

The Role of Educational Technology in Transforming Knowledge Delivery within Kenyan Higher Learning Institutions

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Abstract: *The rapid rise of educational technology has profoundly reshaped the methods of knowledge delivery across the global learning environments, and Kenyan institutions are not left behind. The study explores the role that could be played by institutional infrastructure, culture, faculty and students in the adoption of education technology with the help of digital tools and e-learning platforms in transforming traditional teaching and learning practices within Kenya's diverse educational landscape. The study adopted a descriptive research design. It employed a structured questionnaire to collect primary data from the respondents of higher learning institutions for the analysis. The analysis and testing of the hypothesis were done with the help of descriptive statistics, coefficient of correlation and multiple regression analysis. The findings reveal that the majority of respondents agree on the EdTech adoption though they feel that the existing infrastructure and enabling environment is not fostering accessibility and reliability of the technology. There is a strong relationship between institutional infrastructure, culture, faculty and students towards adoption. This could be an overall indication of significant impact on EdTech adoption despite lack of appropriate infrastructure facilities and an enabling environment. The study recommends institutions to improve in digital infrastructures, invest in professional development, technology adoption strategies alignment with national education policies and encourage stakeholder's collaboration to ensure seamless accessibility and reliability of the technology in Kenya.*

Keywords: Education Technology, Knowledge Delivery

I. INTRODUCTION

Technology in modern education globally has been closely marked with numerous transformative trends in the year 2025, which includes artificial intelligence driven personalized learning systems that are tailored education content to specific student needs and learning style thus enhancing engagement and retention. More technologies such as virtual reality, and augmented reality create hands-on interactive learning experiences that have made education more engaging and accessible to many students in the world today. Additionally, offering flexible leaning models either online or face to face or both education learning accessibility and accommodating diverse learning preferences (Digital Learning Institute, 2025).

The adoption of technology in Kenyan universities and schools is really advancing though they face a number of huddles in achieving 2025-2030 AI strategy whereby it focuses on AI literacy from primary school through higher education. This is meant to promote AI ready infrastructure, data governance and digital innovation hubs (Digiken), which provides community based support, teacher training and curriculum pilot for AI integration (Nucamp, 2025, September 9).

The adoption of technology has been experiencing challenges including the digital divide, which has inhibited many from accessibility due to social economic inequalities, geographical disparities and lack of digital skills, which could be evident from low levels as 48% of network penetration, an indication that half of the population remains offline, with about 55.6% urban penetration as compared to 25% in rural areas (Digital 2025).

There is need to acknowledge the existing huddles and engage on the need to bridge the digital divide with combined strategies on improving infrastructures, affordability, digital literacy and community engagement on addressing both



urban and rural issues. Also to call for policies in simplifying licensing smaller and community ISPs in fostering affordability and innovation solutions and strengthening multisector collaboration aiming at inclusion planning to enhance the growth of technology in Kenya (Okello, Frederick, 2024).

EdTech has been a game changer in knowledge delivery in Kenya by providing digital access, and tools could improve teaching and learning experiences that have brought about increased accessibility to educational resources, support in personalized learning and improvement in digital literacy among the students and tutors. This could be achieved if efforts are focused on continuous investment in digital infrastructure, teacher training and policy support, which could ensure sustainability in EdTech transformation and closing the digital divide gap. With adoption, it is expected to contribute significantly to Kenya's ambition on building a future ready education system that could empower learners for the 21st century economy, (EdTech transformation in Kenya).

The current study is meant to assess the relationship and impact in Education Technology, institutional infrastructure, institutional culture, teacher pedagogical practices, and on student learning outcomes, engagement, and knowledge acquisition among the different higher levels of educational in Kenya. This paper contributes to the broader discourse on technology-enabled education by offering insights into how Kenyan institutions can leverage digital solutions to promote equitable and effective knowledge delivery.

1.1. Objectives of the Study

- To assess the relationship between Education Technology and institutional infrastructure, institutional culture, teacher pedagogical practices and student learning outcomes, engagement, and knowledge acquisition across different educational levels in Kenya.
- To examine the impact of education technology on institutional infrastructure, institutional culture, tutor pedagogical practices, student learning outcomes, engagement, and knowledge acquisition across different educational levels in Kenya.

