

The Adoption of ICT Tools for Collaborative Learning Among Students in Kenyan Higher Education Institutions

Dr. Misava Ombajo Edward, Dr Muraina Kamilu Olanrewaju

UNICAF UNIVERSITY-ZAMBIA

ISSN: 1533 - 9211

CORRESPONDING AUTHOR:

Dr. Misava Ombajo Edward
emisava@gmail.com

KEYWORDS:

Collaborative learning, ICT,
Higher Education and
Teaching

Received: 02 July 2024
Accepted: 16 July 2024
Published :22 July 2024

TO CITE THIS ARTICLE:

Ombajo, M. E., &
Olanrewaju, M. K.
(2024). The adoption
of ICT tools for
collaborative learning
among students in
Kenyan higher
education institutions.
*Seybold Report
Journal*, 19(7), 71-95.
[DOI:10.511/77.1705](https://doi.org/10.511/77.1705)

Abstract

Technology use for communication and information has had a huge impact on the dynamics of the learning and teaching process, providing value and making it more accessible. The purpose of this research is to assess the potential of ICT technologies in facilitating collaborative learning among students in Kenyan higher education institutions. The integration of ICT has revolutionized the educational landscape, giving rise to novel methodologies and approaches that bear influence on the stages of planning, implementation, and evaluation. Collaborative learning, once a traditional approach, has been enhanced through ICT utilization. Institutions have invested significantly in acquiring ICT tools, which are nurturing the cultivation of survival skills relevant to the 21st century in students. Collaboration, a key survival skill, now extends beyond working with peers and encompasses virtual team meetings facilitated by ICT. The study is informed by Vygotsky's theory of social-cultural learning and Roger's diffusion of innovations theory. A mixed research design with a concurrent triangulation approach was employed, involving both quantitative and qualitative data collection. The study population comprised Deans and students. Purposive sampling and multi-stage sampling techniques were used to select 204 students and 10 deans respectively as participants. The study was guided by four major research questions with six associated hypotheses. Data was collected using self developed questionnaires and interviews, and data was analyzed using frequencies, percentages, means, t-tests, and thematic analysis. According to the findings, many ICT technologies, including cellphones, computers, whiteboards, emails, and virtual learning environments, have been substantially integrated into the instructional process in Kenya's higher education institutions. Other technologies, such as iPads, tablets, and mind-mapping software, are underused. On a five-point Likert scale, the use of ICT tools for teaching and learning was somewhat above average, with a mean score of 3.408. The study provided evidence of successful collaborative learning in higher education institutions. Nonetheless, challenges persist in using ICT for collaborative learning, encompassing technical, organizational, and pedagogical aspects. The study recommends that instructors have ongoing professional pedagogical assistance, that there be a fundamental change in learning design and execution to maximize current ICT resources and possibilities, and that both female and male students receive improved help in using ICT tools for collaborative learning.

Introduction

The Transformative Power of ICT in African Higher Education: Challenges and Opportunities

Information and Communication Technology (ICT) is rapidly transforming education across the globe, and Africa is no exception. This paper explores the significant role ICT can play in enhancing teaching, learning, and research within African higher education institutions.

The Need for Teacher Training and Supportive Policies

Ergado et al. (2022) emphasize the importance of integrating ICT into education, particularly in developing countries like those in Africa. They highlight the need for well-designed training programs to equip educators with the necessary skills and knowledge to effectively utilize ICT tools in their teaching practices. UNESCO (2017) reinforces this point, stressing the need for teacher training programs to align with government initiatives focused on quality education. Furthermore, Ergado et al. (2022) propose that a supportive policy environment from education system administrators is crucial for successful ICT implementation. A positive attitude towards ICT use fosters its integration, while a lack of support can hinder progress. Studies by Alemu (2017) and Kaur (2015) reveal common challenges faced by African universities, including inadequate training, limited technical support, insufficient funding for ICT development, and a skills gap among educators.

The Kenyan Case Study: E-learning and Collaborative Learning

Alam's (2016) study in Kenya underscores the transformative impact of ICT on various aspects of higher education, including teaching, learning, and research. The study emphasizes the need to adopt new approaches and methodologies to effectively integrate ICT into existing educational systems. Research suggests that ICT empowers students to become active participants in their learning journeys, moving away from traditional passive roles. This shift towards active learning can lead to a more engaging and effective educational experience. Furthermore, ICT can be a valuable tool for universities to address staffing limitations. By establishing networked labs, developing online databases, and providing access to expert lectures, universities can leverage technology to enhance their educational offerings.

