Kenya's former Nyanza and Western provinces. The target population was purposively and conveniently selected. The population included conveniently sampled Deputy Principals, Registrars, Heads of Department, and Trainers from public TVET institutions that are established, registered, have running programs accredited by TVETA. The categories of TVET institutions were two national polytechnics, 19 technical training institutions, 15 training and vocational colleges. A total of thirty-seven out of 61 institutions were interviewed. Primary data was collected using questionnaires. The collected data were analysed and interpreted using the analysis of variance.

Results and Discussions

Management Strategies Employed by TVET Institutions in technology Acceptance and Adoption during Covid-19 Pandemic

The strategies researched included improvements in the Organisation structure in line with government policies, conducting Pandemic-related training to improve preparedness, and investing in infrastructure and technology to support working remotely during the Covid-19 Pandemic were among the strategies identified. In addition, management changes made in response to the Covid-19 Pandemic, diversification of sources of finance, and incorporation of public health officers were among other strategies identified.

The study established that the most widely employed strategies are conducting Pandemic related training to enhance preparedness and ensuring the current curriculum leads to the achievement of Organisational goals. This is shown in Figure 1 below.
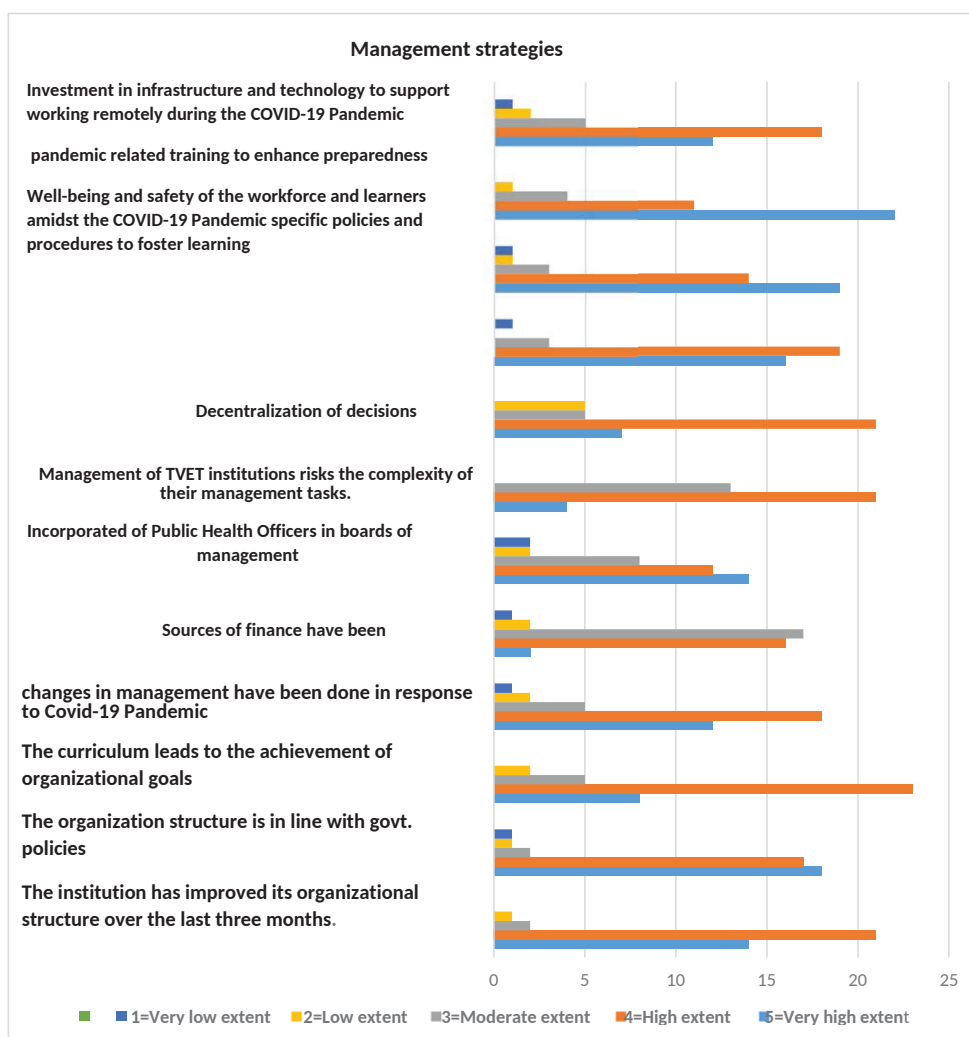
Figure 1: *Management strategies employed by TVET Institutions*

Technology-enabled learning in addressing the gap for 21st-century Skills Needs of TVET Institutions in Developing Countries

This part focused on the study's second objective, which determined the learning delivery choices available to TVET institutions in the face of the Covid-19 Pandemic. The study identified learning delivery methods used in TVET institutions as: Face-to-face learning, blended learning, online and distance learning. In addition, the study sought different learning delivery methods before and during the Covid-19 Pandemic. Before the onset of the pandemic, the most popular learning delivery method was a face-to-face method at 94.7%. This was followed by blended learning

at 18.4%, online learning at 7.9% and distance learning at 2.6% respectively. Figure 2 shows the findings of the study.
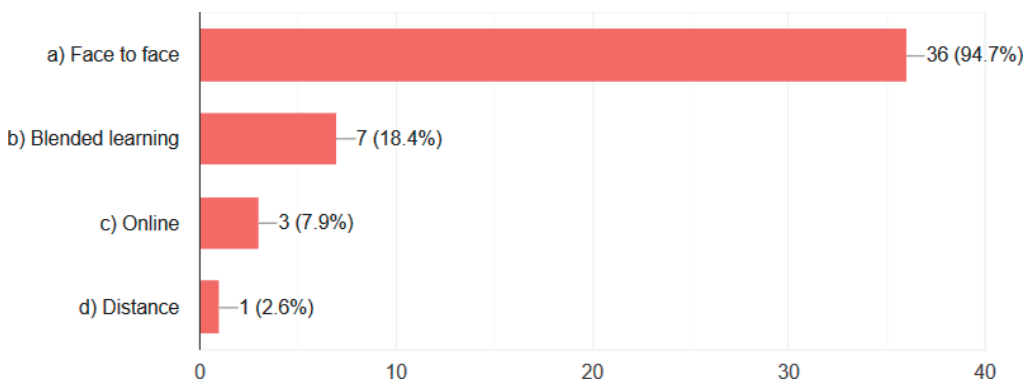
Figure 2: Learning delivery methods before the onset of Covid-19 Pandemic

During the Covid-19 Pandemic, the preferred learning delivery methods shifted from face-to-face, which was the most popular method in the pre-Covid-19 period to online learning, which accounted for 68.4%. This was followed by blended learning at 60.5% while both the face-face and distance learning methods accounted for 23.7 % as shown in Figure 3
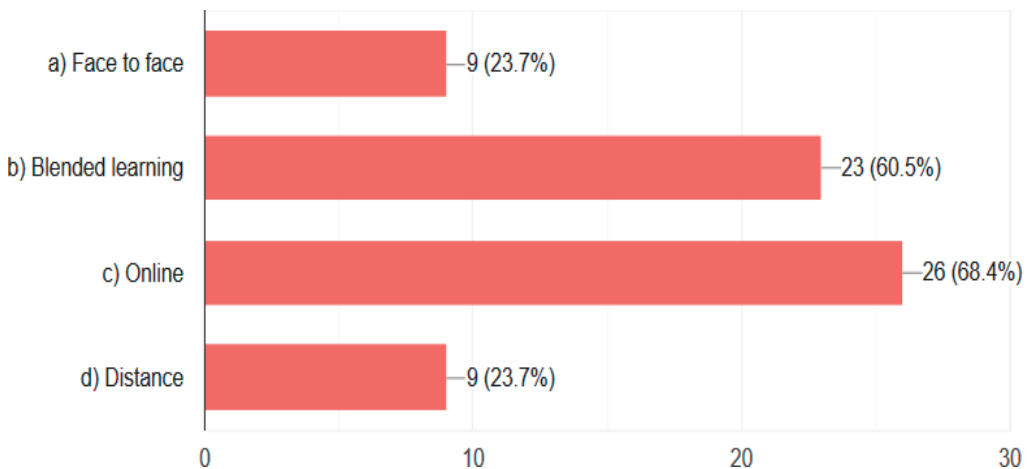
Figure 3: Learning Delivery Methods Used in the TVET Institution after the Onset of Covid-19 Pandemic

Learning delivery platforms amidst Covid-19 pandemic

From the findings, the largest used platform was Microsoft teams at 86.5% with 32 of the respondents using it, followed by WhatsApp at 59.5% having been used by 22 respondents, Zoom at 45.9%, Google classroom 27%, MOOC, and Moodle is used by 8.1%, Skype at 2.7% and there is 13.5% other forms of online

delivery platforms (Figure 4). The study identified the learning platforms used by TVET institutions before and during the pandemic, as learning has moved significantly from face-to-face to online learning. Platforms include WhatsApp, Moodle, MOOC, Microsoft Teams, Google Classroom, Zoom and Skype. The results show that Microsoft Teams is the most used platform at 86.5%, and 32 surveyed use it. Next, WhatsApp was used by 59.5% of respondents; Zoom was 45.9%, Google Classroom 27%, MOOC and Moodle were used, by 8.1%, Skype 2.7%, and other types of online distribution platforms were 13.5% (Figure 4).
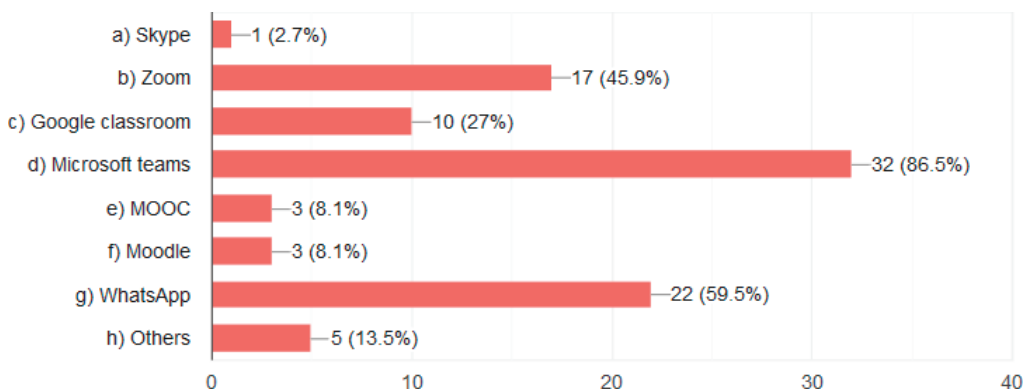
Figure 4: *Learning Delivery Platforms Used in TVET Institution Amidst Covid 19 pandemic*

The findings indicated that Microsoft teams was the most widely used learning delivery platform, while Skype is the least used. A significant number of the Technical Vocational Colleges lacked the necessary resources ICT infrastructure to implement online learning. Some respondents felt that the government should finance upcoming TVET institutions to invest in ICT infrastructure through education. At the same time, others felt a need to change how content is delivered to the trainee. Limited resources were also seen as a challenge since it made it challenging to implement some of the requirements. Some respondents saw it essential for TVET institutions to embrace blended, online learning and alternative study/delivery platforms to enable smooth learning in any pandemic beyond the Covid-19 Pandemic.

Conclusion
COVID–19 brought a significant change in the management strategies for technology acceptance and sustainability in TVET Institutions. Trainers and trainees were compelled to adopt learning methods with less physical contact. Diversification of funding sources, incorporating health officials into the board, and strategising on TVET institutions' management do not complicate management roles. Decentralization of decision making and introduction of pandemic-specific

policies and practices to facilitate learning, prioritizing the well-being and safety of workers and learners Covid-19-Pandemic; conduct pandemic-related training to improve your readiness and invest in infrastructure and technologies that support remote work during the COVID 19 pandemic. The mentioned strategies were employed; however, the most important were conducting Pandemic related training to enhance preparedness and investing in infrastructure and technology to support working remotely during the Covid-19 pandemic and improving a current curriculum leading to the achievement of Organisational goals widely employed strategies.

On technology-enabled learning, the study concluded that before the pandemic, the most popular learning delivery method was the face-to-face method, while the least popular was distance learning. However, Covid-19 Pandemic proved challenging to offer face-to-face learning/training in TVET institutions, and Learning institutions were asked to embrace virtual platforms to deliver learning for some programs that may not require practical training and assessment as they continued to innovate so that online learning would be a reality for all programs. The study also concludes that there has been a significant surge in the usage of online platforms since the Covid-19 Pandemic. It is also worth noting that distance learning was unpopular both before and during the Covid-19 Pandemic; most respondents saw it as a learning delivery option. According to this study, using online platforms such as voice apps, virtual tutoring, video conferencing tools, and online learning software has skyrocketed since COVID 19. Organizing digital education to adapt to the existing curriculum also provides users and trainers with a way to ensure that the learning opportunities offered to align with the education system's broader educational goals.

Recommendations
The study recommended the following:

  (i)   Diversity of management strategies should be encouraged during the period and post-Covid-19 pandemic. Emphasis should also be placed on pandemic-related training to enhance preparedness and investing in infrastructure and technology to support working remotely in case of any other arising pandemic or absurd situation.
  (ii) Strengthening of learning resources strategy among TVETs to realise better results. Besides, the focus should be directed at the relevance of learning resources at these institutions.
  (iii) Learning institutions should embrace virtual learning platforms as a feasible emerging mode of delivery in the wake of the Covid-19 Pandemic and any other absurd situation.
  (iv) Institutions should explore more comprehensive delivery modes in learning, including WhatsApp, Moodle, MOOC, Microsoft teams, Google classroom,

(v)   Zoom and Skype

(vi)   Policy developers to develop policies on technology-enabled learning

(vii)   Capacity building of trainers and trainees on technology-enabled learning. This will go a long way in acceptance, adoption, and sustainability in learning delivery options

(viii) The study proposes future studies on the effectiveness of technology-enabled learning in TVET institutions and the management strategies employed in achieving technology acceptance, adoption, and sustainability.

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2

**EMPOWERING THE
YOUTH THROUGH CBET,
ENTREPRENEURSHIP AND
INDUSTRIAL LINKAGES**

Youth Empowerment through Quality Apprenticeships and Competency-Based Education and Training (CBET) in Technical and Vocational Education and Training (TVET): Lessons Kenya can Draw from Germany

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Abstract

Despite the significance and proven value attached to quality apprenticeship in combating unemployment and allowing smooth transition into the workplace, the apprenticeship in Kenya, particularly formal apprenticeship, is still under-employed. This is mainly due to the lack of a standard and comprehensive policy detailing how it can be effectively and optimally employed. The study aims to investigate how Kenya can optimally implement quality apprenticeship to empower youths and reduce the rate of unemployment by drawing lessons from the quality apprenticeship framework in Germany. The methodology employed to achieve this objective was a desk review through the synthesis of available information about quality apprenticeship in Kenya and Germany and identification of gaps in Kenya while drawing lessons from Germany. The findings revealed that Kenya has an ineffective apprenticeship programs, with only a few institutions offering structured internships in their curriculum and no structured policy while Germany has a robust framework which has led to empowered youths with employability skills. The paper concludes that Kenya needs to establish a comprehensive apprenticeship framework and policy guiding structured and systematic guidelines to be adopted. The paper recommends the need for collaboration among stakeholders, and development of an apprenticeship policy which includes established structures that apprentices and employers need to meet.

Keywords: Quality Apprenticeship, TVET, CBET, Employability.

Introduction

Quality apprenticeship involves a form of technical vocational education and training (TVET) which combines on-the-job training and off-the-job learning enabling learners to acquire knowledge, expertise, and skills to carry out specific occupations (Forster & Bol, 2018). According to Fazio et al. (2016), quality apprenticeships are governed and financed by laws, policy decisions, and collective agreement among stakeholders such as governments, employers' associations, trade unions, and international Organisations such as the International Labour Organisation (ILO). For it to be considered a quality apprenticeship, there is a need

for a written contract detailing the respective responsibilities of the apprentice and those of the employer (Aggarwal, 2019). Further, the written contract needs to have remuneration and standard social prediction coverage (Forster & Bol, 2018).

According to Wicht et al. (2019), the expected outcome of a quality apprenticeship is recognised qualification based on clearly defined training and successful completion of formal assessment. Thus, a quality apprenticeship allows learners to experience and apply the theory they have learned to real-world situations. Several countries, both developed and developing, are attempting to strengthen their apprenticeships, including the USA, Denmark, Norway, Kenya, and China, to name a few (Aggarwal, 2019). It is important to note that apprenticeship programs are organised in different ways across countries, and thus, there lacks a standardized definition of apprenticeship.