1.2. Hypothesis of the Study

There is no statistically significant relationship between Education Technology and institutional infrastructure, institutional culture, teacher pedagogical practices and student learning outcomes, engagement, and knowledge acquisition across different educational levels in Kenya.

There is no statistically significant impact of education technology on institutional infrastructure & culture, tutor pedagogical practices, student learning outcomes, engagement, and knowledge acquisition across different educational levels in Kenya.

II. LITERATURE REVIEW

2.1. Theoretical Review

2.1.1. Technological Pedagogical Content Knowledge (TPACK) Theory

The theory emphasizes how to ensure effective teaching by leveraging technology, which requires dynamic interplay of the three domains namely technological knowledge, pedagogical knowledge and content knowledge without any isolation. Essentially, the theory guides the tutors to go an extra mile beyond having tech tools in learning. This could encourage thoughtful integration to enhance engagement, understanding and collaboration with the students. It matters for this could offer a practical roadmap on navigating digital transformation in promoting student centered learning by leveraging technology (Mishra P. & Koehler M. J., 2006)

2.1.2. Activity Theory

The theory diagenesis human action within their broader social, cultural and historical context with the help of technology. It views learning and behavior as part of system integration that involves student, tutor, institution and academic policies. The theory believes that on how and why things are done within a structured environment. It is applicable to higher learning institutions for it discloses how digital tools reshape educational practices, how students and tutors adapt to new



technology and how they influence their collaboration, assessment and engagement. This theory matters because it focuses solely on content delivery by emphasizing on system changes in the institutional structure, which offers a holistic lens of understanding the ripple effect of technology on higher education (Engeström Y., 1987).

2.2. Empirical Review

Nguyo, Patrick et al. (2015) undertook a study with the aim to disclose the role played by ICT in knowledge sharing in the State Corporation in Kenya. It was confirmed that ICT had a positive impact on knowledge sharing at a rate of 65.2%, which could be attributed to its tools, skills and infrastructure. The study could be significant on policy formulation and knowledge management on integrating ICT and knowledge sharing framework to increase ICT investment.

Tarus J. et al. (2015) explored challenges hindering Kenyan public universities in the implementation of e-learning. It is public knowledge that the majority of the universities adopted a new way of learning and teaching on the ICT platform, though faced with setbacks due to unutilized potential. It's revealed that its benefits outweigh the challenges. The study disclosed that e-learning comes with challenges that need to be taken care of before enjoyment of the fruits thereof. It was recommended that the institutions should put in place a robust ICT infrastructure and necessary training on e-learning skills that could boost accessibility and the level of adoption.

Omutange E. et al. (2025), investigated the way modern digital platforms such as YouTube, Google Classroom, ChatGPT and virtual labs on effective teaching and learning outcomes in TVETs institutions in Kenya. It was discovered that accessibility levels were average on those popular platforms with about 77.6% impact on learning, however there was a moderate teaching effectiveness. The study recommended refresher courses to be administered to tutors to build up digital competency, which could see the institutions adopt fully digital platforms.

Seth S. et al. analyzed how Indian higher education institutions are adopting advanced technologies to improve learning, teaching and institutional efficiency. The study adopted a literature review design on technological trends, government initiatives and institutional practices. It was discovered that technological accessibility had expanded to remote and marginalized areas; personalized learning by offering individual student content needs; streamlined administration operations though there faced challenges with the digital divide, infrastructure gaps and faculty training. It is now left up to the government to ensure institutionalization of technology uses and bridge digital disparities by implementing the requisite policies on faculty development and student digital literacy in India.

Reddy, V. B. (2025) reflects and predicts on how technology could reshape higher education, especially after the outbreak of covid-19 pandemic. The study adopted a thematic analysis research design to disclose trends in the adoption of the technology. Despite challenges of inequality and data security, it is evident there has been a paradigm shift that includes online platform and digital tools that have triggered institutions to leverage quickly by shifting from traditional classroom model to remote learning environment; staff training on digital skills need to be equipped with the requisite digital competencies; inclusion policy reforms to ensure equitable access to technology, especially for marginalized communities, which could bridge the digital divide gap. The study expressly serves as a reference on the recent and future outlook on the innovation with a call on the stakeholders to balance their enthusiasm for the technology with the commitment to equity and preparedness.

