



Influence of Accessibility Costs of E-Learning on Internal Efficiency for the Selected Universities in Nairobi County, Kenya

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Abstract

Despite online educational program being merited to have scaled access to higher education remotely, however, literature portrays that accessibility cost impedes its internal efficiency. Therefore, this study sought to assess the influence of accessibility cost of e-learning on internal efficiency in the selected universities in Nairobi County, Kenya. To gain in-depth data analysis in this study, a research design used was a case study. Multistage and systematic simple random sampling was used in selecting sample units and administering 201 structured questionnaires, respectively. Study results revealed the existence of gender disparity on e-Learning in favour of male, while the popularly used accessibility ICT component was laptop and/or computer. Again, majority of respondent were from private universities than public, suggesting the existence of preference and choice among students on the university type. Further, inferential tests result from OLS regression models of accessibility costs on internal efficiency showed to be non-critical at ($p < 0.1$) significance level, however, the direction of influence showed to positively influence internal efficiency of academic performance, distance effect, affordability, student retention, and accessibility. The random factors from the model showed to positive and statistical significance at ($p < 0.001$) in influencing the selected internal efficiencies, suggesting existence of unobserved and/or omitted variables that are critical; hence, creating research worth for further investigation. In conclusion, accessibility cost showed to impede e-Learning internal efficiency, however, there is need for the government intervention through tax incentive regime and budgetary consideration to lessen accessibility cost burden for vulnerable student.

Subject Areas

Education Management

Keywords

Gender Disparity, Academic Performance, Distance Effect, Affordability, Student Retention

1. Introduction

Advancement in technological innovation, which is attached largely on the accessibility of quality education via e-Learning educational platform, has been the main catalyst for economic growth by allowing the production workforce for various sectors of economic development globally. According to the report of Organization for Economic Co-operation and Development (OECD), these sectors of economic development include but not limited to agriculture, health and industrialization [1]. For instance, access to quality education has enabled the use of technology to improve food productivity, while increased productivity in modern industries is linked with digital innovation such as the utilization of robotics, digital automation and artificial intelligence [2]. Equally, access to quality education has manifested rapid revolution in technological advancement that utilises virtual learning in particular the electronic gadgets for e-Learning education intelligence [3].

The most significant innovations that have come with advancement in technology is the introduction of distance learning model of education that navigate distance being one of the barriers in accessing quality educational. Again, a notable importance of e-learning includes the making of learning easier remotely all over the world, which allows students to access learning material anytime and anywhere [2] [4]. This has resulted in reducing the costs of infrastructure and construction. The findings by [5], who surveyed the financial case of e-Learning, in particular Web Based Distance Learning (WBDL) showed that the cost was low for WBDL as compared with costs on convectional educational learning. Based on this finding by [5], the study validates the effectiveness of e-Learning courses. Perhaps, the costs effect could be influencing the higher educational institution in scaling the adoption of e-Learning for sustainability and other associated educational benefits to the economy.

Despite access to education being associated with high index of economic value in human developments, however, accessibility to quality education remains to be a challenge [3] [6]. The greatest challenge found that largely impedes accessibility to e-Learning education platform was the targeted investment in regard to accessibility costs. The study conducted by [7] on the ICT usability on e-Learning during COVID-19 pandemic the study findings revealed several factors that limit the usability of ICTs on e-Learning education and the limiting factors identified in the study were: lack of funds, lack of e-Learning materials and slow uptake of e-commerce in the country. Similarly, as pointed out in the studies of [8]-[10] that inefficiency remains to be challenge in majority of the higher learning institutions because they are inconsiderate in specificity in the allocation of resources during

budgeting; perhaps a scenario that brings disconnect between the processes leads to inefficient allocation of resources.