Aggarwal (2019) notes that quality apprenticeship facilitates the school-to-work transition as employers are reluctant to hire young people with no prior experience. Kehl et al. (2019) indicate that it is challenging for employers to assess fresh graduates' technical and soft skills. Through apprenticeship programs, employers can train their workers to meet the needs of their candidates while apprentices can demonstrate their productivity. Secondly, quality apprenticeship enables coordination between education and industry regulating to reduced skills mismatch (Mane & Corbella, 2017). Through quality apprenticeships programs, there is a systematic way to collaborate between TVET institutes and labour market players (Reed et al., 2012).

Additionally, through quality apprenticeships, the labour market can influence the training of TVET institutes while offering students opportunities to apply evidence-based practices in the workplace, resulting in reduced skills mismatches. Apprenticeships are also linked to improved productivity and innovation. Further, ILO (2018) indicates that employees who are well trained can understand the complexities of processes and thus have a higher chance of improving processes. School-based vocational training is expensive as TVET institutes are not adequately equipped with the latest facilities, tools, and equipment (Aggarwal, 2019). Thus, quality apprenticeship also promotes cost-effectiveness in the delivery of vocational training.

The Kenya Vision 2030 is focused on economic, social and political pillars defining human resource development as a major objective. With one of the key pillars of the Kenya Vision 2030 the economic pillar, vocational training is identified as an effective strategy of addressing skills gaps, reducing youth unemployment and providing support for the SME (Kenya Vision 2030, 2014). The history of apprenticeship in Kenya dates back many years whereby, in 1994, a successful pilot project through voucher programme targeting skills upgrade at micro and small enterprises in the informal manufacturing sector. The training vouchers

were distributed with the participants paying only 10% while the 90% of the voucher costs were covered and subsidised by the government. The programme was deemed successful as it resulted to stronger competition between public and private institutions and reduced prices for training providers as well as implementation of new training programmes (OECD/IDRC, 2010). A follow up study by Hamory et al. (2015) revealed that costs that were not covered by the programme such as transportation, maternity leave, child care and housing costs were major constraints and barriers faced. In Kenya, TVET institutions have also adapted to meet the needs within the Vision 2030 such as improving the technical skills of young Kenyans with the number of TVET institutions increasing over the years. For instance, Kenya Vision 2030 (2014) reports that the number of TVET institutions increased by 6.7% by 2013. Currently apprenticeship in Kenya is not widespread over the sectors and is marginally practiced in health, manufacturing, education and agriculture (UNIDO, 2017). This is despite the acknowledgement of shortage of skills in many sectors including the construction industry which reports having less than 2,000 trained painters, masons and plumber when compared to more than 5,000 engineers and architectures countrywide (Kenya Federation of Master Builders, 2017). This clearly highlights a general shortage of skills practitioners in the industry and a reflection of the various sectors in the country.

Problem Statement

Apprenticeship programmes are critical in any economy as they facilitate a smooth transition from learning institutions to employment through the provision of early exposure to realities and contextualised learning in the workplace (Nyareki et al., 2016). However, despite their significance and proven value in combating unemployment, quality apprenticeship remains underutilised in Kenya. According to Kiriri (2019), Kenya requires a comprehensive for the enhancement of formal apprenticeship and informal apprenticeship (jua kali) to facilitate engagement and collaboration among the relevant stakeholders. Formal apprenticeship in Kenya takes place in the workplace and complemented with classroom-based learning while informal apprenticeship involves skills acquired through interactions with the experienced craftsperson within an informal setting (Hamory et al., 2015; Hicks et al., 2011).

While there is no standard policy on quality apprenticeship, the Kenya National Training Authority Act Apprenticeship and Internship provides a regulatory framework for enhancing apprenticeship. However, the act has been criticised for focusing only on formal sector employment with little focus on the informal sector. According to Nyareki et al. (2016), there is a need for an appropriate framework for promoting structured quality apprenticeship that facilitates employment opportunities with decent income, quality work, capacity building, innovativeness, and growth of entrepreneurial capabilities.

Quality apprenticeships can help youths get life and employability skills and bridge the gap between available employment opportunities and needed skills (Odero et al., 2017; Sikenyi, 2017). The current study entails a desktop review on an apprenticeship in Kenya and Germany, proposing recommendations for Kenya to adopt from the lessons learned on the apprenticeship program in Germany. As recommended by Saunders et al. (2019), a desk review was employed as it provided a fast and economical approach of acquiring insights about the research topic. The desk review allowed for contextual and in-depth understanding on apprenticeship in Kenya and Germany facilitating an increased focus on the issues, opportunities, and challenges faced.

Results and Discussions
Development of Apprenticeship Programs;
The Case for Kenya

The integration of youths into the labour market is a significant challenge for developing countries like Kenya, with inactivity and high underemployment rates reported rampantly (Kiriri, 2019). Training programs target the employability of youths lacking relevant skills, a significant barrier for youths getting employment. According to the World Bank (2016), lack of appropriate skills means that the individual lacks the technical, cognitive, and non-cognitive capabilities to meet the demands of the employers. Training programs such as apprenticeships provide a viable solution to the problem of inadequate skills for those leaving formal schooling, the unemployed, and youths as they transition from school to work (Honorati, 2016). However, while apprenticeships can help improve employability and the productivity of young people, they can be costly and limited. In Kenya, World Bank (2016) reports a challenge of availability of capable and educated workers resulting in employers seeking older adults to employ at the expense of the youths. Therefore, it is essential to identify an appropriate framework for promoting the acquisition of relevant skills, the transition from school to the labour market, and the improved employability of youths employed.

In Kenya, there are negative perceptions linked to apprenticeship, since it is perceived as ineffective approach to training and thus unpopular as a transition to the workforce (Kiriri, 2019). According to Odero et al. (2017), this undermines the opportunities that quality apprenticeship has in increasing the employability and productivity of youths. In Kenya, informal apprenticeship is highly common, unlike formal apprenticeship particularly in the informal sector (Honorati, 2016). This has resulted in perceptions that apprenticeship is for the informal sector and those who do not do well in class, rather than viewing it as a complementary approach to learning. According to Kiriri (2019), informal apprenticeship in Kenya offers flexibility and cost-effectiveness in skills transfer, with the informal sector absorbing a high proportion of youths. However, while informal

apprenticeship provides opportunities for youths in Kenya, it does not bridge the skills mismatch in the formal sector, where the internship is unstructured and not regulated (Honorati, 2016). By employing quality apprenticeship, both informal and formal sectors will benefit as it promotes skills training and enhances the employability of youths.

A review of existing evidence indicates sparse knowledge and evidence of the success and use of apprenticeship in Kenya. This is despite the evidence on the success of apprenticeships in countries such as Germany and the UK. Nyareki et al. (2016) suggest that vocational and technical training programs can provide and implement quality apprenticeship. As explained by Were (2017), the success of vocational and technical training programs is linked to the skills taught, the demand-driven approach, and whether they are implemented successfully. According to Kiriri (2019), a challenge facing the implementation of apprenticeship is the notion that it is meant for those who cannot do well in the formal education system making it difficult to attract young graduates and youths of the appropriate age. Further, the majority of interns are working with no pay or promise of professional development. This results in negative perceptions of apprenticeship. Other challenges including lack of exposure, poor knowledge, and mentorship and the lack of commitment by stakeholders to enhance the internship program (Honorati, 2016; Sikenyi, 2017). A review of the country's apprenticeship system must allow for the establishment of a quality apprenticeship program that closes the gap between the labour market and the youths. Germany is one of the countries which have been successful in its apprenticeship program, and Kenya can draw important lessons from Germany to create a robust apprenticeship policy framework.

The Case for Germany

Germany has a high percentage of young people, and this includes 55% of graduates of general education who join the labour force using an apprenticeship training program (Voss & Schöneberg, 2018). In Germany, the apprenticeship is the dual vocational education system, with students graduating from general education at an average age of 16 eligible to start their apprenticeship (Bergseng et al., 2019). The duration of the apprenticeship ranges between two and four years and commences with a written contract illustrating and detailing the formal employer-apprentice relationship (Protsch & Solga, 2016). This provides for structured and proper training and practice. In Germany, apprenticeship occurs in two coordinated frameworks, with 70% of the time spent with the employer, while 30% is with the vocational schools (Haasler, 2020). A major significance in the German dual apprenticeship system is the vocational education standards regulated by the German Chambers of Commerce and Industry, with the government financing the school-based training while employers finance and pay the apprentices while at their workplaces (Voss & Schöneberg, 2018). In addition to national standards, an independent assessment of successful completion of

an apprenticeship is carried out to provide qualification for the apprenticeship program. Successful completion involves the apprentice graduating with a Dual VET certificate which is nationally recognised and can help one to gain further education or get employment.

Unlike Kenya, the German vocational track has been strong, with skilled labour playing a significant role in economic development and prosperity amidst changing labour markets (Protsch & Solga, 2016). During the recent economic crises, the German vocational education and training systems have received attention. The country has recorded low youth unemployment rates compared to other countries worldwide (OECD, 2019; Forster & Bol, 2018). According to Forster et al. (2016), Germany has dual apprenticeship training that has promoted smooth school to labour force transitions resulting in low youth unemployment rates. As such, the skill formation in Germany has been linked with this dual system of apprenticeship training.

The German dual system has been utilised as a model for countries worldwide seeking to improve the employability of their youths by providing skills formation (Protsch & Solga, 2016). However, the country also utilises school-based vocational training programs for youths with a second training sector (Haasler, 2020). Additionally, Wicht et al. (2019) report that the country implements pre-vocational programs which target youth to prepare them for entering a vocational program or enrolling in a regular school qualification. In 2017, a third of Germany's approximately one million youth opted to go to the vocational track in pre-vocational programs, 22% enrolled in school-based programs, while about 45% opted to use the dual system (Blossfeld, 2018). Additionally, tertiary education has significantly increased, illustrating the changing labour and the significance of apprenticeship. Aggarwal (2019) indicates that dual apprenticeship training allows for flexibility and adaptability, allowing quality apprenticeship within the changing aboard market and needs. The National Industrial Training Authority (NITA) provides guidelines for apprenticeships in Kenya and improvements can be done by establishing appropriate legislation to create a regulatory framework for quality apprenticeship. However, there is a need to develop and put appropriate policies to govern and provide directions to TVETs and employers on how to adopt a quality apprenticeship program.

Conclusion

The Study concluded that Youth unemployment was a significant challenge facing Kenya, and was worsened by the labor market favoring older adults in their recruitment. The use of quality apprenticeship provides a viable option of encouraging and promoting youth employment by providing youths with appropriate skills that match the demands of the labour market. While evidence on an apprenticeship in Kenya is sparse, existing evidence concludes that apprenticeship is underdeveloped

and not optimised in Kenya. This is unlike the case for Germany, whereby quality apprenticeship has successfully been implemented with the positive results seen by the lower rates of youth unemployment. By adopting the framework used in Germany, a quality apprenticeship can be achieved.

Recommendations

Based on the findings from this study, the researchers proposed the following recommendations to assist in development of a strong, effective, quality apprenticeship system in the country.'

a. Kenyan Government promote meaningful dialogue among all stakeholders as a collaboration for the success of apprenticeship program. The significant players identified in the apprenticeship program include the government, the labour market, the academic institutions, and the potential apprentices. As illustrated by the evidence above, apprenticeship is effective as it links workplace training and school training.
b. Kenya to develop an appropriate regulatory framework to oversee the implementation of the quality apprenticeship program. Germany has successfully implemented the quality apprenticeship as it has put in place an institutional and regulatory framework with appropriate policies and legislation to ensure its success. As revealed by evidence, quality apprenticeship involves various elements, including a written contract, conditions, and requirements that both employers and apprentices must adhere to.
c. Kenyan regulatory framework to establish formal structures for apprentices and employers, including protection, remuneration, and working conditions'.
d. Kenyan Government to establish National standards for recognition qualifications obtained through apprenticeships. This will result in promotion, adoption and improving the quality of apprenticeship.

The adoption of these recommendations will allow Kenya to have quality apprenticeships providing opportunities for the smooth transition from being a student to an individual with high employability skills.

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Assessment of Industrial Attachment Programmes of Technical and Vocational Education and Training Institutions in Kenya: A Case Study of Sigalagala National Polytechnic

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Abstract

The Technical and Vocational Education and Training (TVET) Programmes in Kenya include compulsory industrial attachment at all levels. The industrial attachment programme gives trainees the opportunity to relate theory to practice and to prepare them for the ever-increasing workforce requirements and for further training. The objectives of the study were; to find out whether or not the industrial attachment objectives were being achieved; to investigate any differences in the perceptions of stakeholders regarding attainment of objectives of the industrial attachment programme; to establish the extent to which stakeholders find the industrial attachment useful; to investigate any differences in the perceptions of stakeholders regarding the usefulness of industrial attachment programme. The study focused on the programme at Sigalagala National Polytechnic. It employed cross-sectional descriptive research design and data were collected from 28 trainers, 71 trainees and 17 workplace supervisors through self-completion questionnaires. The reported findings were based on four-point Likert-type items. Descriptive statistics, one-way analysis of variance at 0.05 level of significance and Tukey's post hoc test were used to analyse the data. The findings revealed that trainers, trainees and workplace supervisors rated highly elements of attainment of programme objectives and programme usefulness. In addition, there was almost a similar agreement in the responses of participants as there was only one statistically significant difference in their ratings of all the items relating to the attainment of programme objectives. The stakeholders' ratings differed in less than half the items relating to programme's usefulness. The study concludes that stakeholders of the programme expressed high satisfaction with the attainment of the programme objectives and its usefulness. However, the Industrial Liaison Office that coordinates the programme needs to reflect on the findings, identify the possible causes of the programme's success, and strive to maintain those success factors.

Keywords: Industrial attachment, TVET, Objectives, Usefulness, Stakeholders.

Introduction

The world of work is ever changing and influences of the new technologies have altered the workplace with employers demanding workers to have diverse skills to handle several tasks. This calls for the Technical and Vocational Education and Training (TVET) programmes to be responsive to these rapidly changing workplace requirements. The Kenya Vision 2030 envisages strengthening linkages between the industry and TVET institutions in order to promote training that is demand-driven, and ensure that the training institutions are responsive to the requirements of industry (GoK, 2007,. According to Kenya Institute of Education (2009), TVET programmes are designed to enable trainees acquire adequate competencies for formal and informal employment and to prepare them for further training. Donkor, Nsoh, and Mitchual (2009) observed that the programmes need to create the environment where trainees could relate theory to practice through simulated work environment in institutions and industrial attachment at real workplace. However, the simulated work environment in most training institutions differs to a great extent from that of the real workplace environment in which the trainees will eventually be required to perform. Consequently, TVET institutions incorporate on-the-job attachments in their programmes in order to provide workplace experience for trainees.

Industrial attachment is a practical skill training enterprise designed to bridge the gap between the theoretical world of academic enterprise and the world of work of professional practice (Lauber, Ruth, Theuri & Woodlock, 2004). Adjei, Nyarko and Nunfam (2014) describe it as a process of anticipatory socialisation where participants engage with industry to observe, learn, experiment and put theory into practice in order to acquire technical knowledge, productive and innovative skills, competencies, attitudes and abilities necessary for the world of work. It also serves as a perfect transition from the classroom to the world of work by developing students' job-related skills, and enhancing job placement opportunities, as well as developing the problem-solving, communication and human relations skills of students (Ayarkwa, Adinyira & Osei-Asibey, 2012). It is also emerging that industrial placement would help trainees to acquire further knowledge and skills relating to the nature of their future jobs and would become more productive and more efficient in carrying out their jobs after graduation and recruitment (Donkor et al., 2009).

In spite of the benefits of the industrial attachment programme to the institution and industry, Afonja, Sraku-Lartey and Oni (2005) lament that placement of students for industrial work experience is problematic as employers are reluctant to take on students. In view of this, Kerre (2010) advocates for employer involvement in providing experiential learning by accepting interns or apprentices that enhance the systematic and classroom-based knowledge learning through practical application. Afonja et al. (2005) further contend that even when students are accepted by

employers for industrial attachment, they are often not well supervised or assessed. Moreover, Nyerere (2009) observed that the quality of TVET graduates seems to have declined in recent years, partly due to lack of meaningful work experience and supervision during attachment. Faculty-employer involvement in the design and supervision, establishment of strong industrial placement units by faculties and employer compensation (Afonja et al., 2005) are among the strategies of strengthening industrial attachment.

In view of the foregoing discussion, the purpose of including a compulsory industrial attachment in TVET programmes is well recognised. It gives trainees the opportunity to relate theory to practice and to prepare them well upon completion for the ever-increasing workforce requirements and for further training. These benefits could only be appreciated if authentic assessment of trainees on industrial attachment effectively takes place where the trainee is attached at relevant Organisations and only if he/she is exposed to all broad sections of his/her specific field of study. This paper focuses on the attainment of objectives and usefulness of the programme in Sigalagala National Polytechnic, Western Kenya.