Kenya's national ICT strategy recognizes the critical role of e-learning in the educational system (Waema, 2005; Kariuki, 2009). Similarly, the Ministry of Education Policy Framework prioritizes open and remote learning (ODL) and e-learning initiatives. While most Kenyan universities have launched e-learning programs, these initiatives are often in their early stages and implemented on a small scale. Many institutions utilize a blended learning approach due to implementation challenges. The E-Readiness Survey of Kenyan Universities (2013) reports that only 11% of Kenyan university students are enrolled in blended e-learning courses (Kashorda & Waema, 2014). Despite these challenges, the implementation of e-learning and blended learning remains an essential approach for expanding access to quality education, as outlined in Kenya Vision 2030 (NESC, 2007).

The Power of Collaborative Learning with ICT Tools

According to Mongake (2019), a harmonious balance between ICT and pedagogical approaches is key to fostering collaborative learning within educational institutions. Technology plays a vital role in this process, with hardware like whiteboards, laptops, tablets, and mobile devices facilitating collaboration, communication, and knowledge acquisition. Studies by Garcia et al. (2014) emphasize the importance of integrating both hardware and software ICT tools to enrich the learning experience. ICT has fundamentally reshaped various aspects of society, including education (Makrakis, 2014; UNESCO, 2012a). A wide range of ICT applications have emerged that promote collaboration, connectivity, experiential learning, and critical thinking. These applications offer valuable pedagogical tools to enhance teaching and learning. ICT advancements in network capabilities, bandwidth, and computational power have further paved the way for collaborative learning to flourish. Collaborative learning is a pedagogical approach where students work together to complete tasks, develop solutions, and construct knowledge. Chandra (2015) emphasizes that collaborative learning is not just a strategy, but a philosophy that fosters cognitive development through interpersonal interactions, aligning with Vygotsky's sociocultural theory of learning (1978). Digital tools empower learners to interact and collaborate with peers, catering to diverse learning styles and enhancing academic performance (Towndrow, 2007). However, higher education institutions in Africa exhibit varying levels of responsiveness in integrating these tools, requiring students to adapt to different learning environments. The recent shift towards online and blended learning due to the pandemic has further highlighted the challenges and complexities faced by universities in Africa as they adapt to this new educational landscape. Overall, ICT presents a powerful opportunity to transform higher education in Africa. By providing adequate training for

educators, fostering supportive policies, and effectively integrating ICT tools, African universities can create a more engaging, accessible, and high-quality learning experience for their students.

Research Approach and Design

The researcher collected both qualitative and quantitative data concurrently based on the following research questions and the related hypotheses:

1. What is the level of adoption of ICT for learning among Kenya's students in higher education institutions?
2. To what extent is collaborative learning implemented in Kenya's higher education institutions?

Ho1: In Kenya's higher Institutions of learning, there is no significant relationship between using ICT for learning and collaborative learning.

Ho2: There is no significant relationship in Kenya's higher Institutions of learning between ICT-related challenges and collaborative learning.

Ho3: There is no significant difference between male and female students' responses to the use of ICT for learning in Kenya's higher Institutions of learning.

Ho4: There is no significant difference between male and female students' responses to the use of collaborative learning in Kenya's higher Institutions of learning.

Population and Sample of the Research Study

This study included students and deans (program leaders) from Kenyan universities (both public and private). Kenya has 74 universities (Commission for University Education, 2021) with over 565,000 students. Details on gender distribution and enrollment by university are included in table 1.

TABLE 1: TOTAL STUDENT POPULATION - COMMISSION FOR UNIVERSITY EDUCATION, 2021

Education Departments	Public University		Private University		Total
Gender	Male	Female	Male	Female	
Total number of Students in the Kenyan Universities	268843	188081	56516	51605	565045

To ensure a representative sample, 204 students were chosen using random sampling across four universities (2 public, 2 private) with established departments and a 10+ year history. We aimed for a sample size of 204 using the formula $n = N / 1 + N * (e)^2$ ($N=565,045$, $e=7\%$ confidence level). More emphasis was placed on education departments as they prepare future teachers for ICT use. Student emails were obtained from departments. For qualitative data, multistage sampling was used. Ten (10) deans from the selected universities were chosen to complement other data sources. In Kenya, we have a total of 105 deans existing in all the 74 universities.