Based on evidential findings from literature, the low investment on educational access could result into overall internal inefficiency such as students' poor performance, and students low retention rate, among others [3] [11]. Majority of past studies have analysed the influence of costs on internal efficiencies, yet, educational costs are specific and varies [6] [12] [13]. That's, past studies shows several forms of e-Learning education costs, in particular, technological costs, infrastructural costs, and maintenance costs [14]. Therefore, the existence of unclearly defined influencing level of specific accessibility costs in e-Learning educational platform forms a study gap, whereby this study tend to unravel from empirical results.

Therefore, the understanding of influencing level of specifically accessibility costs, could brings into lens the targeted and informed policy decision making on e-Learning investment that are aimed at bridging educational accessibility barriers for students undertaking e-Learning courses. However, while analysing influence of accessibility costs on internal efficiency of e-learning, the Cost-Benefit Analysis tests (CBA) was considered as a guiding theoretical framework in this study. This would help educational institutional policy makers and stakeholders to integrate rational accessibility costs decisions into e-Learning development agenda. Accordingly, the CBA theory is grounded on foundation of micro economic, in particular the aspect of maximization in decision making in the realm of scarce resources [15].

In this study, CBA theory resonates around specified measurement of e-Learning internal efficiency of education on the evaluated net benefits accrued from accessibility costs incurred for university education. Past studies [16] have revealed the existing relation in ration form between input costs and internal efficiency whereby input costs largely influencing the output marginally. The meaning of internal efficiency in this study is the measurable e-learning training goals and/or the output metrics from online education. Therefore, to contextualise the study theory, the accessibility costs measurement as input factor involves aggregating the institutional fees, e-Book Costs, Laptop/Computer, Mobile Phones Costs, Internet Connectivity Costs and Writing Materials Costs, while the accrued benefits measure which was the output and/or internal efficiency variables are academic performance, distance effect, affordability, student retention, and accessibility. The conceptual framework that describes the nexus between accessibility costs as input variable and internal efficiency as output could be simply figured as follows (See **Figure 1**).

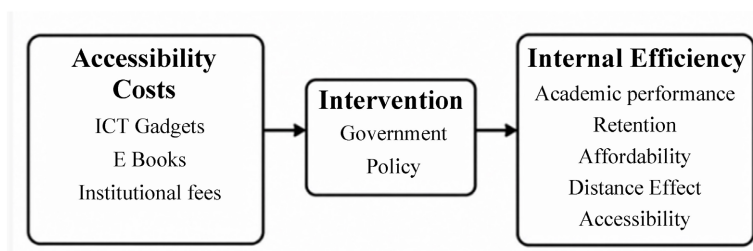


Figure 1. Conceptual Framework showing nexus between input and output.

2. Study Methodology

2.1. Description of the Study Area

This study was carried out in the months of August to October in the year 2025 at Nairobi County in Kenya. The Nairobi County is regarded as a major economic and technological region owed to its huge business enterprises and surging population. Therefore, these characteristics have significantly attracted the establishment of several higher learning institutions from range from tertiary colleges and universities. Owed to its significance as a technological hub centre with presence of several higher institution of learning that caters the demand for education by the surging population, Nairobi County was selected as a study area.

According to Kenya National Bureau of statistics (KNBS) of 2023 [17], the estimated population of the study area is about 5.5 million people, while its land area being approximated 696 square kilometres. The political administrative units found in Nairobi county are 17 in numbers namely; Roysambu, Kasarani, Ruaraka, Kamkunji, Starehe, Mathare, Embakasi South, North, Central, East, West, Dagoretti North, South, Westlands, Langata, Kibra and Makadara. The bordering counties are Kiambu County to the North-Weastern, Kajiado County borders at South and South-western, while at Eastern part is the Machakos County.

The learning institutions available in the study area range from several basic education institution, tertiary colleges, and universities. Since our focus in this study was to investigate influence of accessibility costs on e-Learning at universities. Therefore, the choice of the study area was appropriate because majority of the Universities in Kenya have their Main Campus and/or Satellite Campus located in study area with established e-Learning programs.