Statement of the Problem

The industrial attachment component of TVET programmes in Kenya was incorporated for the purpose of attaching trainees to industries or businesses for them to acquire practical skills and appropriate work-ethics and to acquaint themselves with how new technologies, machines and equipment they have learnt in their institutions operate. Yet, not much attention is being given to supervision and assessment of work-integrated learning in respect to TVET in Kenya. There appears to be no grading and certification of industrial attachment by the Kenya National Examination Council (KNEC). Consequently, several years after the integration of the programme in TVET curricula, no empirical study had been conducted to assess the attachment programme at Sigalagala National Polytechnic. An assessment of the programme was deemed timely and appropriate to examine issues regarding the attainment of objectives and its usefulness to the stakeholders.

Objectives of the Study

The study was guided by the following objectives:

(i)   To find out whether or not the industrial attachment objectives were being achieved.

(ii)   To investigate any differences in the perceptions of stakeholders regarding the attainment of the objectives of the programme;

(iii)   To establish the extent to which stakeholders find the industrial attachment useful; and

(iv)   To investigate any differences in the perceptions of stakeholders regarding the usefulness of the programme.

Research Questions

The study sought to answer the following research questions:

  (i)   How do stakeholders rate the attainment of the objectives of industrial attachment?
 (ii)   Do the ratings of the stakeholders regarding the attainment of programme objectives differ?
(iii)   How do stakeholders rate the usefulness of the industrial attachment; and.
 (iv)   Do the ratings of the stakeholders regarding programme usefulness differ?

Methodology

The study employed cross-sectional descriptive survey research design. The choice of the survey method was informed by the views of Cohen, Manion and Morrison (2000) who suggested that surveys gather data at a particular point in time with the intention of describing the nature of existing conditions, or identifying standards against which existing conditions can be compared, or determining the relationships that exist between specific events.

A sample size of 144 was drawn from a target population of 390. This represented 30% of randomly selected trainees and workplace supervisors and all trainers who participated in industrial attachment between January and April 2020. Kerlinger (2003) suggested that a sample size of between 10% and 30% of the population suffices.

Data were collected using questionnaire as it enables the coverage of wide area and extensive contents within a short period of time (Kothari, 2004). Previous studies (Kamunzyu, 2010; Donkor et al., 2009; Spowart, 2006; Aleisa & Alabdulahfez, 2002) that assessed work-based learning programmes mostly used researcher-designed questionnaires for data collection. The questionnaire used a 4-point Likert scale as opposed to the conventional five-point scale due to the tendency for individuals to select responses in the center of the scale if an odd number response scale was used (Anderson, 1985; Casley & Kumar, 1988).

Piloting ensured validity and reliability of the questionnaire. This involved administration of the questionnaire to accessible stakeholders with similar characteristics to the sample. Reliability of the instrument was determined using Cronbach's alpha analysis that gave value of 0.76. Saunders, Lewis and Thornhill (2007) advise that alpha should be at least 0.70 to retain an item in an "adequate" scale. The instrument used was thus considered valid and adequately reliable.

Data were analysed using descriptive statistics and one way analysis of variance (ANOVA). The Statistical Package for Social Sciences (SPSS) aided in the analysis. The mean rating for each item was computed for each of the three sub-groups of participants. The resultant mean rating for each item was computed and

then compared with the theoretical mean rating (assuming normal distribution of responses) of 2.50. The computed mean ratings for the three sub-groups were compared using ANOVA at 0.05 level of significance. Where statistically significant differences were established, the Tukey's post hoc test was conducted to determine exactly where the differences among the groups occurred. The results of the analysis were tabulated.

Results and Discussion

The findings of the study are presented into five sections addressing the four research questions posed above, beginning with the demographic information of the study participants (80.6 %.).

Biographical Information of Participants

The participants in the study were TVET trainers and trainees drawn from across all the academic departments and also the immediate supervisors who were in charge of the various sections based on trainees' field of specializations in the host organisations. All the participants had been involved in the industrial attachment during the study period. There were 18 (64.3 %) male and 10 (35.7 %) female trainers. A majority of them (67.9 %) had conducted up to five (5) assessments of trainees on attachment at various periods. Forty-six (64.9) male trainees and 25 female trainees (35.2 %) took part in the study. More than half of them (59.2 %) were pursuing diploma programmes while the remainder (40.8 %) was taking craft certificate courses. All the trainees were either in their second or third module/stages of study.

Attainment of the Industrial Attachment Objectives

All the four items relating to the attainment of the programme objectives had mean ratings and resultant mean ratings that far exceeded the theoretical mean (Table 1).

Table 1: *Stakeholders' ratings of the attainment of the industrial attachment objectives*

Elements of Programme Objectives	Trainer Ratings ($n_1 = 28$)		Trainee Ratings ($n_2 = 71$)		Workplace Supervisor Ratings ($n_3 = 17$)		Resultant Mean	F Value
	Mean	SD	Mean	SD	Mean	SD		
1. Exposing trainees to industrial/ business work culture through the actual involvement in real work situation	3.75	.441	3.79	.476	3.65	.493	3.76	.629

2.	Providing opportunities for trainees to apply the practical skills acquired through formal instructions in real situation	3.54	.507	3.56	.554	3.47	.515	3.54	.208
3.	Exposing trainees to new scientific and technological equipment which are not available in the Polytechnic	3.43	.634	3.52	.582	3.29	.686	3.47	1.016
4.	Building confidence in trainees in technical operations and problem solving by working with professionals in the world of work	3.64	.488	3.87	.335	3.59	.507	3.78	5.424*
5.	Developing positive attitude towards work	3.79	.418	3.80	.401	3.82	.393	3.80	.047

*Statistically significant at .05 level, df = 2 for numerator and 113 for denominator (computed F value > $F_{0.05 (2, 113)}$ = 3.07).

As indicated in Table 1, the programme objective of developing positive attitude towards work had the highest resultant mean rating of 3.80. The lowest resultant mean rating of 3.47 was for the objective of exposing trainees to new scientific and technological equipment which are not available in the Polytechnic.

The results of the study suggest that trainers, trainees and workplace supervisors rated highly elements of the programme objectives indicating satisfactory attainment of the programme objectives. Thus, all three stakeholders felt that the programme had achieved its set objectives. The findings are similar to those of Donkor et al. (2009) who reported that the supervised industrial attachment at University of Education, Winneba had attained its objectives. These findings are also similar to those of other studies in other parts of the world (Adjei et al., 2014; Spowart, 2006; Aleisa & Alabdulahfez, 2002) that found out that their student industrial attachment programmes had met the set objectives.

Comparison of Stakeholder Ratings on Programme Objectives

Due to the disparity in the sample sizes of the three sub-groups (n_1 = 28, n_2 = 71, n_3 = 17), the ANOVA was preceded by a test of homogeneity of variances. The

results indicated that all the items met the requirements that the three sub-groups were from a homogenous population. The item-by-item ANOVA results which appear in Table 1 (last column) show that there was uniform agreement in the responses of the respondents except for the objective, 'building confidence in trainees in technical operations and problem solving by working with professionals in the world of work', that had $F = 5.424 > F_{0.05 (2, 113)} = 3.07$). This indicated a statistically significant difference in the ratings of trainers, trainees and workplace supervisors. The ratings of the respondents regarding four of the items relating to the attainment of the program objectives showed a high degree of similarity. Thus, trainers, trainers and workplace supervisors were, to a greater extent unanimous in rating highly the attainment of the programme objectives and that they perceive the programme as meeting its objectives.

Usefulness of the Industrial Attachment Programme

The results which appear in Table 2 indicate that all the nine items relating to the usefulness of the programme had mean ratings that exceeded the theoretical mean.

Table 2: Stakeholders' ratings of the usefulness of the industrial attachment programme

Elements of Programme Usefulness	Trainer Ratings $(n_1 = 28)$		Trainee Ratings $(n_2 = 71)$		Workplace Supervisor Ratings $(n_3 = 17)$		Resultant Mean	F Value
	Mean	SD	Mean	SD	Mean	SD		
1. Opportunity for trainees to apply theories and principles to practical issues in real work setting	3.64	.488	3.42	.577	3.83	.393	3.53	4.627*
2. Helps trainees to acquire further knowledge and skills relating to the nature of their future jobs	3.82	.390	3.76	.430	3.65	.493	3.76	.871
3. Opportunity to interact and share experiences and problems with industry practitioners	3.46	.637	3.63	.567	3.24	.562	3.53	3.463*

No.	Item	Mean	SD	Mean	SD	Mean	SD	Mean	F
4.	Enables trainees to better understand the tasks and practices performed by industry professionals	3.71	.535	3.59	.495	3.71	.588	3.64	.733
5.	Acquaintance with new technologies, machines and equipment function	3.79	.418	3.70	.619	3.53	.515	3.70	1.109
6.	Helps trainees to improve their self-confidence in performing a task	3.71	.460	3.48	.557	3.71	470	3.57	2.712
7.	Opportunity for trainees to create networks with potential employers	3.54	.508	3.41	.767	3.65	.493	3.47	1.001
8.	Opportunity for strengthening institution-industry linkage and support for institution programmes	3.57	.634	3.18	.850	3.65	.702	3.34	3.949*
9.	Opportunity for host Organisations to reduce recruitment and training costs of their staff	2.39	.832	2.91	1.011	2.59	.712	2.74	3.422*

*Statistically significant at .05 level, df = 2 for numerator and 113 for denominator (computed F value > $F_{0.05 (2, 113)}$ = 3.07).

As indicated in Table 2, the item that industrial attachment 'helps trainees to acquire further knowledge and skills related to the nature of their future jobs' had the highest resultant mean rating of 3.76. The lowest resultant mean rating of 2.74 related to the 'opportunity for host Organisations to reduce recruitment and training costs of their staff during the attachment period'. The results of the study thus showed that trainers, trainees and workplace supervisors rated highly elements of the usefulness of the programme.

The findings from this study were closely related to those of Bailey & Merritt (1997) who reported that industrial attachment increases the learning power of

students by enabling them to get job experiences and reinforce academic instruction through the use of applied learning opportunities. The study findings are also consistent with those of Donkor et al. (2009), Cullen (2005), and Spowart (2006) who found out that stakeholders perceived the industrial attachment useful.

Comparison of Stakeholder Ratings on Programme Usefulness

The item-by-item ANOVA results in the last column in Table 2 indicated that there was uniform agreement in the responses of the respondents for five items since there were no significant differences in the ratings of trainers, trainees and workplace supervisors regarding those elements of program usefulness. Thus, the ratings of the respondents regarding these items showed a high degree of similarity. However, the respondents differed in their ratings regarding the other four items namely; 'opportunity for trainees to apply theories and principles to practical issues in real work setting', F = 4.627; 'opportunity to interact and share experiences and problems with industry practitioners', F = 3.463; 'opportunity for strengthening institution-industry linkage and support for institution programmes', F = 3.949; and 'opportunity for host Organisations to reduce recruitment and training costs of their staff', F = 3.422. All these values exceeded the table value (F0.05 (2, 113) = 3.07) required for significance at the 0.05 level). To determine which sub-groups significantly differed, Tukey's post hoc test (at 0.05 level of significance) was used to make pair wise comparisons of the mean ratings of the three stakeholders. The results indicated that the ratings of both trainees and trainers were significantly higher than that of workplace supervisors in three of the items while the ratings of trainees and workplace supervisors were significantly higher than that of trainers on the last item.

Conclusions

In view of the foregoing findings, it could be concluded that stakeholders of the programme expressed high satisfaction with the attainment of the programme objectives and its usefulness. The attained programme objectives include exposing trainees to industrial/business work culture through the actual involvement in real work situation, providing opportunities for trainees to apply the practical skills acquired through formal instructions in real situation and exposing trainees to new scientific and technological equipment which are not available in the Polytechnic. Other objectives achieved are building confidence in the trainees in technical operations and problem solving by working with professionals in the world of work and developing positive attitude towards work.

The programme's usefulness lies in the opportunity for trainees to apply theories and principles to practical issues in real work setting, helping trainees to acquire further knowledge and skills relating to the nature of their future jobs, and enabling trainees to better understand the tasks and practices performed by industry professionals.

Other benefits to the trainees include acquaintance with new technologies, machines and equipment function, improving their self-confidence in performing tasks and the opportunity for them to create networks with potential employers. For the training institutions and the attaching organisations, the programme is useful in that it offers an opportunity for strengthening institution-industry linkage and support for institution programmes. The programme's usefulness to the host organisations lies in the opportunity to reduce recruitment and training costs of their staff during the attachment period.

Recommendations

The findings suggest that the attachment programme is achieving its objectives and that stakeholders have found it useful. Hence, the programme seems promising and the findings would undoubtedly be encouraging not only to the Industrial Liaison Office that coordinates the programme but the Polytechnic at large. However, the office needs to reflect on the findings, identify the possible causes of the programme's success, and strive to maintain the identified success factors for continued attainment of the programme objectives and usefulness.

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Effects of Kenya Youth Employment and Opportunities Project on Graduate Employability: Bridging the Gender Gap

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Abstract

The Government of Kenya has initiated several programs to equip the youth with requisite employability skills. Despite these initiatives, skill gap still hinders the employability of TVET graduates. This study evaluated the effects of Kenya Youth Employment Opportunity Program (KYEOP) in providing Life Skill Training (LST), Job Specific Skills Training (JSST) and Internship on graduate employability. The study adopted explanatory sequential mixed research design that employed both quantitative and qualitative approaches. The study was undertaken in Kwale County and focused on Computer Technology Course. From a target population of 750 trainees, a random sample of 55 trainees (10.2% of the population) were selected. Additionally, 7 trainers, and 15 employers were included in the study, providing a total sample size of 77. The collection and analysis of quantitative data was done in the first phase, while the collection and analysis of qualitative data was done during the second phase. Results indicated that there were positive correlations between all indicators of training and internship on graduate employability. However, the rating of internship as a predictor of employability was lower compared to training. The study revealed that there was significant difference between the means for internship and gender. Conversely, there were no significant differences in the means for LST and JSST. Multiple Regression yielded positive correlation between predictor variables (gender, Life skills, Technical training and internship) and graduate employability. Additionally, resultant R squared value indicated that 12.5 percent of the variance in employability was explained by the four predictor variables. The study concluded that the program equipped graduates with appropriate life skills and job specific training as required for transition to decent gainful employment. However, internship arrangements by service providers, inadequate support mechanisms to ensure trainees complete internship and absence of pro-poor and gender sensitive support mechanisms still remained major challenges. The study recommended review of policies and provision of adequate funds for pro-poor and gender responsive models.

Introduction

Background Information

The key role of education and training in national development has been universally recognised, and many governments are striving offer it to its deserving citizens. We need not overemphasise that education and training are prerequisites for human development, and is critical in diverse economic growth. UNESCO (2020) counsels that education and training is not only a fundamental human and enabling right, but also a public good. It remains the unlocking key to the individuals intellectual and creative prowess and by investing in expanding access to quality education and training, majority of societies have achieved high sustainable rates of growth (Republic of Kenya, 2013; World Economic Forum, 2020).

World Economic Forum (2020) and UNESCO (2020) contended that skills gaps continue to be high across jobs globally and this will intensify in years to come They counsel that the top skills and skill groups which employers perceive as rising in prominence in the near future include groups such as critical thinking, problem solving and skills in self-management such as active learning, resilience, stress tolerance and flexibility

The Government of Kenya with support of multilateral donors, has introduced several youth initiative programs since early 2000. (Ismail ,2018, Balwanz,2012; Jutta & Omollo,2014). Majority of programs are heterogeneous ranging from those that provide training to enhance the skills of the youth Annette (2017) and those that catalyze employability (Ismail ,2018). These program interventions stimulate job creation particularly small and medium enterprises (Chhinzer & Russo, 2018).

The Word Bank has been the most active proponent of youth employment programs in Kenya (Omollo,2012). The Kenya Youth Employment and Opportunities Project (KYEOP) is one such program that aims at increasing employment and earning opportunities for youth. Although the project targets 17 counties, Kenyatta University (KU) Consultancy was contracted by NITA to provide services in Kwale, Mombasa, Nairobi, Nakuru, Kisumu and Bungoma Counties.

Statement of the Problem

Despite the innovations in the design of KYEOP program, there still exists a knowledge gap regarding its effect on preparing the beneficiaries for transition to decent gainful employment. Additionally, there is inadequate systematic research evidence to demonstrate that the training, and internships offered are preparing beneficiaries for smooth transition to employability. This study bridged this evidence gap by investigating the effects of the program on graduate employability.

Objectives of the Study

(i) Determine the effects of Life Skills Training (LST), Job Specific Skills Training (JSST) and internship on trainee employability by gender.

(ii) Determine the correlation between LST, JSST and Internship on Trainee proficiency and employability by gender.