III. RESULTS AND DISCUSSION

Table 3.1. Descriptive Statistics

Factors		SA (%)	A (%)	UD (%)	D (%)	SD (%)	Mean	SD	Decisions
Institutional Infrastructure (IF)	The network accessibility and reliability	4 (13.3)	7 (23.3)	7 (23.3)	3 (10)	9 (30)	2.80	1.448	Undecided
	Equipped systems – software/tools.	2 (6.6)	15 (50)	5 (16.7)	3 (10)	5 (16.7)	3.20	1.243	Undecided
	Online technical support	6 (20)	11 (36.7)	10 (33.3)	0	1 (10)	3.57	1.135	Agree



	Systems user friendly	7 (23.3)	12 (40)	6 (20)	2 (6.7)	3 (10)	3.60	1.221	Agree
	Knowledge management system	9 (30)	13 (43.3)	2 (6.7)	5 (16.7)	1 (3.3)	3.80	1.157	Agree
Institutional Culture (CL)	E-learning and digital resources.	7 (23.3)	13 (43.3)	7 (23.3)	2 (6.7)	1 (3.3)	3.77	1.006	Agree
	Infrastructure and training	6 (20)	6 (20)	9 (30)	8 (26.7)	1 (3.3)	3.27	1.172	Undecided
	Leadership that promote adoption	7 (23.3)	9 (30)	8 (26.7)	3 (10)	3 (10)	3.47	1.252	Agree
	Conducive learning environment	10 (33.3)	12 (40)	4 (13.3)	3 (10)	1 (3.3)	3.90	1.094	Agree
	Data security	5 (16.7)	13 (43.3)	8 (26.7)	1 (3.3)	3 (10)	3.53	1.137	Agree
Faculty (FC)	Technological proficiency	8 (26.7)	12 (40)	5 (16.7)	1 (3.3)	4 (13.3)	3.63	1.299	Agree
	Lecturer of technical support	7 (23.3)	10 (33.3)	6 (20)	3 (10)	4 (13.3)	3.43	1.331	Agree
	Enhanced learning option	4 (13.3)	14 (46.7)	9 (30)	1 (3.3)	2 (6.7)	3.57	1.006	Agree
	Flexible learning option	10 (33.3)	15 (50)	4 (13.3)	0	1 (3.3)	4.10	.885	Agree
	System is accessibility	6 (20)	16 (53.3)	6 (20)	1 (3.3)	1 (3.3)	3.83	.913	Agree
Student (SD)	Enhanced your digital literacy	14 (46.7)	11 (36.7)	2 (6.7)	1 (3.3)	2 (6.7)	4.13	1.137	Agree
	Cultivate motivation and interest	8 (26.7)	15 (50)	4 (13.3)	2 (6.7)	1 (3.3)	3.90	.995	Agree
	Adoption and system engagement	6 (20)	18 (62)	4 (13.3)	0	2 (6.7)	3.87	.973	Agree
	System flexibility	8 (26.7)	9 (30)	6 (20)	3 (10)	4 (13.3)	3.47	1.358	Agree
	System accessibility	6 (20)	14 (46.7)	5 (16.7)	3 (10)	2 (6.7)	3.63	1.129	Agree
Education Technology (ET)	Interaction and engagement	8 (26.7)	15 (50)	5 (16.7)	2 (6.7)	0	3.97	.850	Agree
	Improved accessibility in learning	10 (33.3)	13 (43.3)	4 (13.3)	1 (3.3)	2 (6.7)	3.93	1.112	Agree



New learning approaches	11 (36.7)	9 (30)	4 (13.3)	3 (10)	3 (10)	3.73	1.337	Agree
Streamlined administration	8 (26.7)	13 (43.3)	8 (26.7)	0	1 (3.3)	3.90	.923	Agree
Personalized learning	9 (30)	13 (43.3)	4 (13.3)	0	4 (13.3)	3.77	1.278	Agree

Source: Primary data.

NB: N = 30, SA = strongly agree, A = agree, UN = undecided, D = disagree, SD = strongly disagree, decision making criteria: SA (1.0 - 1.79), A (1.8 - 1.59), UN (2.6 - 3.39), D (3.4 - 4.19) & SD (4.2 - 5.0)

Inference: The data analysis shows that majority of the respondents appear to agree that adoption of educational technology in institutions has an impact on knowledge delivery despite the fact that the respondents doubt on whether institutional infrastructural facilities and culture could offer accessibility, reliability and required tools / software for training and learning.