TABLE 2: SAMPLING METHODS

Total Number of Universities in Kenya/Students	No. of Universities/Students selected	Sampling method
74 Universities	4 universities	Purposive sampling
565,045 students	204 students	Simple random sampling
105 deans in 74 Universities	10 deans (Heads of programs)	Multistage sampling

The researcher identified deans at Kenyan universities as key informants for a study on academic programs as shown in Table 2. Due to their leadership roles, deans were considered to have comprehensive knowledge. A two-stage sampling method was used. First, four universities were chosen from a list of 74. Then, within each university, 2-3 departments were randomly selected,

resulting in a total of 10 deans participating in qualitative interviews. Permissions were obtained from relevant authorities and informed consent was secured from all participants.

Results of Findings, including Graphical Illustrations

Quantitative Phase: Results from the Questionnaires

In total, the study received active participation from 204 students who diligently completed the questionnaire. These 204 respondents collectively constitute the quantitative segment of the research, contributing valuable data and insights to the study's overall findings and analysis. The 204 questionnaire respondents were recruited from four universities, which are denoted W, X, Y and Z as in Table 3. *Gender*: The sample had a slightly higher proportion of female participants (54.4%) compared to males (45.6%). *Year of Study*: Most participants (41.2%) were in their 1st year, followed by 3rd year (25.5%), 2nd year (22.5%), and 4th year (10.8%). *Disciplines*: A majority of participants were from Education (57.4%), followed by Nursing (24.5%) and Business (6.9%). Other disciplines like Engineering, Medicine, Midwifery, Religion, Sciences, and Technology/Computer have very few participants (less than 3% each). *University*: University Y had the highest number of participants (81 or 39.7%), followed by University Z (50 or 34.5%), University W (46 or 22.6%), and University X (27 or 13.3%).

TABLE 3: DEMOGRAPHIC INFORMATION

The table summarizes information about the participants in the study:

Variable	Category	Frequency, f	Valid Percent, %
<u>Gender</u>	Female	111	54.4
	Male	93	45.6
<u>Year of study</u>	1 st year	84	41.2
	2 nd Year	46	22.5
	3 rd Year	52	25.5
	4 th Year	22	10.8
<u>Disciplines</u>	Business	14	6.9
	Education	117	57.4
	Engineering	2	1.0
	Medicine	2	1.0
	Midwifery	2	1.0
	Nursing	50	24.5
	Religion	1	0.5
	Sciences	1	0.5
	Technology/Computer	15	7.4
<u>University</u>	W	46	22.6
	X	27	13.3
	Y	81	39.7
	Z	50	34.5

Research Question 1: What is the degree of ICT adoption for learning among students in Higher Institutions within Kenya?

The first research question concerned the availability of ICT resources and the use of ICT resources among students. Descriptive statistics were computed using SPSS version 29 to assess the availability and utilization of both hardware and software resources in higher education institutions,

as illustrated in Table 4. The received responses were distributed as follows: 891 responses indicated "Always," 559 responses for "Often," 285 were neutral, and 1658 responses were "Never." The means and standard deviations for each tool or resource are displayed in Table 8. The tools with the highest means were laptops, with a mean of 3.92, followed by Internet/WIFI at 3.30, email at 3.27, smartphones at 3.21, and Interactive whiteboards at 3.02. Other resources demonstrated moderate availability and usage: LCD Projector (2.95), desktops (2.70), Chat/text messaging (2.99), and presentation tools (2.88), all surpassing the mean value of 2.50. Conversely, the remaining resources scored below the mean value of 2.50: iPad/iPod (1.92), mind mapping tools (1.88), drawing tools (2.07), Smart TV (2.48), Blogs (2.39), Scanner (2.13), photo sharing (2.24), Voice over Internet protocol (2.50), and Tablet (2.08). The combined mean for the availability and utilization of hardware and software resources equated to 2.658, slightly exceeding the mean value of 2.50.