Hypothesis

Ha: There is a significant correlation between the KYEOP program and graduate employability by gender.

Ho: There is no significant correlation between KYEOP program and graduate employability by gender.
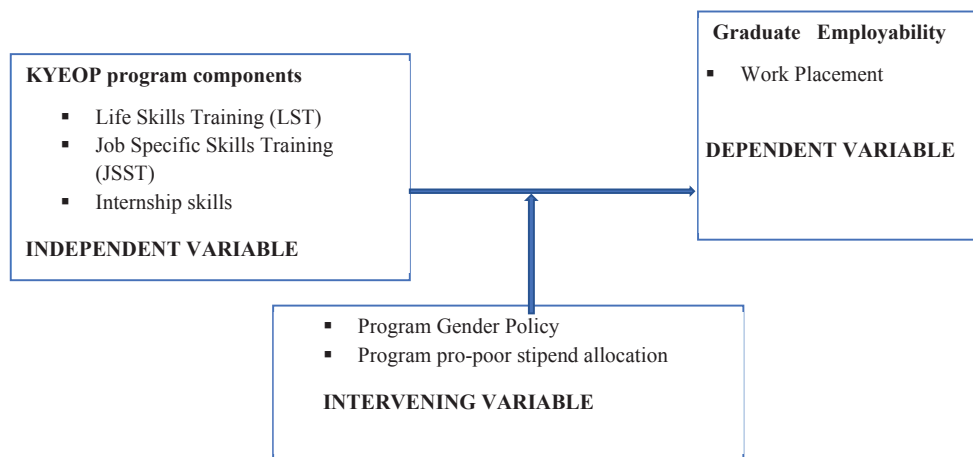
Figure 1: Conceptual Framework Illustrating the Effects of KYEOP Program on Graduate Employability

The conceptual framework portrayed in Figure 1 illustrates a relationship between the KYEOP program components of Life skills training (LST), the Job specific skills training (JSST) and Internship as the predictor /independent variables and the graduate employability as the dependent variable. The framework suggests that when the effects of the three components of program intervention are well implemented, then the program leads to graduate employability. The intervening variables competing with the independent variables to influence the dependent variable included program gender policy and pro-poor stipend allocation mechanisms.

Research Methodology

This study adopted an explanatory sequential mixed research illustrated in Figure 1. (Creswell & Clark ,2011; Creswell,2012). This sub-type was employed to collect and analyse quantitative and qualitative data in the first and second phases

respectively. The two data sets were merged and interpreted in line with the study objectives. (Orodho, Nzabalirwa, Odundo, Waweru & Ndayambaje,2016). The use of both quantitative and qualitative data was found useful in data triangulation and interpretation of the effects of KYEOP intervention on graduate employability.
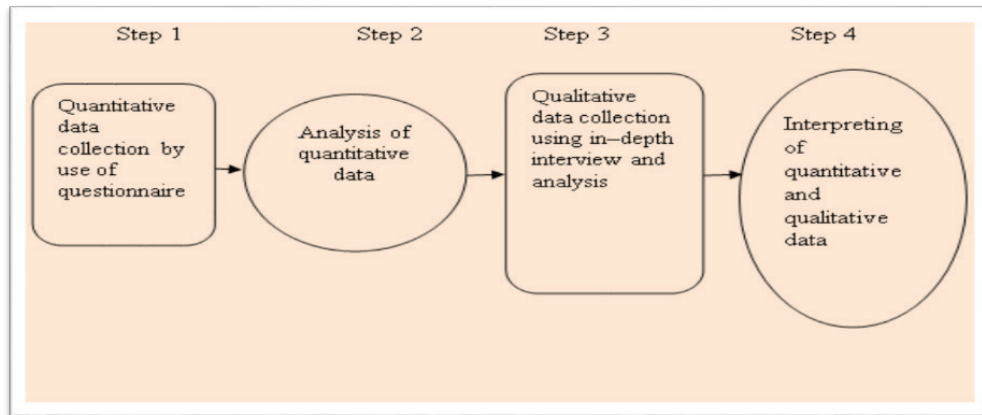
Figure 1: *Explanatory sequential Mixed Methods Design*
Source: Adapted from Creswell, (2012)

Study Variables
The dependent variable (DV) was trainee employability measured by proficiency in internally administered theory and practical examination. The independent variable (IV) was Life Skills Training, Skill Specific Technical Training and Internship provided before transition to employment.

Population and Sample Size
The population comprised trainees, trainers and prospective employers during the cycle one intervention. From a target group of 750 trainees allocated to the Consultancy Unit as service providers by NITA, a random sample of an intact group of 55 trainees in Kwale County, representing 10.2 percent of the total were selected. Additionally, seven trainers, and 15 prospective employers were included yielding a sample size of 77 participants. This sample size was considered representative to the target population (Creswell, 2012).

Data Collection and Analysis
The quantitative data was collected using questionnaires from trainees during the first quantitative phase. In the second phase, qualitative data was collected from trainers and prospective employers using key informant interviews supplemented with observation checklist. The questionnaires were content and face validated, and reliability determined using Cronbach's alpha (Orodho, 2017).

Quantitative data were analysed using the Statistical Package for Social Sciences

(SPSS) computer software to generate descriptive and inferential statistics. The main descriptive statistics (means, standard deviation) and the inferential statistics included Pearson's correlation, analysis of variance (ANOVA) and multiple regression statistics. The qualitative data from interviews were analysed employing the narrative and thematic analytical approaches (Creswell & Clark, 2011).

Results and Discussion

Life Skill Training (LST) and Technical-Internship on Competency of Trainees

The trainees were requested to provide their perceptions regarding the effects of the LST, JSST on their level of competency measured by their proficiency internal examination. The summarised results are carried in Table 1.

Table 1: Effects of Life Skill Training (LST) and Technical-internship on Employability

SN	Statement	Mean	SD
1	Mien and decorum	3.506	.836
2	Punctuality	3.273	.971
3	Leadership skills	3.073	.920
4	Positive attitudes critical thinking	3.373	.721
5	Collaboration and Creativity	3.373	.721
6	Judgement and decision making	2.964	1.036
7	Systematic identification of computer problems	3.273	.971
8	Categorizing and identifying items	3.073	.920
9	Data codding and information management	3.373	.721
10	Internship /Attachment	2.964	1.036

The results contained in Table 1 shows that majority of trainees were confident that the program intervention adequately prepared them for employability in either formal or informal sector. Further examination of the results established that the leading component of LST was mien and decorum (Mean= 3.506, SD=.836), followed jointly by positive attitude towards training and work and collaboration and creativity (Mean =3.373; SD=.836). Punctuality and leadership indicated positive responses at (Mean = 3.273; SD=.971), and (Mean = 3.073; SD= .920).

With regards to technical training, the results equally portrayed a positive picture. The study found that training in data coding and information management using various computer software was ranked first (Mean =3.373; SD=.1.036) followed closely by systematic identification of computer problems (Mean = 3.273; SD=.971) and categorising and identifying computer repair and maintenance items (Mean =3.073; SD=.920). It was also established that correct judgement and decision making on computer issues to be repaired or maintained was equally important

(Mean = 2.964; SD=1.036). Results on internship indicated that its effect on employability was comparatively lower (Mean =2.964; SD=1.036). Findings of this study are similar to Betherman and Khan (2015) study which took stock of effects of knowledge gaps on youth employment in Sub-Saharan Africa.

The study concluded that providing a well-blended skill set enhanced the graduates' probability of finding   employment. In a similar vein, Ismail (2018) study on lessons learned in youth employment programs in developing countries concluded that appropriately implemented   training, internship and related interventions make youth workforce more skilled and alluring to employers. It is instructive to note that the results show quite a good congruence with other studies such as Annette (2017) study on effects of internship on early labour market performance, World Economic Forum (2020) on future of jobs and UNESCO (2020) on youth education and employability prospects. The common contention in these studies is the emphasis placed on the need to blend top skills and skill groups which resonate well with perceptions of employers regarding jobs that are rising in prominence in future and may be utilised as catalysts for graduate employability.

Correlation between LST, JSST and Internship on graduate Employability by gender

The second objective was to determine the correlation between LST, Technical Training and Internship on trainee employability by gender. The results are displayed in Table 2.

Table 2: *Correlation between LST and Technical –Internship on Employability by gender*

Attribute	Gender	Leadership	Positive Attitudes	Hybrid Skills	Employability
Gender	1	.8658**	.711**	.585**	.295*
Leadership		1	.856**	.740**	.276*
Positive Attitudes			1	.736**	.424**
Hybrid skills				1	.333*
Employability					1

** Indicates that the variables were significant at .01 level (two tailed test)

*Indicates that the variables were significantly correlated at .05 level (two tailed test)

The results contained in Table 2 showed that there was a strong and positive correlation between nearly all indicators of project intervention and graduate employability by gender. There was a strong positive correlation between gender and leadership (r= .8658, and positive attitudes (r= .711) as measures of Life Skills Training and employability. Gender was also positively related to acquisition of hybrid skills namely LST and JSST (r= .595) as well as proficiency in internal

examinations that combined theory and practical (r= .295). The emerging picture showed that all program interventions were positively related to employability prospects. The findings were in tandem with Kluve et.al. (2017) meta-analysis of 67 skills training interventions in developed and developing countries. Invariably, their findings compared very well with findings of this study in concluding that project interventions that combine LST, JSST, and work placement have positive effects on graduate employability and their economic empowerment.

Table 3 carries data generated from One- Way Analysis of Variance (ANOVA) which combined four models: Life Skill Training, Technical Training, Internship and Gender

Table 3: *One Way Table 3: ANOVA of the effects of KYEOP Program on Employability*

ANOVA						
Effects of KYEOP program by gender		Sum of Squares	df	Mean Square	F	Sig.
Life Skills Training (LST)	Between Groups	3.578	4	.895	.856	.497
	Within Groups	51.181	49	1.045		
	Total	54.759	53			
Technical Training	Between Groups	10.326	4	2.581	2.048	.102
	Within Groups	63.020	50	1.260		
	Total	73.345	54			
Internship	Between Groups	17.398	4	4.349	2.641	.044
	Within Groups	82.348	50	1.647		
	Total	99.745	54			
Gender	Between Groups	2.664	4	.666	3.309	.018
	Within Groups	10.063	50	.201		
	Total	12.727	54			

The data shows in Table 3 further revealed that there was a significant difference between the means for internship (p=. 04, < .05) and gender (. p=.018, <.05). However, there were no significant differences in the means for Life Skills Training (p=.497,>.05) and Technical Training (p=.102,>.05).

Bridging the Gender Gap between Technical Training, employability and Economic Empowerment

Table 4 shows results of a Multiple Regression was performed on the four predictor variables, namely Gender, Life Skills Training, Technical Training and Internship as independent variable and graduate employability as a dependent variable.

Table 4: *Model summary of Effects of KYEOP Program on Employability*

Model Summary					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	.353[a]	.125	.054	1.04735	1.397

a. Predictors: (Constant), Gender, Life Skills Training (LST), Technical Training, Internship

b. Dependent Variable: Employability

The results of the Multiple Regression contained in Table 4 shows a moderate correlation between predictor variables and graduate employability (r= .353). Further, the results yielded an R squared value. (R2=125), indicating that 12.5 percent of the variance in employability can be explained by the four predictor variables. The remaining 87.5 percent are attributable to variables not contained in the predictor variables. The Dublin-Watson value of 1.397 lies in the range (0-2) point to the positive autocorrelation confirming positive correlation among variables. The implication is that both females and males acquired both LST and JSST which are critical synergist that stimulate employability for men and women.

Employers interviewed regarding the influence of life skill training on graduate employability by gender were unequivocal that; "the LST and technical training was attractive to graduates irrespective of gender contrary to the erroneous notion not based on research evidence that women tend to be restricted to jobs which are considered acceptable for females, like hairdressing and dress making (Curtis,2016). The findings are consistent with those of Kluve, et.at. (2017) which established that the positive effect of skill training and entrepreneurial support on employment and earning was higher for women than men. This finding echo Kumar (2017) study on targeted SME financing and employment effects which suggested that interventions should be customised for women and combine training with access to finance.

The study found a strong case to argue for more gender responsive programs that spur women economic empowerment. Additionally, this finding is in tandem with Annette (2017) study which emphasizes the need for intensive skilling and mentorship that appropriately prepare beneficiaries for decent gainful employment. The emerging picture is similar to Ismail (2018) in a study on lessons learned from youth employment programs in developing countries that graduates were more willing to create entrepreneurial enterprises but combinations of constraints including lack of capital and supportive regulatory environments were not being exploited critical catalysts that accelerate prospects of employability. Thus, it is imperative that SMEs is a more promising employment destination especially after acquiring requisite skillsets.

Key informant interviews with prospective employer revealed that: "internship experience enabled graduates to merge the training skills and attitudes during program intervention and real working environment. Additionally, apart from internship providing beneficiaries an opportunity to team up with their more experienced colleagues, the exposure made them become more realistic and confident about preparation for employability "(E5). The finding is similar to Katerina and Athanasios (2019) study on internship and employability prospects and Balwanz (2012) study on youth skill development in Kenya that concluded that students who attended internship programs were knowledgeable about what employers expected them to do at work. Further Katharina and Athanasios (2019) were categorical that internships ensure a seamless transition from training by providing trainees the ability to test their abilities, beliefs and attitudes pertaining specific tasks or career pathways. In a similar vein, Azevedo, Davis and Charles (2013) study which tested what worked in the Ninaweza program in Kenya were unambiguous that internship programs not only reinforce the technical and transferable skills but specifically nurture the life skills and foster an awareness, resilience and lifelong learning irrespective of gender in this dynamic 21st century.

Conclusion and Recommendations

The results from this study showed that the KYEOP program has made commendable strides in providing adequate knowledge, work related technical skills and desirable attitudes which are ingredients for employability. Nonetheless, despite these impressive milestones, the study established that the effect of the intervention on graduates as a preparation for decent gainful employment, especially in SMEs was gaining momentum especially among females. It is concluded that the gender gap in training and access to training was slowly being bridged, enabling women to access more lucrative technical enterprises.

However, the study concluded that the program had respectively gender-blind policies that did not resonate well with the unique needs of girls and women, especially those from marginalised and lower socio-economic backgrounds. These challenges can have deleterious effects on girls and women's employability prospects and economic empowerment.

This study recommended that graduates transiting into internship and/or employment should be closely followed and mentored through lifelong learning to enable them sustain their skills for employability. There is also an urgent need to consider introducing a differentiated funding aimed at advantaging females, as well as being responsive to the plight of prospective project beneficiaries originating f5rom areas prone to poverty and other anti-social practices.

Acknowledgement

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Empowering Youth through Competence-Based Education and Training (CBET), Entrepreneurship and Industrial Linkages in Kenya: A Case Study of The Kisumu National Polytechnic, Kenya

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Abstract

TVET Institutions are key Organisations in the provision of specialised skills integrated between the theoretical classroom and Industry-based training among the youths. However, unemployment has been the top concern for the youth at 63% over the past 6 years. This study sought to examine Competence Based Education and Training, industrial linkages and entrepreneurship education as a veritable tool for youth empowerment in Kenya. Since the nation is presently experiencing challenges of unemployment, the study showed that one of the most efficient ways of empowering the youth is through competency-based education and training, entrepreneurship education and Industrial linkages. The data that was used in this study was obtained through questionnaires. Desktop qualitative research methodology coupled with descriptive research design was also employed. With the student population spiraling to 4000 students, the sample size of randomly selected 363 students, which gave a 5% margin of error, was employed using the Taro Yamani formula. Findings revealed that through CBET, Entrepreneurship and Industrial linkage, the youths are highly empowered to meet the standards and requirements of the job market. The paper recommended that the curriculum at all levels of education should be entrepreneurial based and that all stakeholders and government should provide enabling environment for the development of entrepreneurship education needed for economic enhancement and youth empowerment in Kenya through CBET.

Keywords: CBET, Entrepreneurship Education, Industrial Linkages.

Introduction

The Technical and Vocational Education and Training (TVET) in Kenya is not new. It dates back to early 1900s when the native industrial training depot was started in Nairobi by the missionaries (Elimu Insight, 2016). Technical and Vocational Education and Training refers to a range of learning experiences which are relevant to the world of work and may occur in a variety of learning context (Republic of Kenya, 2012). The TVET subsector contributes significantly to economic and social development of a country. The achievement of sustainable development and acceleration of economic growth depends on industrial production and

expansion of value addition process. To achieve effective industrial and vibrant value addition, diverse skills in various production fields are required. In this endeavor, the Kenyan Vision 2030 and sustainable development goal number four recognises that inclusive education and training of is fundamental to the achievement of expected economic status (Kenyan Vision 2030; Republic of Kenya, 2012). The education sector is expected to provide relevant skills required to steer the country to attain its economic and social goals as envisioned in the Vision 2030.