Table 3.2. Reliability Test Statistics

Cronbach's Alpha	N of Items
0.938	25

From the table above its evident that the quality of the 25 items has a Cronbach's alpha of 0.938, which confirms that there is a better internal consistency which is a sign of greater reliability of the data for the current research.

3.3. Testing H_{01} : There is no statistical significant relationship between Education Technology and institutional infrastructure, institutional culture, teacher pedagogical practices and student learning outcomes, engagement, and knowledge acquisition across different educational levels in Kenya.

Table 3.3.1. Correlations Matrix

		Infrastructure	Culture	Faculty	Student	EdTech
Infrastructure	Pearson Correlation	1	0.515**	0.765**	0.617**	0.678**
Culture	Pearson Correlation		1	0.626**	0.618**	0.418*
Faculty	Pearson Correlation			1	0.702**	0.775**
Student	Pearson Correlation				1	0.775**
EdTech	Pearson Correlation					1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Inference: The institutional infrastructure, faculty and students have a strong relationship of 0.678, 0.775 and 0.775 respectively on the intention on adoption of EdTech. Whereas institutional culture has a moderate relation of 0.418 on intention on adoption of EdTech on institutions.

3.4. Testing H_{02} : There is no statistical significant impact of education technology on institutional infrastructure & culture, tutor pedagogical practices, student learning outcomes, engagement, and knowledge acquisition across different educational levels in Kenya.

Table 3.4.1. Regression Model Summary

Model	R	R Square	Adjusted Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.868 ^a	0.753	0.713	0.4423	0.753	19.018	4	25	0.000

a. Predictors: (Constant), Student, Infrastructure, Culture, Faculty



Inference: The model shows an overall relationship of 0.868 in institutional infrastructure, culture, faculty and students towards adoption is positively very strong. The $R^2 = 0.753$, which is an indication that 75% variability on EdTech adoption is due to change in the predictor variables. The F-value of 19.018 with the p-value < 0.05 indicates that institutional infrastructure, culture, faculty and students have a significant impact on EdTech adoption at institutions.

Table 3.4.2. Coefficients^a of the Model

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	.930	.423		2.197	.038		
Infrastructure	.120	.148	.127	.810	.426	.402	2.490
Culture	-.284	.139	-.275	-2.040	.052	.545	1.836
Faculty	.431	.163	.477	2.646	.014	.305	3.283
Students	.511	.144	.532	3.558	.002	.443	2.256

a. Dependent Variable: EdTech

Inference: The above table indicates that a unit increase in institutional infrastructure, faculty and students leads to an increase by 0.127, 0.477 and 0.532 respectively on the intention to adopt EdTech. While a unit increase in institutional culture could lead to a decline by 0.275 in intention on adoption of EdTech that could be attributed to inadequacy in accessibility, equipped systems with necessary tools and training needs in higher learning institutions. The t-test outcome is a confirmation that faculty and students have a significant impact on intention on adoption of EdTech unlike institutional infrastructure and culture that do not have meaningful impact toward adoption.

IV. CONCLUSION AND RECOMMENDATIONS

4.1. Conclusion

It is revealed that majority of the respondents agree on the adoption of EdTech in higher learning institutions regardless of doubt on the existence of the requisite infrastructure and accommodating environment which could accelerate accessibility and reliability of the system. The relationship that exists in institutional infrastructure, culture, faculty and student is significantly strong towards adoption of EdTech. Their overall impact is 19.018, which is significant since its p-value < 0.05 . On individual contribution, faculty and students have a significant impact at t-value of 2.646 and 3.558 respectively, whereby their p-value < 0.05 , whereas that of institutional infrastructure and culture had no meaningful impact since their p-value > 0.05 where their t-value was 0.81 and -2.04 respectively, which could be due to inadequate infrastructure and conducive environment for adoption.

4.2. Recommendation

The study recommends, improvement in digital infrastructure for affordable internet connectivity; embark on professional development to strengthen digital skills and pedagogical capacity for a better technology integration; encourage collaboration among the government, private sector and community stakeholders to ensure broad support for technology initiatives; alignment of technology adoption strategies with national education policies that could advocate for consistent and sustainable funding to support digital transformation efforts in Kenyan institutions.

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