TABLE 4: ICT HARDWARE AND SOFTWARE TOOLS FOR TEACHING AND LEARNING

Hardware	Always	Often	Neutral	Seldom	Often	Never	Mean	Std Dev.	Total
Laptop	93	58	15	19		19	3.920	1.320	204
Internet	114	0	7	0		83	3.300	1.947	204
Desktop	43	43	14	18		86	2.700	1.659	204
Tablet	18	29	19	23		115	2.080	1.422	204
Scanner	21	22	28	25		108	2.130	1.420	204
Interactive Whiteboard	76	29	7	8		84	3.020	1.826	204
LCD projector	62	34	17	13		78	2.950	1.728	204
Smart TV	50	20	15	12		107	2.480	1.726	204
Smartphone	83	32	4	14		71	3.210	1.794	204
IPad/iPod	18	21	15	23		127	1.920	1.380	204
Blogs	28	33	28	17		98	2.390	1.536	204
Chats	62	42	10	12		78	2.990	1.739	204
email	80	41	8	5		70	3.270	1.763	204
Voice Internet protocol	32	37	25	18		92	2.500	1.571	204
Drawing	16	30	23	18		117	2.070	1.409	204
Mind mapping	17	17	20	20		130	1.880	1.346	204
Photo sharing	30	25	19	19		111	2.240	1.552	204
Presentation	48	46	11	15		84	2.800	1.691	204
Overall Mean							2.658		

Research Question 2: To what extent is collaborative learning implemented in Higher Learning Institutions in Kenya?

The extent of collaborative learning within the selected universities was calculated using mean values. A five-point scale was utilized to quantify the extent of collaborative learning, categorizing responses into Great extent, some extent, neutral, less extent, and no extent. The questions incorporated a mix of positive and negative statements. From the five-point scale, the responses were distributed as follows: 1640 responses indicated "Great extent," 740 responses for "Some extent," 123 responses for "Neutral," 150 responses for "Less extent," and 1170 responses for "No extent," as detailed in Table 5.

Across all 19 items within this category, the scores were notably high, exceeding 3.26 (refer to Table 3). The participants exhibited strong agreement with statements related to collaborative techniques in the classroom (4.04), the utilization of ICT for collaborative learning (3.36), a deeper grasp of collaborative learning (3.26), the enjoyable nature of learning in social contexts that build on experiences, backgrounds, and cultures (3.52), and a preference for collaborative learning over traditional methods (3.46).

Negative items were also included, and participants largely concurred with the idea that collaborative learning demands proper planning, additional time, and effort from both instructors and students (3.33). In comparison to other items, there was less agreement concerning collaborative learning hindering the completion of course content (2.47), which is below the mean value of 2.50.

In general, the scores for various variables (as outlined in Table 5) related to collaborative learning were consistently above the mean value of 2.50. For instance,

collaborative learning was seen to promote skill acquisition among students (3.54), enhance critical thinking and problem-solving abilities (3.42), foster personal relationships between students and teachers (3.44), encourage learners to take responsibility for their learning (3.52), emphasize the need for additional training and guidance for successful implementation (3.39), and contribute to increased student retention (3.27). Respondents largely agreed with the recommendation for a learner-friendly curriculum to support collaborative learning success (3.49) and the proposition that collaborative learning, along with ICT usage, should be a mandatory teaching strategy in higher education institutions (3.37). Notably, all variables related to collaborative learning (refer to Table 5) exhibited mean values exceeding 2.50, except for the specific variable suggesting that collaborative learning hinders the timely completion of course content, which scored below 2.50 (at 2.47). The overall mean for all the variables in this category was 3.408, which is more than the mean value of 2.50.

Table 5: Extent of Collaborative Learning

Variable(s)-Collaborative Learning	Great Extent	Some Extent	Neutral	Less Extent	No Extent	Mean	Std Dev.	Total
I use collaborative learning techniques in my studies	100	64	9	11	20	4.04	1.280	204
I easily use ICT to implement collaborative learning in my studies	77	46	14	7	60	3.36	1.683	204
I have a deeper understanding of collaborative learning in my course(s)	69	53	7	13	62	3.26	1.684	204
I enjoy learning that occurs in a social	95	43	1	3	62	3.52	1.746	204

context, building on experiences, background, and cultures								
I prefer collaborative learning to other traditional methods	89	42	6	8	59	3.46	1.717	204
Collaborative learning requires a lot of planning, extra time, and effort from the instructors and even the students	80	43	7	13	61	3.33	1.715	204
Collaborative learning promotes the acquisition of skills as a student	103	29	7	5	60	3.54	1.757	204
Collaborative learning develops personal relationships between students and teacher	84	49	3	9	59	3.44	1.705	204
Collaborative learning makes learners more responsible for self-learning	97	38	5	3	61	3.52	1.743	204
Collaborative learning develops interactive learning in small groups during my studies	99	34	5	4	62	3.51	1.760	204
Collaborative learning enables me as a student to use ICT to learn in better ways	102	32	3	4	63	3.52	1.777	204
I enjoy the use of ICT in collaborative learning	95	40	4	3	62	3.50	1.746	204
Collaborative learning improves critical	92	36	6	5	65	3.42	1.767	204