Similarly, the Constitution of Kenya 2010, places emphasis on quality and relevance of education and training to youth. The Sessional Paper No.1 of 2005, a policy framework for education, training and research, emphasize the role of TVET in providing and promoting lifelong education and training for self-reliance. Over the years the TVET subsector has faced a number of challenges such as; lack of effective coordination and disparities in training standards, rapidly changing technology, globalisation, short-lifespan for product and taste and preference and ever-changing customer requirements and needs. The unpredictable and dynamic business environment has led to continuous shift in demand for improved skills and labor and therefore necessitating restructuring training programs to respond to the industry needs (Republic of Kenya, 2013).

To address the challenges, several policies have been developed and implemented. Some of the policies that have been implemented include; establishment of a national TVET Authority to oversee the national skills training system and regulate the quality of training, formation of TVET Curriculum Development and Assessment Council (CDACC) to coordinate competency-based education and training (CBET), the Kenya National Qualification Framework and the TVET Funding Board to mobilise funds for training. The Sessional Paper No. 14 of 2012, a policy framework for education and training on reforming education and training sectors in Kenya, focuses on the need to assure quality in all levels of education and training. In each level, there is a regulator to ensure quality assurance and compliance to standards. The TVET Authority (TVETA) is a regulator for TVET institutions while the basic education is regulated by Education Standards and Quality Assurance Council (ESQAC).

CBET Approach of Teaching in TVET

The CBET is industry and demand-driven, outcomes-based education and training programme based on industry generated standards (occupational standards). The industry standards form the basis upon which programme/curriculum assessment and learning materials are designed and developed (Kinyanjui, 2007).

The key aspect of competency is that as long as an individual cannot apply his knowledge and skills at work location, he is incompetent regardless of how much knowledge he has. In many occupational areas employers noted that the newly

qualified graduate students did not meet the requirements of practice without further training and therefore, having competence based standards responds to criticisms that education and training programmes were failing to meet the practical requirements of employment. The four levels used in scale of competency standards were Awareness, Knowledge, Skill and Mastery.

Entrepreneurial Education

Entrepreneurial education is the purposeful intervention by the trainer in the life of a learner to impact entrepreneurial qualities and skills for survival in the world of business (Gana, 2007). It aims at equipping learners with skills, knowledge and dispositions to help them develop or implement innovative social or business plans (Nwagwu, 2007). Ayeduse (2011) supported that entrepreneurship education provides meaningful education for trainees which could make them to be self-reliant and provide them with creative and innovative skills necessary for identifying new business opportunities. Ivowim (2009) emphasised that educating an individual entrepreneurially makes them to be equipped with enabling skills to live peacefully and productively in a dynamic society.

Linking Training Programmes with Job Placement

Strong collaboration and partnership between TVET institutions and industry enables the private sector to provide input in the design of market-relevant training for young people. This means the sectoral skills and technological focuses of training programmes can equip students with the capabilities required by the labor market. The risk of mismatch between training and the job market can be minimised through improved programme design (The MasterCard Foundation, 2015). The Skills for Youth Employment Fund is a results-based competitive funding approach that aims to ease the transition from skills training programmes to the world of work. Training programmes should target identified viable skill shortages. This requires all TVET institutions to engage closely with industry to ensure post training placement, and to understand start-up potential and opportunities. Moreover, to link these programmes to measurable outcomes, part of the funding should be dispensed only upon proof of successful employment or self-employment of trainees (Ndile, 2018). Skills in information and communication technologies can help young people secure jobs and succeed as entrepreneurs (Coward et al., 2014). In addition, financial literacy and life skills training can assist youth in preparing for new economic opportunities.

Problem Statement

In the Global Talent Competitiveness Index 2017 edition, Kenya's rank in talent competitiveness was 97 out of 118 economies globally. The nation is greatly lagging behind most of the Sub-Saharan in the key performance indicators, among them vocational and technical skills; Consequently, Kenya is ill prepared to meet the market demand because majority of its graduate students often find themselves

with basic theoretical knowledge that does little to prepare them for the actual job tasks. According to Gustman et., al (1982), there is a strong relation between vocational training in and economic outcomes in the USA as they find courses that end up having huge positive influence in annual income. Otuki (2017) stated that it is crucial to examine how vocational training in a country can be re-loaded and enhanced to make it more appropriate in addressing youth unemployment by considering dominant activities in society and needs of learners. This study therefore sought to determine the impact of the CBET approach curriculum on the development of entrepreneurial skills on the trainees and their readiness for the job market in terms of the technical skills acquired through industrial linkages and exposure.

Research Objectives
This study was guided by two research objectives and four hypotheses:

(i)   To determine the strength of entrepreneurship skills imparted to the TVET students, both the talented and non-talented ones alike and their willingness to undertake an establishment of their own enterprise.
(ii)   To determine the extent to which students through the CBET curriculum are exposed and linked to the industries within their competence.

Hypotheses
(i)   H0: There is no relationship between CBET curriculum and entrepreneurship skills.
(ii)   H1: There is relationship between CBET curriculum and entrepreneurship skills.
(iii)   H02: There is no impact of CBET curriculum on industrial linkage.
(iv)   H2: There is impact of CBET curriculum on industrial linkage.

Methodology
The researcher used explanatory and descriptive research survey design in building up this research work. According to Creswell (1994), this type of research design present facts about the nature and status of a situation as it exists at the time of the study. The choice of this research design was also considered appropriate because of its advantages of identifying attributes of a group of individuals from a large population gathering facts, knowledge, opinion and attitude about other people's events or procedure (Gay, 2007; Orodho, 2004). Data were collected from primary and secondary sources. Self-administered questionnaires were administered to 363 respondents that comprised of students from The Kisumu National Polytechnic Kenya. Also, secondary data were generated from newspapers, journals, media and reports. The responses were measured on a four (4) point Likert scale. of strongly agree (SA) 4 points, agree (A) 3 points, disagree (D) 2 points and strongly disagree (SD) 1 point. The data were analysed using Chi-square as the statistical tool at 5% level of significance and hypothesis evaluated through the test of proportion.

Results and Discussion

Response Rate

Sample population distribution by gender was as shown in the table below.

Table.1: *Gender Distribution of the Respondents*

Response		frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	375	66.6	66.6	66.6
	Female	188	33.4	33.4	100.0
Total		**563**	**100.0**	**100.0**	

From the table 1 above, 66.6% of the respondents were male and 33.4% of the respondents were female.

Table 2: *The position held by the respondents*

Response		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Administrators	25	4.4	4.4	4.4
	Trainers	115	20.4	20.4	24.8
	Technical staffs	60	10.7	10.7	35.5
	Students	363	64.5	64.5	100.0
	Total	**563**	**100.0**	**100.0**	

The table 2 shows that 25 respondents who represented 4.4% were administrators, 115 (20.4%) were trainers, 60 (10.7%) were technical staffs and 363 (64.5%) were trainees.

Test of Hypotheses

There is a relationship between CBET curriculum and entrepreneurship skills.

Table 3: *There is a Relationship between CBET Curriculum and Entrepreneurship Skills*

Response	Observed Frequency, O	Expected Frequency, E	Residual, (O - E)	$(O-E)^2$	$\dfrac{(O-E)^2}{E}$
Strongly Agreed	312	140.75	171.25	29326.56	208.36
Agreed	167	140.75	26.25	689.06	4.90
Disagreed	71	140.75	-69.75	4865.06	34.57
Strongly disagreed	13	140.75	-127.75	16320.06	115.95
Total	**563**				**363.78**

Table 4 *Test statistic*

There is a relationship between CBET curriculum and entrepreneurship skills.	
Chi-Square	363.78[a]
Df	3
Asymp. Sig.	.000

a.   0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 140.75

*The null hypothesis, "*There is no relationship between CBET curriculum and entrepreneurship skills.*" Was rejected since the calculated value of* 363.78 *was greater than the critical value of 7.81 at 5% level of significance.*

*Therefore, the alternative hypothesis is accepted that "*there is a relationship between CBET curriculum and entrepreneurship skills*".*

Test of hypothesis two: There is impact of CBET curriculum on industrial linkages.

Table 5: *There is impact of CBET curriculum on industrial linkage*

Response	Observed Frequency, O	Expected Frequency, E	Residual, (O - E)	$(O - E)^2$	$\dfrac{(O - E)^2}{E}$
Yes	491	187.67	303.33	92009.09	490.27
No	50	187.67	-137.67	18953.03	100.99
Undecided	22	187.67	-165.67	27446.55	146.25
Total	**563**				**737.51**

Table 6: *Test statistic*

There is impact of CBET curriculum on industrial linkages	
Chi-Square	737.51[a]
Df	2
Asymp. Sig.	.000

a.   0 cells (0.00%) have expected frequencies less than 5. The minimum expected cell frequency is 187.67.

The null hypothesis, "there is no impact of *CBET curriculum on industrial linkages*" was rejected since the calculated value of 737.51 was greater than the critical value of 5.99 at 5% level significance.

The alternate hypothesis, "*there is impact of CBET curriculum on industrial*

linkages" was therefore accepted.

Impact of CBET approach on entrepreneurship skills and industrial linkage

The relationship between the CBET curriculum approach, the acquisition of entrepreneurial skills and the industrial linkage assessment data was obtained from administrators, trainers, technical staff and students and tabulated as percentages. The data showed that most of participants 75.2% ($n = 461$) strongly agreed, 16.5% (n = 59) agreed, with a low percentage of 4.1% (n = 22) and 4.2% (n = 21) disagree and strongly disagree respectively against the total sample of 563 respondents.
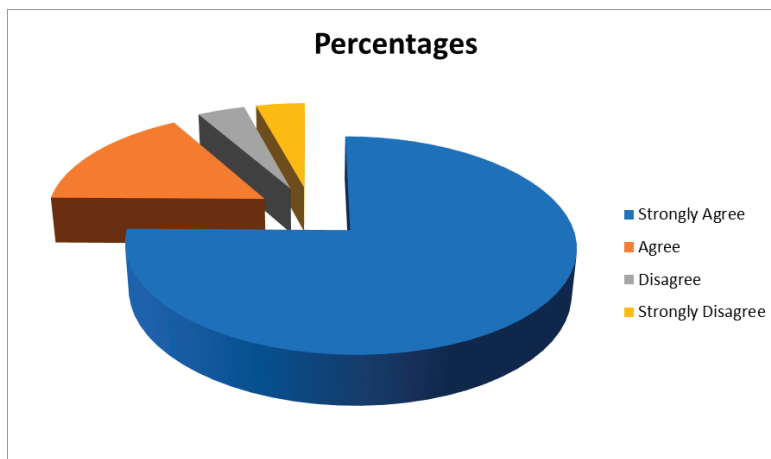
Figure 1: Percentage Response on the Impact of CBET approach on entrepreneurship Skills and Industrial Linkage

Based on the data collected from the respondents in relation to the two hypotheses, the following general percentages were calculated as shown in the table below.

Table 4.7: The Impact of CBET Approach on Entrepreneurship Skills and Industrial linkage

Variables	Strongly Agree (5)	Agree (4)	Disagree (3)	Strongly disagree (2)
Administrators	72%	20%	4%	4%
Trainers	85.2%	8.7%	3.5%	2.6%
Technical staff	58.3%	30%	5%	6.7%
Students	85.4%	7.2%	3.8%	3.6%

All the 563 respondents who were targeted for this study provided their responses, representing a response rate of 100%. Participants were 66.6% and 33.4% males and females respectively. The students formed the majority of the respondents at 64.5% while trainers, technical staff and administrators comprised 20.4%, 10.7%

and 4.4% respectively. The data showed that there was a strong relationship between CBET curriculum approaches and the entrepreneurial skills acquired by the trainees. Further, it also had a strong influence on the job market by enabling trainees to acquire relevant skills needed by the labor market.

Exposure to Labour Market Trends and Industrial Linkage

On average, the trainees rated 71.7%, which is moderately high exposure to the labour market trends. This directly corresponds with interest levels to pursue a specific technical course as a result of being exposed to what the industry needs. TVET graduates rated the access to training opportunities through CBET curriculum among the youth as adequate in terms of equipment for training opportunities (71.8%), compared to the fair rating for research labs (65.4%), practical classes (73.8%), availability of trainers (73.5%), workshop adequacy (72.9%), library resources (72.6%) and access to water and electricity (66.9%) as indicated in the figure below.
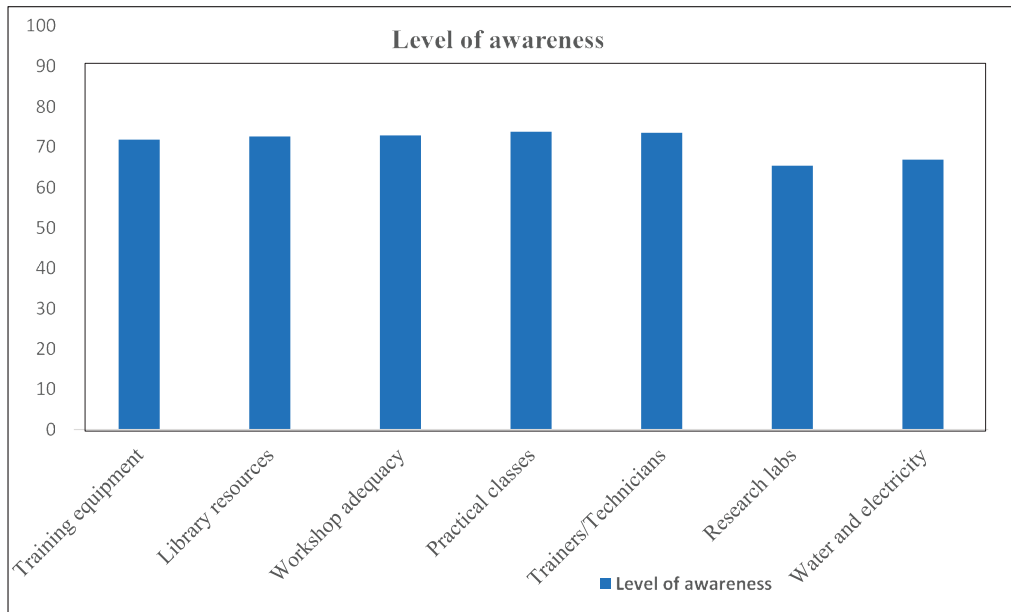
Figure2: *Level of Awareness of Training Opportunities*

The level of awareness of the course content was a critical issue among trainees. Moreover, when asked on issue of practical classes, research labs and access to learning resources which facilitated them to meet the labor market's requirements, responses were as follows: Strongly agree (SA) 64.1% (n = 361), Agree (A) 27.6% (n = 155), Disagree (D) 6.2% (n = 35) and Strongly disagree (SD) 2.1% (n = 12).
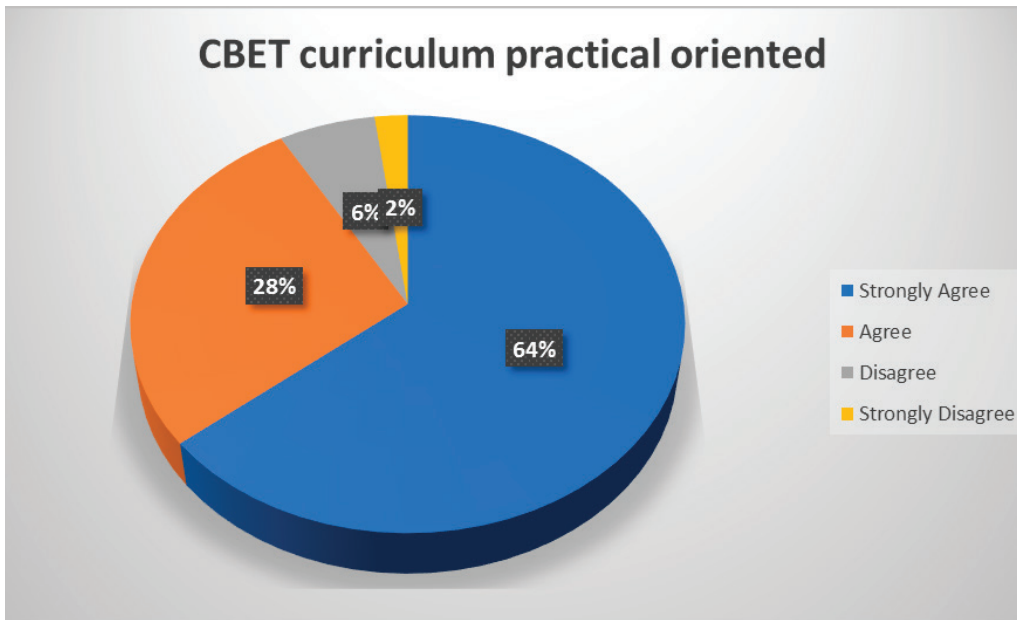
Figure 3: *CBET curriculum Level of Practical Oriented*

Conclusion

The findings from this study showed that there was a strong relationship between the mode of curriculum delivery and employability among the youth in Nairobi. The CBET graduates were more readily absorbed into the labor market than the non-CBET graduates who were less recommended for jobs as shown by the responses from the employers and trainers. Research has shown it that when students are exposed to the concepts, principles and theories of entrepreneurship through the CBET curriculum, their entrepreneurial spirits will be fired to propel them into thinking of how to create jobs for others instead of being job seekers. The course will open their eyes to see the latent entrepreneurial talents within them and enable them to spot and exploit business opportunities. Having been armed with the knowledge of the theories, concepts, and principles of entrepreneurship, students develop the confidence that a successful application of the skills acquired enables them succeed in business. The paper concludes that CBET approach increases the awareness and understanding of the process involved in initiating and managing a new venture as well as enhancing small business ownership as serious career option and to rightfully place oneself to the job market through the industrial linkage.