Accordingly, there are 29 private universities and 9 public universities in the study area of which either of the universities identified in the study area had main campus and/or satellite campuses.

2.2. Sample Size and Sampling Procedure

In order to have in-depth study that gives plausible answers to the objective of this study, there was need to collect data from homogenous population. There exists private and public universities in the study area, while among these universities, some have established e-learning education platform. To obtain homogeneity of the population, students at second year of study, as inclusion criteria, were identified as respondents, while universities with established e-Learning educational platform were selected for data collection. The established e-Learning institution in this study was defined based on the institution that had graduated a number of students. Again, the exclusion criteria were the universities that don't have purely e-Learning program, and universities with blended e-Learning program.

Thereafter, identifying sample units based on the inclusion and exclusion criteria adopted in this study, from a total of 28 universities in the study area, 10 universities were selected. Based on selection criteria, 5 were public universities, while the other 5 were private. Again, the choice of schools and/or faculty from

the 10 selected universities as sample units were based on purely e-Learning program being offered. In this study, social science schools and/or faculty, in particular department of education and business were targeted, while the second year students in those departments were identified as respondents.

The structure questionnaire was used as data collection tool, while the mode in which questionnaire was administered to respondents was via online platform. Prior to the administration of the questionnaire, a sample size was determined in order to ascertain the representative sample of the population. The sample size formula used in this study was as follows:

$$n = \frac{NC^2}{C^2 + (N-1)e^2} \quad (1)$$

whereby: n —represent the sample size, N is the population size, C is coefficient of variance of (30%) while e —is the margin of standard error at 2% [18].

The total population (N) for the study from multi-stage sampling were 1329, who were second year students undertaking purely e-Learning program. Therefore, based on the sample size formula expressed in Equation (1), the representative samples for the study were 193 as shown from determination formula as follows:

$$\begin{aligned} n &= \frac{1329(0.3)^2}{(0.3)^2 + (1329-1)0.02^2} \\ n &= \frac{119.61}{0.6212} \\ n &= 193 \end{aligned}$$

To compensate for erroneously or wrongly entered data and/or missing data from the questionnaire arising during data collection, another 8 questionnaire which represented 5% were added to make 201 sample sizes for the study. Notably, low sample size could invalidate the results due to under representation, which could result into biased study findings. Accordingly, the average response rate of questions in the structured questionnaires in this study was 193, a 95% proportion of 201 respondents. Therefore, the compensatory questionnaires numbers of 5% based on the past study of [19] were distributed proportionally in a pro-rated form to all sample units appropriately catered for non-response data. The prorated proportions based on the population size of 1329 in this study that was used to allocate samples were 126 for private and 75 for public universities, which represents 62.7%, and 37.3%, respectively. Similarly, the proportion of prorated population in each department identified as sample units was preserved.

To give equal chance of selection for all respondents from identified sample units in this study, systematic simple random sampling was done. In order to achieve systematic simple random sampling, a list of students actively undertaking online program was sought from selected departments of social science schools and/or faculty in their respective universities with the formal permission from the departmental heads.

Key information that was needed from the students list was their contacts that include phone number and e-mails for online send of structured questionnaire. Therefore, the first name from the list was chosen as first respondents, which formed the reference points from every identified department for sampling. The rest of respondents from the list provided were chosen systematically by picking every 5th name from the lists as respondent until the list is exhausted. In the event that the selected respondents in the lists decline to participate, the immediate name from the provided list is selected as respondents. The same selection criteria were repeatedly done in the entire lists that were provided from identified departments from both private and public universities that were identified and formed sample units in this study.

Before administrating the questionnaire, consent from respondents was sought by clarifying the intents of the information from them being just for research purposes only.

2.3. Data Type and Analysis

The structured questionnaire was formulated to capture the data and/or information that ought to answer the study objectives. The objective of the study was to understand the influencing effect of aggregated accessibility costs on e-Learning internal efficiencies. Therefore, to capture enough information from respondents, a mix of information of qualitative and quantitative, in particular, numerical data and dummy values were sought.