thinking/problem-solving among students.								
Collaborative learning hinders the completion of content in my studies	40	29	14	24	97	2.47	1.635	204
Collaborative learning increases my retention of content	72	52	6	7	67	3.27	1.719	204
I get excited when using ICT tools in collaborative learning	79	52	3	9	61	3.39	1.705	204
I suggest that teachers and students need more training and guidance to implement collaborative learning	92	43	3	4	62	3.49	1.740	204
I recommend a learner-friendly curriculum for the success of collaborative learning	88	34	10	9	63	3.37	1.747	204
I recommend that collaborative learning and the use of ICT should be a mandatory strategy for teaching in higher institutions.	87	34	10	9	64	3.35	1.751	204
Total	1640	740	123	150	1170			
Overall Mean						3.408		

Hypothesis 1, Ho1: There is no significant relationship between the adoption of ICT for learning and collaborative learning in Kenya.

A Pearson product-moment correlation analysis was conducted to examine the hypothesis to ascertain

the connection between the adoption of ICT tools for learning and collaborative learning, as depicted in Table 12. These two variables were categorized as ICT resources and collaborative tools, with ICT adoption constituting the dependent variable. The corresponding p-values are outlined in Table 6. For the ICT resources (Hardware), the Pearson correlation coefficient (r) was calculated as 0.687, with a significance value (p) of 0.000, based on a sample size 204. In the case of collaborative tools, the Pearson correlation coefficient was found to be $r = 0.717$, accompanied by a significance value of $p = 0.000$, also using the same sample size of 204. Notably, both variables, ICT resources, and collaborative tools, yielded p-values of 0.000, a value lower than the commonly accepted alpha coefficient threshold of < 0.01 . Consequently, the null hypothesis was rejected.

TABLE 6: PEARSON PRODUCT MOMENT CORRELATION-ICT ADOPTION

Variable(s)	N	Mean	Std Dev	r	Sig. Value (p)	Remarks
ICT Resources	204	1.168	0.261	0.687	0.000	Significant
Collaborative tools	204	1.370	0.219	0.717	0.000	Significant

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

Hypothesis 2, Ho2: There is no significant relationship between the challenges related to the use of ICT and collaborative learning in Kenya.

The hypothesis, *Ho2* aimed to establish the relationship between the challenges linked to the use of ICT and collaborative learning. A Pearson product-moment correlation analysis was used to determine the association between the adoption of ICT tools for learning and collaborative learning. The independent variables consisted of the three categories of challenges: technical, organizational, and pedagogical. These challenges were assessed against the dependent variable

of collaborative learning. The correlation coefficients (r), significance values (p), and sample size (N) are displayed in Table 7.

In terms of technical challenges, the Pearson correlation coefficient (r) was computed as 0.635, and the associated significance value (p) was determined as 0.000, using a sample size of 204. Concerning organizational challenges, the Pearson correlation coefficient yielded $r = 0.557$, and the significance value was $p = 0.000$, also based on the same sample size of 204. Similarly, for pedagogical challenges, the Pearson correlation coefficient was calculated as $r = 0.431$, with a significance value of $p = 0.000$, using the identical sample size of 204. Importantly, all three variables—technical, organizational, and pedagogical—generated p -values of 0.000, a value lower than the widely accepted alpha coefficient threshold of < 0.01 . Thus, the null hypothesis was rejected.

TABLE 7: PEARSON PRODUCT MOMENT CORRELATION-COLLABORATIVE LEARNING

Variable(s)	N	Mean	Std Dev	r	Sig. Value	
					(p)	Remarks
Technical challenges	204	2.139	0.330	0.635	0.000	significant
Organizational challenges	204	1.776	0.701	0.557	0.000	significant
Pedagogical Challenges	204	-1.463	0.493	0.431	0.000	significant

Correlation is significant at the 0.01 level (2 tailed)

Hypothesis 3, Ho3: There is no significant difference in the responses of male and female students concerning the adoption of ICT for learning in Higher Institutions in Kenya.

A one-sample t-test was performed to compare the adoption of ICT for collaborative learning between genders. As presented in Table 8, the mean adoption score for females was ($M=66.8407$,

SD = 30.204), resulting in a t-distribution value of $t(112) = 23.524$ and a corresponding p-value of 0.000. Notably, the p-value of 0.000 is less than the established significance level of 0.05.