Recommendations

Based on the results of this study, there is urgent need for the government to provide basic infrastructural facilities to improve the CBET curriculum delivery and start-up capital through micro-finance banks and other specialised agencies to adequately empower young entrepreneurs. Additionally, the present method

of teaching entrepreneurship as a subject should be replaced with teaching entrepreneurship as an activity. As subject, abstract concepts of entrepreneurship are taught to students without practical supplements, while entrepreneurship activity combines teaching with experiential exercises. Entrepreneurship should have a mandatory industrial training programme. The governments should also provide mandatory internship training to the TVET graduates to allow them acquire hands on experience in their fields of study.

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3

ROLE OF TVET IN RECONCILING SKILLS SUPPLY AND DEMAND

Socio-Economic Factors Influencing the Willingness to enroll in TVET Institutions among Kenyan Youths

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Abstract

Technical and Vocational Education and Training (TVET) reforms in Kenya have brought positive change in the TVET sub-sector. These changes include improved quality assurance of TVET institutions, improved enrolment rates and governing structures of the TVET sub-sector. Despite these positive changes, TVET enrolment is still low. Moreover, gender disparities are pronounced in certain courses, especially science, engineering and technology courses, where male domination is persistent. Socio-economic factors play a significant role in influencing access and equity to TVET in Kenya. In order to improve the enrolment level, achieve gender equality in enrolments in TVET evidence on gaps causing these low rates of enrolments need to be established. Therefore, this research sought to establish the socio-economic factors influencing the willingness to enrol for TVET among Kenyan youth. This study employed descriptive and regression techniques to outline the characteristics of willingness to enroll for TVET in Kenya. From the findings, 75% of the youth would be willing to enroll in TVET institutions while 25% would not be willing to enroll for TVET institutions. This shows that a high number of youths are willing to get vocational and or technical training and education. Out of the youth who are willing to enroll in TVET 50.16 % were male and 49.84% were female. This implied that more male youth are willing to enroll in TVET than female youth. Factors influencing TVET enrolment include age, gender, marital status, location, peer support, social media, family income, religion and public awareness.

Keywords: Socio-Economic factors, Youth NEET, Access of TVET

Introduction

Background, Rationale and Gap information

TVET sector has received focus in global context. A report on strategy for TVET by UNESCO (2016) identifies TVET as a probable area that will address youth unemployment across the globe. However, many challenges still face the sector especially in developing countries despite the commitment of resources to improve the sector (Maclean & Lai, 2011). First, negative image and status accorded to TVET, especially by the main stakeholders (Ngure, 2015). Secondly, gender disparities are still prominent in the enrolments rates especially to science, engineering and technology courses (Murgor, 2013). Socio-Economic factors

majorly influence the access, demand levels and equality in TVET. While socio-economic indicators may vary across studies, family income level, gender, age, government funding, education levels have been commonly used in various studies (Mulondame, 2017). In order to improve the enrolment rates and achieve gender equality in TVET, evidence on gaps causing these low enrolment rates should be established. This study sought to establish the socio-economic factors influencing the willingness to enrol for TVET programmes among Kenyan youth NEET. The International Labor Organisation (ILO) report on global employment trends (2020) showed that the participation rate of young people aged 15-24 years in the labor force continues to decline. It is, therefore, important to understand drivers of TVET enrolment. In the recent years, the government (Mukhwana et al., 2021) has initiated reforms in the education and training sector. One of these reforms included intentional commitment of resources to TVET institutions to promote access. The reforms are being implemented by various institutions, including Technical and Vocational Education and Training Authority (TVETA) which was established under the TVET Act No. 29 0f 2013 to regulate and coordinate TVET in Kenya (Akala & Changilwa, 2018). The Kenya Economic Survey of 2021 showed that there has been an increase of 7.5 % in the number of accredited TVET institutions from 2019 to 2021. The survey however showed that placement in TVET programmes like diploma, certificate and artisan courses decreased by 12.5, 27.4 and 16.6 percent respectively.

A study by Mulondanome (2017), demonstrated that some of the socio-economic factors influencing access to youth polytechnics in Kakamega County. Among the factors identified were learners' attitude, government funding and gender. The study was only done in Kakamega County and sampled youth who were already enrolled in youth polytechnics. The study did not provide an empirical model but rather focused on descriptive and correlation analysis of the socio-economic factors.

Sankale (2017), investigated determinants influencing the demand for TVET institutions in Kajiado County. The study used a multiple regression empirical model to test the hypothesis when the data was Likert-type data, hence possible loss of information from the data would be experienced. This study also sampled data from students enrolled already in the institution.

The studies failed to capture youths not enrolled to any institution and with low attainment of education. Moreover, most studies do not apply empirical approaches.

Objectives of the study
The overall goal of the research was to explore the socio-economic factors that influence the willingness to enroll for TVET institutions among the youth who are not in education, employment or training (NEET) in Kenya. Specifically, this aim of this research was to;

(i)   Identify the characteristics of youth NEET willing to enroll in TVET.

(ii) Determine the socio-economic factors significant in influencing their willingness to enroll to TVETs.

Conceptual Framework

The variables used were adopted from a study by Nazidin et al., (2019), which looked at intention of students to enroll to private institutions. The variables have also been used in other studies like (Adrean, 2010; Furukawa, 2011). Arguably, these variables form a good basis for building up attitude of willingness towards furthering tertiary education (Nazidin *et al.,* 2019).
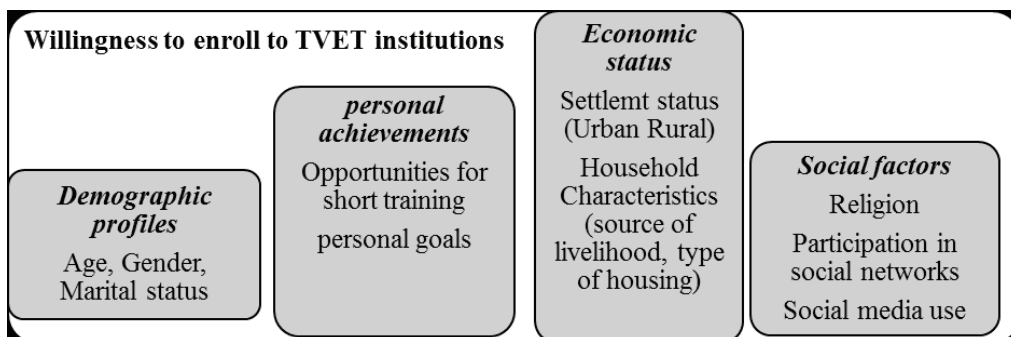
Figure 1: Conceptual Framework

From figure 1, the variables in the study were grouped into four categories. The categories were demographic profiles, personal achievements, economic status and social factors. Grouping the variables into categories makes it easy to track and link the significance of each variable to a broader perspective.

Methodology

Data and Analysis

Secondary data collected by Dalberg on the Kenyan youth values and skills survey in 2018 was analysed in this study. The data sampled 2361 Kenyan youth aged 15-25 years with a key focus on youth NEET. This study employed descriptive techniques to outline the characteristics of youth NEET willing to enroll in TVET in Kenya. Binary logistic regression model was used to identify the socio-economic factors influencing the willingness to enroll to TVET among youth NEET. Analysis was done using R language version 4.0.3.

Model Specification

The Binary logistic model was used because the outcome variable was taken as willingness to enroll in TVET institutions, which was measured as a binary response of yes and no responses. However, a limitation of the model is the assumption of linearity between the outcome variable and the predictor variables (Hellevic, 2009). Generally, the model is specified as follows.

$$\frac{p}{1-p} = e^{(X\beta)} \tag{1}$$

where $\frac{p}{1-p}$ is the odds of being in the category of interest which in this study was considered as the affirmative of the willingness to enroll in TVET institutions and X is the predictor variables and β is the coefficient of the predictor variables. The model can be evaluated further as.

$$\ln\left(\frac{p}{1-p}\right) = X\beta \tag{2}$$

Solving for p (the success probability which is the youth are willing to enroll tom TVET).

$$P(x; b, w) = \frac{e^{\beta_0 + X\beta}}{1 + e^{\beta_0 + X\beta}} = \frac{1}{1 + e^{-(\beta_0 + X\beta)}} \tag{3}$$

Odds ratio show the association between the outcome and the explanatory variable. Specifically, they show the likelihood of an outcome given that there was an exposure compared to when the outcome was there is no exposure. In this study the exposures were used to predict the odds of the youth's willingness to enroll to TVET. When the odds are equal to one it means that the exposure did not affect the outcome. When the odds are greater than one it means the exposure leads to higher odds and is regarded as positive association to the outcome, and when the odds are less than one it means that exposure leads to lower odds and hence a negative effect on the outcome (Martinez et al., 2017).

Results and Discussion

The analysis showed that 957 (75 %) of youth were willing to enroll to TVET institutions and 323 (25 %) were not willing to enroll to TVET institutions. This showed that a high percentage of youths' NEET, who are of ages 15-25 were willing to enroll to TVET courses. A study by Samoilenko and Carter (2015) showed that youth who were in the category of NEET were characterised by low education attainment. Therefore, justifying the higher number of youth willing to enrol in TVET to further their education. The vocational education and skills offered by TVET were important in engaging more youth into entrepreneurship culture (Mack & Senghor, 2019). Moreover, more education attainment reduces the chances of being in the NEET category (Contini *et al.,* 2019).

Table 1: *Characteristics of youth NEET willing to enroll to TVET*

Variable	Frequency	% Frequency
Gender		
Female	1216	51.50
Male	1145	48.50
Total	2361	100
Age		
15-18	206	8.80
19-22	821	35.00
23-25	1320	56.20
Total	2347	100
Marital Status		
Single	1614	69.70
Married	702	30.30
Total	2316	100
Social Media Exposure		
No exposure	1235	52.60
Some exposure	113	4.80
Great Exposure	1001	42.60
Total	2348	100
Awareness of Government Opportunities		
Yes	613	26
No	1748	74
Total	2316	100
Settlement status		
Rural	1684	71.30
Urban	677	28.70
Total	2316	100
Source of livelihood		
Dependent on others	1152	48.80
Self-employed	580	24.60
External employment	628	26.60
Total	2348	100

From table 1, 51.5% of the respondents were female while 48.5% of the respondents were male. The ILO (2019) report on youth NEET confirms these findings where they state that two of three youth NEET are young women. Gender roles contribute to this disparity since women in most rural areas are prone to staying at home and engaging in unpaid form of work, for instance childcare and small-scale farming (Konigs et al., 2015).

Youths of ages 15-18 years sampled were 8.8% while those of ages 19-22 were 35.0% and youths of ages 23-25 sampled were 56.2%. Since most of the youth are of ages 23-25, at this point in life they want to engage in education that can assure them of their goal of being financially stable (Musumeci & Ghislieri2020). According to Contini et al., (2019), the chances of being in the NEET group increases significantly as age increases hence the latter ages have a higher concentration of youth NEETs compared to the lower ages. More so, most of the youth of ages 23-25 have already completed their secondary education and have the required qualifications to join tertiary levels of education (Nyerere, 2018).

Out of the youths sampled, 69.7% were single while 30.3% were married. Single youth were more willing to enroll in TVET compared to youth who were married. Marriage brings about other responsibilities like childcare and support of spouse, these reasons are associated with hindering youth from pursuing their goals especially goals that involve financial commitment like education (Newman & Newman, 2017).

Large percentage of youths were not exposed to social media as is indicated by 52.6% while 42.6% had a great exposure to social media and only 4.8% had a little bit of exposure to social media. Youth NEET are more likely to disengage from social networks both physically and in social media (Henderson et al., 2017). However, social inclusion play a major role in helping reduce this gap since the youth are able to identify opportunities by networking (Dickens & Marx, 2020).

Most of the youths were not aware of opportunities provided by the government for youth empowerment as is shown by 74% and 26% knew about government opportunities for youth empowerment. The results revealed a high percentage of youths (71.3%) were settled in rural areas, while 28.3% lived in the urban settlement. Table 1 also showed that 48.8% of the youths depended on others to get their source of livelihood while 24.6% were self-employed and 26.6 were on external employment.

Table 2: *Individual Model for Each Category of Characteristics*

Variable	Odds Ratio	Pr (>|z|)
Demographic profiles		
Gender (female – reference category)		
Male	1.10	0.493
Age group (15-18- reference category)		
19-22	1.13	0.644
23-25	0.99	0.974
Marital status (Single -Reference Category)		
Married	0.56	0.0007

Personal Achievements and goals		
Opportunities for short training (No)		
Yes	1.35	0.045
Goals (Financial stability- reference category)		
Having a good family	0.55	0.036
Furthering education	2.20	0.000
Being like peers/ friends	1.10	0.787
Social Characteristics		
Religion (Christian; protestant & SDA- Reference Category)		
Roman Catholic	1.55	0.004
Islam	0.74	0.357
Other	4.30	0.003
Social group members (Yes- reference category)		
No	0.22	0.157
Social Media exposure (No exposure-reference category)		
Some Social media exposure	0.56	0.048
Great Social media Exposure	0.47	0.000
Awareness of Government Opportunities (Yes- Reference category)		
No	0.80	0.114
Economic Characteristics		
Settlement status (Rural- reference category)		
Urban	0.63	0.010
Source of livelihood (Dependent on others- reference category)		
Self-employment	0.97	0.892
External Employment	0.99	0.997
Type of Housing (Formal housing- reference category)		
Informal housing	0.76	0.279
Rented	1.46	0.068

Table 2 shows regression results, where for each category the sets of variables were regressed against the outcome variable. From table 2, the significant socio-economic factors were marital status, opportunities for short training, personal goals, religion, social media exposure and settlement status. The odds ratio for the marital status variable was 0.56, where the base category was single. This shows that there was a 44% chance less likely to be willing to enroll in TVET among the married youth compared to youth who were single.

Table 3 showed that for youth who had an opportunity to attend short trainings

they were 1.35 times more or 35% more likely to be willing to enroll in TVET s compared to youth who did not have an opportunity to attend short trainings. Youths whose personal goal was to have a good family, were 45% less likely to be willing to enroll to TVET, while youths whose goal was to further their education were 2.20 times more likely to be willing to enroll to TVET.

Religion was also a significant socio-economic factor. Catholic youths were 55% more likely to be willing to enroll in TVET compared to Christian youth and Islamic youth were 26% less likely to be willing to enroll in TVET compared to Christians. In spite of not being significant predictors, membership to social groups and awareness of government opportunities had odds ratio of 0.22 and 0.80, showing that youth who were not members to social groups were 78% less likely to be willing to enroll in TVET compared to those who were members of social groups. Youths who were not aware of government opportunities were 20% less likely to be willing to enroll in TVET compared to those who knew about government opportunities.

Youths who had a great social media exposure were 1.71 times more likely to be willing to enroll in TVET compared to youth who did not have any exposure to social media. The utilisation of social media to relay information ensures a wider reach of audience within a short period of time and at low cost (Mutahi & Kimari, 2017). It can also be used as a tool for instructional delivery by TVET tutors (Nwokike et al., 2021). The rise of the new industrial era renders social media as a mainstream media for communication especially among the youth (Chege & Nicholas, 2018). Social media influences decisions among its users, for instance, and there are successful businesses running through social media platforms (Kapoor et al., 2018). Although there are risks associated with social media in terms of influencing decisions, TVET institutions can leverage on its wide reach to relay information on funding and intakes in order to reach more youth NEET (Tajudeen et al., 2016).

Youths who lived in urban settlement status were 37% less likely to be willing to enroll TVET compared to youth who lived in the rural settlement status. The findings from this study are consistent with those obtained by Chea and Huijsmans (2018) who found out that youth in the rural areas were likely to join TVET institutions as compared to youth in urban areas. This is because of the qualification limitation, where in urban areas youths are more qualified to join universities since they have the advantage of better exposure to information and education resources compared to rural areas.