In this study, the dummy variables were captured as numerical data in Likert scale and/or no or yes answer. Thereafter, respondents' response in a dummy variable was coded as 0 to reflect negative response and/or no, while the value of 1 to reflect the affirmations and/or yes answer. The coded dummy variables into numerical facilitated the analysis of information sought using Ordinary Least Squares regression model.

In this study, the independent variable for the model was accessibility costs, which were largely numerical values.

Determination of accessibility costs was done by aggregating entire the yearly costs that student expressed to incur while in pursuit of his/her virtual university education. The specified expressed estimates of accessibility costs that students could incur after the second year of study in this study were; institutional fees, e-Book Costs, acquisition costs of Laptop/Computer, Mobile Phones Costs, Internet Connectivity Costs and Writing Materials Costs.

On the other hand, the data captured for dependent variable in OLS regression model was largely dummy response. In particular, the affirmation response, which was qualitatively expressed, that inclined to be in agree that the identified accessibility costs constrain virtual learning was captured as yes, while the alternate was no. These dummy responses formed the basis that allowed data coding for analysis. The identified dependent variables in this study were: academic performance, distance effect, affordability, students retention/progression, and accessibility to

online activities.

Therefore, based on dataset that was captured from the respondents for analysis, the OLS regression model used for analysing took the expressed equation function (2) as follows:

$$\begin{bmatrix} \text{Academic Performance} \\ \text{Distance Effect} \\ \text{Affordability} \\ \text{Student Retention} \\ \text{Accessability} \end{bmatrix} = \beta_0 + \beta_i \text{Agg Accessibility Costs} + \varepsilon_i \quad (2)$$

where: (academic performance, Distance effect, affordability, student retention and accessability)—represent internal efficiency variables; β_0 —represent the model constant; β_i —represent the coefficient of delivery and accessibility costs; while ε_i —represent the error term of the model.

Although the coefficients value from OLS regression model depicted direction of influence and causal effect to dependent variables, however, defining coefficient value into deterministic proportion could ease the interpretation of the analysed results. Therefore, in this study Log-likelihood Maximum Tests, which was abbreviated in statistical probability tests as Logit Model, were used to analyse the propensity influence of parameter estimators of accessibility costs on dependent variables.

The Logit model uses variable coefficient from OLS regression model, whereby the output values are confined between 0 to 1 values. The magnitude effect from the output value of Zero from logit model suggests low probability to influence, while the value that tends towards the value of 1 suggests having strong influence.

The logit values can be converted to percentages for ease interpretation, a better value than odds ratio in defining the propensity of aggregated accessibility costs in influencing the specified independent variable.

The expressed odds ratio formula is defined in a mathematical Equation (3) as follows:

$$\text{Odd sratio} = e^{\beta x} \quad (3)$$

whereby: e represent natural-log, and βx —is the respective accessibility costs coefficient value.

Therefore, this study utilized the mathematical formula of logit model expressed in Equation (4) as follows:

$$P(i) = \frac{e^{\beta x}}{e^{\beta x} + 1} = \frac{1}{1 + e^{-\beta x}} \quad (4)$$

whereby: $P(i)$ —represent the probability value of influence determined from OLS regression coefficient values, while $e^{\beta x}$ —represent odds ratio defined from coefficients of parameter estimators from OLS regression analysis models, while x —is the respective model predictors.

Further, error term defined in the OLS regression equation model (2) reveals from the analysis the likelihood of unobserved variables in the model which was omitted and/or beyond the scope of this study, was determined using autocorre-

lation analysis.

2.4. Validity and Reliability Tests

Prior to data collection, validity and reliability tests were done on data collection tools. Therefore, validity tests was performed using tests and Pre-testing of questionnaire to ascertain whether the information obtained reflects the extent to which it accurately represents the variables being measured. While reliability measure was done by analysing consistency of the research instruments using Pearson's product moment correlation coefficient.

Accordingly, the mathematical expressed Pearson's product moment correlation coefficient formula used in this study was as follows:

$$r = \frac{n(\sum xy) - (\sum x)(\sum y)}{\left[n\sum x^2 - (\sum x)^2 \right] \left[n\sum y^2 - (\sum y)^2 \right]} \quad (5)$$

where: x = the scores obtained during the first pilot; y = the scores obtained during the second pilot; r = Pearson r ; $\sum x$ = The sum of scores from the first pilot; $\sum y$ = The sum of scores from the second pilot; $\sum xy$ = The sum of the products of scores in the first and the second pilot; $\sum x^2$ = The sum of the squared scores in the first pilot; $\sum y^2$ = The sum of squares in the second pilot; and n = the number of paired x and y pilot cases.

From the reliability analysis tests performed using Pearson's product moment correlation coefficient formula the coefficient value generated from questionnaire tests was 0.78, which was considered reliable. This reliability test determination level whereby the coefficient value above 0.7 is considered reliable.

3. Study Results and Discussion

3.1. Student Demographic Characteristics

Out of 201 targeted respondents in **Table 1**, there was high proportion of youthful respondents interviewed with their age category ranging between 19 - 23 years (47.8%), than adults with age category above 35 years at 5.5%, reveals that youthful population were utilizing e-Learning educational platform.

Again, the finding could suggest that youthful population with aspiration for higher education could have propensity to adopt e-learning educational platform than elderly persons.

This study finding was in tandem with that of [20] [21], who found high enrolment of youthful population at below 25 years on e-learning program than students with above 35 years at higher institution of learning.

Table 1. Students demographic characteristics.

Variable	Frequency	Proportion
Age levels		
19 - 23 years	96	47.8%

Continued

24 - 29 years	82	40.8%
30 - 34 years	12	6.0%
Above 35 years	11	5.5%
Total	201	100%
Gender		
Male	114	56.7%
Female	87	43.3%
Total	201	100%
University Type		
Private	126	62.7%
Public	75	37.3%
Total	201	100%

Source: Author, 2025.

Again, in regard to gender, the findings revealed that majority at 114 (56.7%) were male students compared with female at 87 (43.3%), suggesting the existence of underrepresentation of female on e-Learning educational platform. This finding suggest to defeat the leverage that female gender could gain by enrolling on e-learning educational platform, since their household's chores demand them to be near homes than males. Although this finding could be attributed on other factors, since past studies suggest more female in e-Learning enrolment than male [22]. Therefore, the contradicting findings based on gender in this study point out the existence of research gap that calls for in-depth study that considers for instance realm of socio-cultural factors.

Further, the study findings showed that students enrolment at private universities were higher than at public at 126 (62.7%) and 75 (37.3%), respectively, which point out the existence of underlying factors that influence students decision making on preference and choice institutional type. Therefore, the existence of skewed preference and choice from study findings on institutional type creates a study gap that calls for further investigation on influencing parameters.

3.2. Determination of Accessibility Costs

The results in **Table 2**, which defined accessibility costs in this study, revealed the aggregated costs expended by student under e-Learning educational platform.

Table 2. Summary of aggregated accessibility cost.

Variable	Respondents	Average Costs
Institutional Costs	198 (98.5%)	88,754/=
E-Books	192 (95.5%)	59,370/=
Laptops/Computers	201(100%)	16,466/=

Continued

Mobile Phones	190 (94.5%)	14,125/=
Internet Connectivity	192 (95.5%)	12,585/=
Writing Materials	195 (97.0%)	7,534/=
Total		207,694/=

Source: Author, 2025; n = 201; Average cost are expressed in Kenya Shillings whereby \$1 = 129 Kenya Shillings.