Conclusion
Youth of ages 15-25 years category comprise the highest proportion of the global population and it has been noted that one out of five youth in this category are not in employment education or training globally. In order to close this gap

and ensure that more youth in this age category contribute meaningfully to the national economy, TVET sector has been identified to play an important role. The findings from this study showed that the socio-economic factors that significantly influenced the willingness to enroll in TVET included religion, social media exposure and settlement status.

Recommendations

Information on TVET should be disseminated through a variety of media forums and government involvement in terms of opportunities should be disseminated among the youth to give them more options of improving their skills through TVET. From the findings, social involvement plays a major role in influencing the decision of youth. Therefore, leveraging on social networks that is churches, social media and other forms of social networks plays a major role in influencing the youth' decision to be willing to enroll and eventually enroll in TVET.

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Youth Preparedness for the Fourth Industrial Revolution: A Case Study of Kenya

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Abstract

The Fourth Industrial Revolution, with its characteristic technological advances calls for acquisition of relevant skills to keep pace with the rapid shifts in technology. TVET institutions have a critical role of nurturing youths for the 4IR, as well as being sufficiently equipped with learning equipment and competent trainers. This study aimed at investigating the preparedness of the youths in Kenya for the 4IR by exploring their awareness of the skills that drive 4IR. The survey employed proportionate, stratified, and random sampling procedures to select youths aged between 15 and 25 years from all the 47 counties in Kenya. By using the adjusted odds ratios (OR), the following findings were evidence: compared to females, males were 1.15 times more likely to be aware of 4IR skills; youths with access to a computer, either personally owned or owned by someone else in the household were 2.25 times more likely to be aware of skills for 4IR compared to those who did not have access to a computer. Similarly, the use of internet increased the odds of 4IR skills awareness by 2.78 points. There was a statistically significant relationship between academic qualification of youths and 4IR awareness. To enhance knowledge of 4IR skills, it will be important to educate learners on ICT skills, TVET institutions would develop new curricula with a core 4IR technology and integrate other courses that will equip learners with professional, problem solving, creative and critical thinking skills, organize and facilitate short courses where learners and educators can acquire new skills. Industry experts could collaborate with TVET institutions to offer apprenticeship and internship programs and increase access to quality internet, electricity, technological devices (smart phones, computers, and televisions).

Keywords: Youths, 4IR, innovation, Kenya

Introduction

The Fourth Industrial Revolution (4IR) represents a new era of innovation in technology that is enhancing human-machine relationships, unlocking new market opportunities, and fuelling growth across the global economy. Specifically, 4IR centers on artificial intelligence (AI), robotics, 3-D printing, cloud computing and

the Internet of Things (IoT), not in isolation but rather encompasses a fusion in which all the high-powered tech tools integrate with the physical and biological worlds (Hussain, 2021). The world is currently witnessing the unfolding of the 4IR which is continuously widening the social inequality between developed and the developing economies (Jerome & Ajakaiye, 2019). Consequently, countries must be ready for the 4IR to stay viable in the global economy by preparing their populations for the pending shifts in how work is (Xu, David, & Kim, 2018).

Technical advancement and economic survival will require the upskilling and reskilling of learners to take the centre stage in the 4IR (Omodero & Adetula, 2021). Consequently, clearly identifying which employability skills are responsive to the 4IR is now more important than ever before (Novak & Loy, 2019). Dasman (2011) found that technical schools play a crucial role in equipping learners with hands-on skills that ensure employability, productivity, and competitiveness in the global economy. Further, the authors found that trainers from such learning institutions are required to have sound knowledge of different disciplines and the necessary practical industry experience. With this knowledge, (Tcherneva, 2018), observed that trainers understood the relevant employability skills that are needed by industries and, therefore, endeavour to make their teaching approach to prepare learners for the reality of work.

Kenya has a vast network of TVET institutions that offer a wide range of technical programs, with a remarkable expansion in the student enrolment. Despite this remarkable progress, TVET institutions in Kenya still have gaps in terms of inadequate funding by the government, understaffing particularly in technical subjects which is because of poor remuneration, the use of obsolete equipment and insufficient learning materials (Nyerere, 2009). Until recently, the curriculum that was offered in TVET institutions was theory-based as opposed to practical based, and therefore not adequately linked to the labour market. This is occasioned by the fact that there is a limited link between these institutions and the industries, leading to mismatch of skills taught in the institutions and those sought by the industries (Anindo et al., 2016). Given that TVET institutions are mandated to equip students with skills necessary for service delivery and production of goods in all sectors of the economy and with the 4IR with us, it is imperative to address the skills mismatch by entrenching relevant and technical skills in the TVET curricula which will enable graduates secure and maintain jobs, even with the much-anticipated changes in the job market because of the 4IR.

Statement of the Problem
While there have been concerted efforts by many African Governments to promote the 4IR and take steps to leverage on it, there is still a long way to go to fully tap into the immense benefits of the innovation-led prosperity. First, there is need to have a sufficient supply of practical skills and talent particularly in

Science, Technology, Engineering and Mathematics (STEM) – An obligation that is tasked on TVET institutions. Secondly, professionals in regular jobs would acquire current and relevant skills to deal with the inevitable disruptive effects of new technologies in their work environments. Therefore, the future of TVET institutions is a crucial consideration in the journey towards the 4IR in addressing the widening technical and professional skills gap among the youths. The 4IR is not only present in industrial production but is also manifested in all aspects of the society including but not limited to technology, medicine, security, consumption, business, and hospitality (Li, Yun, & Aizhi, 2017).

Objectives of the Study

As curricula have important effects on students' professional skills (Carter, et al., 2016), through analysing and comparing 4IR-relevant skills, the research aimed at investigating the preparedness of youths in terms of their awareness of the 4IR skills. This was done by addressing the following two specific objectives:

(i)   To determine the youth's awareness of the skills needed for the 4IR.
(ii)   To determine the relationship between 4IR skills and other predictor variables.

Significance of the Study

The findings of this study will contribute knowledge of new trends in preparing students for the 4IR and lessons for TVET institutions in designing new and adaptive 4IR-relevant curricula for the future of a tech innovation-led economy. Moreover, the findings will enlighten and sensitise the government and TVET institution administrators not only to tap the growing demand for technical skills as has been witnessed in the recent past, but also to invest in the necessary technology, resources, and competent trainers.

Research Methodology

Data

This study used the data collected by Dalberg Research in 2018 on Youth Skills and Values Household Survey. The survey used proportionate, stratified, and random sampling procedures to select subjects from all the 47 counties in Kenya (strata) with the inclusion criteria restricted to youths aged between 15 and 25 years inclusive. The main aim of the survey was to understand the skills and capabilities that the youths view critical as well as the opportunities that are available to them to acquire and apply these skills.

Methods and Variables

The dependent variable for this study was the youths' awareness of the 4IR relevant skills which was measured by the question: "What kind of training do you think is most useful in finding a job?" The skills were categorized into skills that are required by the 4IR (coded as 1) and those that are not (coded as 0). The binary

logistic model was thus used to evaluate the probabilities of falling in either of these two groups as predicted by the independent variables in the model.

The relationship between dependent and independent variables in the model were as presented in the conceptual framework in Figure 2.1.

Independent variables

Socio-economic characteristics

- Gender
- Enumeration area type
- Socio-economic status score
- Access to electricity
- Smart phone ownership
- Computer ownership
- Television ownership

Education & apprenticeship

- Qualification
- Attended short training
- Aware of any TVET program
- Apprenticeship opinion

Communication and problem solving skills

- Communication
- Problem solving
- Critical thinking
- Creative thinking

Internet use and work preparedness

- Use internet
- Prepared for career/work

Dependent variable

Fourth Industrial Skills awareness

- No
- Yes

Figure:1 *Conceptual Framework*

Data was analysed by employing both descriptive and inferential statistical procedures using the R statistical computing language version 4.1.1. Descriptive statistics were presented in tables of frequency and percentages and visualised using bar charts. Inferential statistics, particularly the Chi-square test of independence were computed to test the association between categorical variables. Further analysis using the binary logistic regression technique was carried out with the aim of modelling the relationship between the outcome and independent variables.

Results and Discussions'
Association between 4IR Skills Awareness and Youths' Characteristics

The descriptive statistics were calculated and presented in tables of frequencies and percentages to reveal the distribution of categorical variables in the data set. These frequencies were further disaggregated by the outcome variable and the chi-square test of independence applied to test the association between each of the independent variables and this outcome.

Socio-economic Characteristics

A total of 2361 respondents were interviewed (1216 (51%) female and 1145 (49%) males). In terms of enumeration type, most of the respondents were from the rural setting 1684 (71%) compared to 677 (29%) which is a characteristic of any developing country. The 4IR certainly depends on technological devices and/or the access to them, both of which require finances. The study therefore calculated the socio-economic status of individuals on a scale of 0-100 and found the median score to be 40 with an interquartile range of 29. Access to power is essential, because 4IR largely depends on electronic devices and accessories. The study found that two thirds of the respondents had access to power of some sort – which included public electricity grid 1039 (44%), individual solar device 301 (13%), solar home system 11 (1%) and generator 4 (0%).

Table:1 The Association Between Socio-Economic Characteristics and 4IR Skills awareness.

Variables	No (N=956)	Yes (N=1405)	Total (N=2361)	p value
Gender				**< 0.001[1]**
Female	534 (55.9%)	682 (48.5%)	1216 (51.5%)	
Male	422 (44.1%)	723 (51.5%)	1145 (48.5%)	
Enumeration area type				**0.002[1]**
Rural	716 (74.9%)	968 (68.9%)	1684 (71.3%)	
Urban	240 (25.1%)	437 (31.1%)	677 (28.7%)	
Socio-economic status score				**< 0.001[2]**
Median (IQR)	38.00 (33.25)	43 (29.00)	40.00 (29.00)	
Range	0.00 - 85.00	0.00 - 97.00	0.00 - 97.00	
Access to electricity				**< 0.001[1]**
No	380 (39.7%)	418 (29.8%)	798 (33.8%)	
Yes	576 (60.3%)	987 (70.2%)	1563 (66.2%)	
Access to television				**< 0.001[1]**
No	676 (70.7%)	896 (63.8%)	1572 (66.6%)	
Yes	280 (29.3%)	509 (36.2%)	789 (33.4%)	
Access to smart phone				**< 0.001[1]**

No	558 (58.4%)	656 (46.7%)	1214 (51.4%)	
Yes	398 (41.6%)	749 (53.3%)	1147 (48.6%)	
Access to computer				**< 0.001[1]**
No	941 (98.4%)	1337 (95.2%)	2278 (96.5%)	
Yes	15 (1.6%)	68 (4.8%)	83 (3.5%)	

1.   Pearson's Chi-squared test
2.   Kruskal-Wallis one-way ANOVA

Television is considered a useful source of information from which youths and/or their parents/guardians can learn the current trends, including trends in technology and innovation. The study found that a total of 796 (33%) had access to a television either owned personally 168 (7%) or owned communally or by someone else in the household 621 (26%). In addition to a television, smart phones have become a valuable source of information and a way of acquiring knowledge and non-technical skills. With a smart phone, it is possible to log into a website and learn an entire course online and get certified. Moreover, with the current advancement in mobile phone technology, it is possible to run complex applications installed on the phone or by accessing such applications hosted on cloud. Thus, smart phones, go far beyond to just being communication devices. The study found that 1147 (49%) of the respondents had access to a smart phone either owned personally or owned communally by someone within the household. Very few respondents 83 (4%) had access to a computer either personally or communally owned. All the studied characteristics were statistically significantly associated with awareness of the 4IR skills.

Education and Apprenticeship

Apprenticeships and internships provide important opportunities for learners to apply the acquired skills by working under competent industry personnel. In the 4IR era, employers tend to seek learners who have done apprenticeship and/or internship programs in addition to the technical skills acquired in learning institutions (Dasman, 2011). Most of the youths that were studied had not attained any certification whatsoever 2236 (95%) with only 75 (3.2%) and 50 (2.1%) having certificate and diploma qualification respectively. The study also sought the opinion of the youth on the training acquired through apprenticeship, 1206 (51.1%) and 600 (25.4%) indicated that this training is "relevant" and "very relevant" respectively. All these variables showed statistically significant association with the 4IR skills awareness as shown in Table2.

Table:2 *The Association Between Education and Apprenticeship with 4IR Skills Awareness.*

Variables	No (N=956)	Yes (N=1405)	Total (N=2361)	p value
Qualification				**0.011[1]**

None	917 (95.9%)	1319 (93.9%)	2236 (94.7%)	
Certificate	29 (3.0%)	46 (3.3%)	75 (3.2%)	
Diploma	10 (1.0%)	40 (2.8%)	50 (2.1%)	
Attended short training at community level				0.005[1]
N-Miss	78	21	99	
No	731 (83.3%)	1086 (78.5%)	1817 (80.3%)	
Yes	147 (16.7%)	298 (21.5%)	445 (19.7%)	
Number of short trainings attended				<0.001[2]
N-Miss	809	1107	1916	
Median (IQR)	4.00 (1.00)	4.00 (1.00)	4.00 (1.00)	
Range	1.00 - 4.00	1.00 - 15.00	1.00 - 15.00	
Name of TVET institution				0.033[1]
No	463 (48.4%)	618 (44.0%)	1081 (45.8%)	
Yes	493 (51.6%)	787 (56.0%)	1280 (54.2%)	
Aware of any TVET program				0.569[1]
N-Miss	463	618	1081	
No	147 (29.8%)	223 (28.3%)	370 (28.9%)	
Yes	346 (70.2%)	564 (71.7%)	910 (71.1%)	
Planning to enroll in TVETs				0.076[1]
N-Miss	463	618	1081	
No	111 (22.5%)	212 (26.9%)	323 (25.2%)	
Yes	382 (77.5%)	575 (73.1%)	957 (74.8%)	
Apprenticeship opinion				< 0.001[1]
Very irrelevant	17 (1.8%)	24 (1.7%)	41 (1.7%)	
Somehow irrelevant	55 (5.8%)	81 (5.8%)	136 (5.8%)	
Neutral	178 (18.6%)	200 (14.2%)	378 (16.0%)	
Relevant	505 (52.8%)	701 (49.9%)	1206 (51.1%)	
Very relevant	201 (21.0%)	399 (28.4%)	600 (25.4%)	

1 Pearson's Chi-squared test 2 Kruskal-Wallis one-way ANOVA

Capabilities and Values

In all these four investigated skills, more than two thirds of the respondents recorded "Agree" with an additional 19%, 21%, 17% and 16% recording strongly agree for effective communication, problem solving, critical thinking and creative thinking respectively. The study went further to test the association between these skills and the 4IR skills awareness which revealed a statistically significant association as follows: effective communication $\chi^2(4) = 13.96, p = 0.007$, problem solving $\chi^2(4) = 16.92, p < 0.002$, critical thinking

$\chi^2(4) = 8.46, p < 0.076$, and creative thinking $\chi^2(4) = 11.39, p < 0.022$.

Internet Use and Work Preparedness

Among the important areas of the 4IR is Internet of Things (IoT) and cloud computing both of which require reliable and uninterrupted access to fast internet.

The study, therefore, sought to investigate the accessibility and use of internet by respondents. A total of 1114 (47%) uses the internet which was slightly lower than 1235 (53%) who did not use the internet. The majority of those that use internet 778 (56%) were aware of the 4IR skills against 620 (44%) who were not aware of these skills. The study also established that a majority 886 (80%) of the sampled youths use their mobile phones to access the internet with an additional 174 (16%) using other people's phones for the same purpose. The study results showed that mobile phones 1060 (96%) were the most frequently used device for accessing the internet among the youths.

Potential Predictors of the 4IR Skills Awareness for Youths in Kenya

Table 3 shows the results of the binary logistic regression on identified determinant factors that are related to the odds of youth being aware of the 4IR skills. The results showed that 9 out of the 17 variables included in the model were significant predictors of the 4IR skills awareness.