From the result in **Table 2**, it shows that all the respondents at 201 (100%) expended some income to own laptop/computer for online program. This study finding suggests that the ownership of laptop and/or computer is an essential and pre-requires e-learning component for students. Therefore, it calls for the need to formulate a tax policy relief to lessen economic burden to students from low income households. The tax relief would allow students to cheaply acquire the essential e-learning components resulting into improvement on virtual educational learning. The study findings by [23] [24] who found students that uses laptop and/or computer showed a marginal improvement on their performance in education than those students that reliably utilizes smartphones.

Again, the costs of other e-Learning components in **Table 2**, that includes institutional costs/tuition fees 198 (98.5%), E-books 192 (95.5%), Mobile Phones 190 (94.5%), Internet Connectivity 192 (95.5%), and Writing Materials 195 (97.0%), showed to be equally critical based on students proportion on ownership. Therefore, it is equally important for consideration by policy makers while formulating policy incentives.

In regard to the expenditure for e-Learning education, the average costs of fees paid to the university showed to be higher compared with other accessibility components. These findings reveal that the institutional expenditure in running the program takes high proportion on costs for a student to access e-Learning programs at the university. Since government are the key stakeholders in the implementation of educational programs, the formulation of fiscal policy incentives by national treasury could improve e-Learning accessibility. For instance, scaling up the existing policies such as widely distribution of internet super-highway cables by incorporating private entities as investment, and availing of electricity to institutions and/or widely connecting power distribution to rural homes is supported.

Other studies, in particular by [25], while analysing e-Learning system challenge on e-Learning Engineering program at university of Jordan, found the need for key stakeholder's engagement such as governments, and/or non-governmental organization in supporting educational programs by providing grants, bursaries, and e-Learning materials. These supports from government and philanthropist found to reduce institutional costs, which ultimately result into improving students' accessibility on education. Therefore, the provision of these supportive facilities through policy formulation by government could reduce institutional costs on e-Learning education, which in the long run improve educational accessibility.

3.3. Influence of Accessibility Costs on E-Learning Internal Efficiency

The low to moderate R-square value from study result in **Table 3** indicates the presence of a modest explanatory power of variation from the selected construct in this study. The R-square values from the selected explanatory construct in this study were academic performance, affordability, retention, accessibility, and distance effect at 36%, 35%, 23%, 25% and 22%, respectively. These findings imply that the constructs specified in the models explained only part of the variation in the selected internal-efficiency of e-Learning education, while substantial high proportion of the constructs remained unexplained. Linking findings of R square values with Cost-Benefit Analysis in this study, point out the effectiveness of an accessibility investment was not solely reliably to influence; rather there was need for comparison of costs with benefits generated from the investment.

Table 3. Result from selected internal efficiency variables against accessibility cost of e-learning.

Variables					
Independent		Dependant			
Input Cost (X_i)	Academic Performance	Distance Effect	e-Learning Accessibility	Affordability	Student Retention
β_0	1.069	0.756	0.306	0.974	0.491
β_i	-0.003	0.270	0.090	-0.031	0.062
P(i) of β_i	49.9%	56.7%	52.2%	49.2%	51.5%
ε_i	1.000***	0.928***	0.992***	0.999***	0.351***
P(i) of ε_i	73.1%	71.7%	72.9%	73.1%	58.7%
R ² Value	0.360	0.350	0.230	0.250	0.220
T-test	0.044 (0.965)	0.359 (0.720)	1.208 (0.229)	0.408 (0.684)	0.812 (0.418)
F-Value	0.020 (0.965)	0.129 (0.720)	1.459 (0.229)	0.166 (0.684)	0.659 (0.418)

Source: Author, 2025. **Note:** (X_i)—represent dependent variable of input cost; β_0 —represent the constant of the model; β_i —represent coefficient of the predictor variable; ε_i —represent stochastic variable of the model; R² Value—represent the explainable portion of the regression model; T-test—represent the probability of the significance; and F-Value—explain the fitness of the selected variable in the regression model.

Also, the result of random factor which showed to have statistical significance at ($p < 0.001$) level, while their probability to influence based on log-likelihood test statistics were; quality of e-Learning at 73.1%, Effectiveness of e-Learning at 71.7%, Students propensity to gain e-Learning experience was at 73.1%, Accessibility at 72.9%, Students getting support at 73.1%, and while students' progression was at 58.7%, respectively. Accordingly, the significant influence of error term, which predisposes the influence of unobserved variables creates study gap affirms

effect of exogenous factors in this study model.

Therefore, the existence of influence from exogenous factors in the regression model based on the study findings creates study gap, which informs the need for further improvement by investigation other variables which were beyond the scope of this study modification of research design by increasing sample size and/or improving on clustering.

Again, the influencing level of accessibility costs on selected dependent variable showed overly to be statistically insignificant however, their probability level to influence based on Log-Likelihood tests were at 56.7%, 51.0%, 52.2% and 51.5%, respectively. These findings suggest that the influence of inputs costs on specified internal efficiency in this study had low weight for consideration. Nonetheless, despite their insignificance, however, their direction of influence remains to be critical for consideration while formulating e-Learning policies. For instance, the influence of input costs specified in the regression model on internal efficiency on quality e-Learning, which showed to have negative influence level at -0.003 , with log-likelihood probability at 49.9%, suggests that the more the costs of e-Learning to students result into lowering quality of e-Learning education with probable influence at 49.2%. While the variable of students' support which showed a negative influence at -0.031 , suggests that the expended costs by student on e-Learning education at university tend to inhibit e-Learning access with probable degree of influence at 49.2%. This finding could also mean that increasingly e-Learning costs tend to limit student from getting adequate assistance and/or that the support a student needs that perhaps could sufficiently mitigate students' needs e.g. the high costs of e-Books could perhaps impede sufficient access to quality reading materials, while high cost of transport and accommodation, influence the proportion of household income on education, which is a critical influencing factor for e-Learning investment in particular low income households. A Study by [26], while analysing the influence of input cost aspects that define student accessibility costs such as e-books, and internet costs, their influence showed to be negative, which shows to be in support with this study findings.

Observable linkage of these study findings in context to Cost-Benefits Analysis Theory, the existing relationship was that the results of negative and statistically insignificant demonstrate that, as the private cost of participating in online educational program increases with no corresponding increase in educational benefits, resulting into decline of the net benefit from the investment to the student. For instance, students facing high internet charges, expensive electronic learning materials or inadequate access to appropriate ICT devices may consequently result into the reduction in their participation in learning activities. These associated limitation that impedes student participation on online activities could constrain their ability to obtain the expected academic benefits from virtual learning; hence, influencing e-Learning internal efficiency.

4. Summary and Public Policy Recommendation

This case study examines whether students' e-learning accessibility costs are asso-

ciated with internal-efficiency outcomes in selected Nairobi County universities. It uses an online questionnaire administered to 201 second-year students in institutions offering purely e-learning programmes and the analyses aggregated student costs alongside reported outcomes. The manuscript concludes that accessibility costs constrain e-learning efficiency, although the reported regression estimates are largely statistically non-significant. Policy recommendation based on the study results include: provision of financial support through collaborative funding to cushion low income students, enhanced investment by institution on ICT support infrastructure such as internet connectivity, and the need for the formulation of policies such as tax incentives to effectively lower the price of ICT components.

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Author Contributions

Conceptualization, I.C.; methodology, I.C. and J.K.; software, I.C.; validation, J.K. and J.M.; formal analysis, I.C.; investigation, I.C.; resources, I.C.; data curation, I.C.; writing—original draft preparation, I.C.; writing—review and editing, I.C., J.K., and J.M.; visualization, I.C.; supervision, J.K. and J.M.; project administration, I.C.; funding acquisition, not applicable. All authors have read and agreed to the published version of the manuscript.

Conflict of Interest

The authors declare non-existence of competing financial and/or personal interests that could have motivated to influence this study write-up.

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