Table:3 *Logistic Regression Prediction of 4IR Skills Awareness by Specified Predictors.*

Variables	Adjusted OR (95% CI)	P-value
Gender		
Female (ref)	1.00	
Male	1.15 (1.01 - 1.31)	**0.031**
Enumeration type		
Rural (ref)	1.00	
Urban	1.06 (0.91 - 1.23)	0.461
Socio-economic status	1.00 (0.99 - 1.01)	0.811
Access to electricity		
No (ref)	1.00	
Yes	1.05 (0.82 - 1.34)	0.706
Access to television		
No (ref)	1.00	
Yes	0.96 (0.73 - 1.25)	0.754
Access to smart phone		
No (ref)	1.00	
Yes	0.87 (0.68 - 1.09)	0.224
Access to computer		
No (ref)	1.00	
Yes	2.25 (1.28 - 4.20)	**0.007**
Qualification		
None	1.00	
Certificate	0.82 (0.51 - 1.35)	0.435
Diploma	2.01 (1.02 - 4.35)	**0.055**
Short term training		
No (ref)	1.00	
Yes	1.15 (0.98 - 1.35)	**0.088**
Aware of TVET nearby		

No (ref)	1.00	
Yes	1.03 (0.90 - 1.17)	0.684
Apprenticeship opinion	1.13 (1.03 - 1.25)	**0.014**
Effective communication	1.11 (0.97 - 1.27)	0.128
Problem solving	1.12 (1.00 - 1.26)	**0.044**
Critical thinking	1.13 (0.98 - 1.30)	**0.089**
Creative thinking	0.97 (0.84 - 1.13)	0.700
Internet use		
No (ref)	1.00	
Yes	1.63 (1.38 - 1.93)	**0.000**
Preparedness for career	1.09 (1.01 - 1.17)	**0.020**

Discussions

The study found significant association between 4IR skills awareness, and all the variables investigated except the awareness of TVET programs. According to the findings, more males were aware of the 4IR skills than the females. Similar results were found by (Safrankova et al., 2020) and (Rogers et al., 2021) where they observed that girls and women continue to be underpresented in STEM which consequently contributed to their less awareness of the 4IR skills. In their study, Hayes & Bigler (2013) noted that although boys and girls appeared equally interested in most STEM fields during childhood and adolescence, men pursued academic research careers in most of these fields at higher levels than women.

The study also found that youths who had access to a computer were more likely to be aware of the 4IR skills compared to those who did not have access. Access to a computer enables users to access the internet where they can easily access information and data in 4IR technological advancement. It also helps users to design, develop, and deploy applications that define 4IR.

Youth qualification is an integral part of the 4IR. It is through access to quality training that the youth can acquire technical and employable skills needed by potential employers. In addition, youth require short training outside the curriculum to acquire professional, problem solving and lifelong skills that are also crucial in the 4IR. The results from this study showed that most of the interviewed youths did not have any of the nationally recognised qualifications, only a few had craft certificate or diploma qualifications. Interrogating the data further, the study identified several reasons as to why this was the case. For example, many youths had dropped out of school for several reasons that included: lack of school fees / other school needs, teenage pregnancies, loss of interest in school, early marriages, and sicknesses among others.

Conclusions

The results from this study showed that gender, access to a computer, qualification, attendance of short course at community level, apprenticeship opinion, problem solving, critical thinking, internet use and youths' preparedness for work/career contributed significantly to the youths knowledge and awareness of the 4IR

skills. Except for critical thinking, all the variables increased the likelihood of the awareness of the skills related to 4IR. The study recognized technical and professional skills acquisition, access to smart phone and computers, access, and constructive use of the internet as foundational and best practices in this area. In keeping with these best practices among others, youths can gain additional information and knowledge through the internet, social networks, mass media and seminars based on their awareness of the 4IR relevant skills. The interpersonal and lifelong skills of problem solving critical and creative thinking are vital in enabling youths develop strategies and ideas which are necessary for technological innovations and the sustainability of the same.

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4

THEORY, POLICY AND PRACTICE IN TVET

The Future of Technical and Vocational Education and Training in Kenya: Analysis of the Gaps between Policy and its Implementation

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Abstract

This paper discussed the future of technical and vocational education and training (TVET) in Kenya by analysing the gaps between education policy and its implementation. The study adopted a desktop methodology, using secondary data from various sources. Thus, the study relied on already published studies, reports and statistics. The secondary data was easily accessed from online journals and library. Government, international Organisations and Kenya law report websites were used by the researcher. The Ministry of Education and TVET websites provided the researcher with access to relevant materials. International Labor Organisation website provided global perspective principles on TVET. Kenya law reports enabled the researcher to access legal documents. The study noted that despite the crucial role played by TVET in socio-economic and sustainable development, the proposed reforms and objectives outlined in the Sessional Paper No. 14 of 2012 have not be achieved to a large extent. It found that the current TVET system is producing job seekers instead of job creators. The training equipment in used in most institutions were in either inadequate, in poor conditions or obsolete. Additionally, many Kenyans had negative perceptions towards TVET courses since they neither knew nor understood its relevance in attaining sustainable development. The study recommended that the government should increase funding to TVET institutions to enable them to repair faulty equipment or purchase new and modern training equipment. The study also proposed regular sensitisation by TVETA and other stakeholders to change the mindsets of Kenyans. The trainers should be taught entrepreneurial skills to mentor the learners and ensure that graduates become job creators. The Technical and Vocational Education and Training Authority (TVETA) should be made a commission to handle all the issues of TVET trainers and improve their welfare.

Keywords*: TVET, Gaps, Policy Implementation.*

Introduction

Scholars have continually provided strong evidence that indicates the existence of TVET in Kenya before independence. They have shown that the traditional African education system was in itself a TVET since it trained people on skills

such as construction, traditional medicine, pottery, and house work (Mosoti, 2011). The training was a mandatory and, in most cases, parents were the main trainers and had the obligation to pass their skills, knowledge, attitudes and customs to their children and next generation. However, the only challenge was that this training was informal and had no curriculum.

Changes in the TVET sector took a formal dimension after the entry of Christian missionaries and colonialists. The manner in which TVET was provided by them was skewed in order to train Africans agricultural areas so as to provide cheap labor for the white settlers (Nkomazana, 2016). Since then, Africans have always had a negative perception towards TVET. During the colonial period, the government was advised by a 1909 report from Professor Nelson, which proposed the training of Africans on industrial skills and establishment of education department. The government thus provided grants to missions to ensure training in carpentry, masonry, agriculture, tailoring, smith, printing, and medical work are offered (Development & Bennell, 1999).

In 1924, the Phelps-Stokes commission recommended the establishment of Native Industrial Training Depot (NITD). The colonial government established it at Kabete to train African artisans to replace the Indian artisans (Mackatiani et al. 2016). Ten years later, the country noted an increase in demand for formal education. The Beecher report of 1949 brought in some relief to Kenyans since it recommended a better approach to training in the African curriculum. During the same year, Willoughby committee proposed the formation of technical and commercial institute in Nairobi. This led to the formation of Royal Technical College of East Africa in 1954 (Now University of Nairobi).

The post-independence government took a different approach from the colonial government on education. In 1964, the Kenya Education Commission report recommended the abolition of TVET in primary education. The report indicated that academic education had a great economic benefit than TVET that emphasised on manual work. Thus, schools now prepared students to join TVET institutions after secondary education. Since then, TVET has faced many problems. In 1972, the Training Review Committee reported that students leaving TVET had no skills required in the labor market. In 1976, the National Committee on Educational Objectives and Policies (NCEOP) proposed the urgent need to revise the TVET curriculum. It suggested that the curriculum should be practical oriented and particularly on training in subjects like agriculture and business.

Few years later, the Mackay Report of 1981 made three proposals in support of TVET(Anon n.d.). First, it proposed that the establishment of a second university in Kenya should provide technical skills. Second, there was need to expand vocational education to accommodate school leavers. Finally, there was need to include technical subjects in schools. The first proposal failed to see the light of

the day since the second university in the country (Moi University) started offering non-technological courses. The report also informed the introduction of 8-4-4 system to include vocational subjects. In 1988, The Report of the Presidential Working Party on Education and Manpower Training for the Next Decade and beyond proposed the introduction of entrepreneurship education and training at all levels to promote self-employment among graduates of these institutions (Kamunge, 1988).

Many education commissions that followed laid emphasis on the importance of TVET. However, The Koech commission of 1999 made proposals that eliminated technical subjects from the primary school curriculum (Anon n.d.). The commission recommended reduction of subjects to five in primary and maximum of eight in secondary. This was in effect removing technical subjects such as art and music, home science from the syllabus. In 2012, a new policy framework, Reforming Education, Training and Research for Sustainable Development was announced (Education, 2019). This led to Sessional Paper No. 1 of 2019. The aim of this policy was to bring about socio-economic transformation by providing a framework for delivery of inclusive, equitable, quality and relevant training and secure future opportunities. The policy recognises role of TVET and pledges to rebrand and reposition TVET in among other strategies. However, the Kenya Institute of Curriculum Development has already pointed to myriad of challenges facing the implementation of the new Competency-Based Curriculum (CBC) which include inadequate funding and training of teachers on the new demanding curriculum.

The above historical background indicates that TVET has been echoed as a fundamental approach towards the country's social-economic and sustainable development. Its ability to produce the necessary human resource to run the society and create employment opportunities cannot be taken for granted. Thus, this has seen its inclusion in acts of parliament and policy documents such as TVET Act No. 29 of 2013, the Sessional Paper No. 1 of 2019 on Reforming Education and Training in Kenya, National Education Sector Strategic Plan (NESSP) 2018-2022, the Vision 2030 and the 'Big 4' Agenda among others. This paper aimed at discussing the future of Technical and Vocational Education and Training (TVET) in Kenya by analysing the gaps between education policy and its implementation.

Statement of the Problem
In order for Kenya to realise its vision 2030, the youthful population should be equipped with technical skills (Kempe, 2012). Even though the country is currently implementing the Competency-Based Curriculum, a true and careful examination of the 8-4-4 system shows that it failed in inculcating the necessary skills required by the labor market. This resulted in graduates who cannot effectively contribute to the social-economic development of the country. Reports by the Kenya Bureau

of Statistics in early 2020 showed that the unemployment rate was more than 4.7% registered between April and June 2019 (Anon n.d.). According to the agency, the highest proportion of the unemployed was recorded in the age groups of 20-24 and 25-29, each registering over 20 percent. The same age groups also had the highest increase of over 10 percent each in unemployment over the 3 months reference period. Further, many youths are reported to undertake part-time courses for fear of being made redundant after graduation (International Labour Organisation, 2016). These unemployed young men and women are a product of our education system in which the labour market is unable to accommodate. The cause of this challenge can much be linked to the many post-independence approach taken by the government on TVET. A point in case is where plan to set up the second university in Kenya that was to offer technical training ended up offering non-technical courses. The removal of technical subjects in primary schools following Koech proposal in 1999 was an attack on TVET. This was despite the commission recognizing the immense potential of TVET to the economy. These realities only point to the existence of a gap between the policy framework and implementation. One fact that cannot be denied is that the country has a good policy framework on paper but not in practice. Thus, there is need to bridge between what is in the paper and what is being practiced. This was the core of this study.

Objectives of the Study
Main Objective
The main objective of this paper was to discuss the future of Technical and Vocational Education and Training (TVET) in Kenya by analysing the gaps between education and training policies and subsequent implementation.

Specific Objectives
This paper sought to address the following objectives:

(i)   To examine challenges faced by TVET in Kenya.
(ii) To investigate factors hampering implementation of TVET policies.
(iii) To analyse other jurisdictions' approach to TVET.

Methodology
The study adopted a desktop methodology, where secondary data obtained from various sources was analysed. Thus, the study relied on published studies, reports and statistics. Government, international Organisations and Kenya law report websites were used by the researchers. The ministry of education and TVET websites provided the researchers with access to relevant materials. International Labor Organisation website provided the global perspective principles on TVET. Kenya law report enabled the researchers to access legal documents and reports.

This methodology enabled the researcher to conduct the study faster and at a lower cost.

Results and Discussion' and a subheading 'Gaps between Policy Framework and Implementation of TVET

According to Akanbi (2017), a good policy should address a need in the society; be anchored in a legal and institutional framework; have quantifiable approaches; be clear and free from ambiguity; allow for consistent review; and have well qualified and equipped human resource to implement. Although the Kenyan policies exhibit all the above features, studies conducted in TVET institutions in Kenya have shown that the sub-sector has not realised its main objective.

In 2012, Sang, Muthaa and Mbugua conducted a study with the aim of examining challenges faced by technical training institutes. They focused on identifying whether there was adequate training equipments in the institutions, the relevance of the courses offered and qualifications of the trainers. They found out that there was a big difference between the machines used for training and those in industries in Kenya. They argued that the policy needed to be reviewed to capture the labor market realities. The review need to match the training and the needs of modern industries.

In 2016, a research carried out in catholic sponsored schools in Nairobi to investigate the implementation of artisan courses by Kigwilu, Akala, & Wambua, revealed that insufficient resources, negative attitude of students and the inability of students to pay tuition fees were the main challenges. Further, the study identified lack of well-trained trainers, low state support and implementation of the curriculum. These challenges touch the core features of a good policy. Although the policy paper on TVET provide for all the issues, its implementation is the main challenge.

In 2018, there was a study conducted in two counties, Nandi and Uasin Gishu, with the aim of investigating challenges that are hampering effective implementation of TVET programs in the counties (Agufana, 2018). Data was collected through questionnaires and analysed using descriptive statistics involving mean of sample and general population. The results revealed a shortage of professional and qualified teachers. Further, the researcher noted that the institutions had poor infrastructure that could not support the goals and objectives of TVET.

In 2019, a study was conducted to assess the capacity of TVET to train human resource that would enable the realisation of sustainable development goals in western part of Kenya (Khatete n.d.). The study specifically aimed at assessing the state of training infrastructure in TVET institutions in ten public TVET institutions in western Kenya. The study pointed to the close relation between infrastructure and academic performance. The institutions lacked proper structures to support

training such as ICT, workshops, libraries and modern training rooms. With lack of these infrastructure there is no way the country can realise the sustainable development goals.

Mwashighadi, et al., (2020) conducted a study based on the realities of the labor market, on the quality of trainees from TVET institutions in Kenya. They observed that a significant number of trainees from TVET institutions showed incompetence and poor performance. Furthermore, the findings of the Southern African Consortium for Monitoring the Quality of Education (SACMEQ-III) indicate the same challenge identified by Mwashighadi et al. (2020). In the study, Mwashighadi et al also investigated the challenges faced by trainers in implementing the proposed Competency-Based Education Training (CBET) in the coastal region. The researchers specifically aimed at assessing the trainers understanding of the objectives of CBET, identify the methods used by trainers to engage students, examine the link the institutions, trainers and trainees have with the industries, assess the availability of training resources, and identify the perception of the society on CBET programs. On the first objective, the researchers found out that the trainers had a better understanding of the objectives of CBET. The trainers had no proper training equipment of modern-day stature. They also noted that there is little link to the industries as they are using outdated equipment while the local industries have imported new machines that are more computerized. The perception of CBET is still bad. Parents and students perceive CBET institutions as for those who have failed. They do not understand the potential of the CBET programs on employment opportunities, and sustainable development of the state. All the studies indicated failures and gaps in the Kenyan TVET policy framework. Thus, there is need to urgently bridge the gap.

The Projected Future of TVET
In order to project the future of Kenya after bridging the gap between what is in paper and what is practice, it only makes sense to first look at countries that have successfully implemented TVET policies. One such country is China. Scholars have argued that China approach to technical training after the revolution and regaining of independence was the start of the journey to be one of the great economies in the world (Li, 2000). The founding fathers of the new state emphasised on the concept of quality education and acquisition of practical skills. Currently, you will hardly find a Chinese who has no practical skills (Awe et al., 2021). Beside policy and legal framework approach, china took a different institution and administrative approach on TVET. The country assigned a full-fledged ministry to technical education, Ministry of Human Resources and Social Security (Zhang, Chen, & Wu, 2020). This is the equivalent of the Ministry of Labour and social protection in Kenya. Its primary role is to educate students on skill development and address issues of joblessness.

In Europe, Germany is lauded for having a tradition of learning on the job. This approach is enabled through its apprenticeship program, where students spent seventy percent on learning on the job while the rest is spent on school (Anon n.d.). Due to this, it has been noted that one in every two secondary school leavers choose technical course. Thus, we can arguably say that this kind of mindset has been influenced by the apprenticeship program. Further, at the secondary level, there are many TVET programs. Some are just a preparatory training while others lead to vocational qualification and certification. In other instance, there are requirements for one to have TVET qualification before joining a university.

Germany in knowing the potential of TVET, remunerates its trainees. In 2020, the federal government passed Vocational Training Act which requires the trainees to be remunerated (Anon n.d.) The aim is to encourage uptake of the programs and secure its population on opportunities in the modern labour market. Further, the government has also adopted the Federal Recognition Act that aims at assessment and recognition of foreign professional qualifications, and has simplified the process.

Conclusions

As by the approach taken by developed states, it is evident that TVET is vital for socio-economic and sustainable development of a country. Although Kenya has taken both legal and policy approach in TVET, it is evident that the implementation of the policy has been a challenge. What is in the policy paper is not reflected on the ground. Challenges are ranging from inadequate funding, less trained and qualified trainers, incompetent trainees, job seekers instead of creators, and also negative perceptions of TVET programs.

Recommendations

This study recommended that the government should increase funding for TVET institutions to enable them repair faulty equipment and purchase modern training equipment. There is need for civic education to change mentalities. The government should adopt the remuneration approach for TVET graduates like Germany and establish Commission for Technical and Vocational Education and Training to handle the issues of TVET trainers and improve their welfare.

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