Similarly, the mean adoption score for males was ($M=69.5824$, $SD = 29.564$), leading to a t-

distribution value of $t(112) = 23.524$ and a p-value of 0.000. Once again, the p-value of 0.000 is less than the statistical alpha of 0.05. Consequently, the null hypothesis was rejected.

TABLE 8: GENDER AND ICT ADOPTION: A ONE-SAMPLE T-TEST

Gender	N	Mean	Std. Dev	t	df	P-value
Female*Adoption of ICT	113	66.8407	30.204	23.524	112	0.000
Male * Adoption of ICT	91	69.5824	29.564	22.452	90	0.000

95% confidence interval of Difference

Hypothesis 4, Ho4: There is no significant difference in the responses of male and female students regarding the utilization of collaborative learning in Higher Institutions in Kenya.

TO EXAMINE THE DISPARITIES BETWEEN MALE AND FEMALE STUDENTS' RESPONSES REGARDING COLLABORATIVE LEARNING, A ONE-SAMPLE T-TEST WAS CARRIED OUT WITH A 95% CONFIDENCE INTERVAL OF DIFFERENCE, AS DISPLAYED IN TABLE 9. THE MEAN SCORE FOR COLLABORATIVE TOOLS AMONG FEMALES WAS $M=19.8673$, $SD=9.79295$, YIELDING A T-DISTRIBUTION VALUE OF $T(112) = 21.566$ AND A CORRESPONDING P-VALUE OF 0.000. THIS P-VALUE IS LOWER THAN THE ESTABLISHED STATISTICAL SIGNIFICANCE LEVEL OF 0.05. SIMILARLY, THE MALE STUDENTS EXHIBITED A SLIGHTLY HIGHER MEAN VALUE OF $M=20.4835$, $SD=10.46726$, WITH A T-

DISTRIBUTION VALUE OF T (90) =18.668 AND A P-VALUE OF 0.000, AGAIN BELOW THE STATISTICAL ALPHA OF 0.05. CONSEQUENTLY, THE NULL HYPOTHESIS WAS REJECTED.

TABLE 91: GENDER AND COLLABORATIVE TOOLS: A ONE SAMPLE T-TEST

Gender	N	Mean	Std. Dev	t	df	P-value
Female* Collaborative tools	113	19.8673	9.79295	21.566	112	0.000
Male * Collaborative tools	91	20.4835	10.46726	18.668	90	0.000

95% confidence interval of Difference

Summary of the interview responses related to the adoption of ICT for learning and collaborative learning included:

Availability of ICT resources: The institutions have a range of ICT resources available for teaching and learning, including desktop computers, projectors, smartboards, laptops, smartphones, and access to the Moodle platform for online learning.

Utilization of ICT resources: Collaborative learning is enhanced using the Moodle, Edmodo, and MUSOMI platforms which include recorded lessons in both video and audio formats. Students can listen to these lessons and engage with the educational content.

Effectiveness of collaborative learning: The use of Mentimeter, and Kahoot among other software allows students to raise questions, and training enables learners and users to use the online platform well. Feedback and assessment data are used to make necessary adjustments to collaborative learning strategies and resources to enhance effectiveness.

Challenges associated with the use of ICT for collaborative learning: Technical glitches, software malfunctions, hardware issues, connectivity problems, and erratic internet connections can disrupt online collaborative sessions. Not all lecturers are trained, and some prefer old

methods of teaching. Data bundles are expensive in Kenya, and there is a gender gap in ICT use and collaboration.

Solutions to address challenges: Incorporating technology for group work and utilizing collaborative learning forums can significantly enhance student engagement and promote effective learning through peer interaction. Ensure affordable internet access for students by subsidizing or providing it free of charge at universities and schools. Incorporate ICT tools and learning gadgets into school fees to enable all learners to acquire necessary devices, facilitating equitable access to online learning. Teachers should receive orientation on the effective use of technology in the classroom and become familiar with collaborative tools.

Gender applies in responses regarding the adoption of ICT for learning and collaborative learning: Males display a stronger preference for technological gadgets while females often grapple with challenges related to their numerous responsibilities, which can impact their educational participation, leading to higher class absenteeism. To address this, a suggestion is made for universities to incorporate laptop costs within their fees, aiming to create more equitable access to technology and reduce the gender gap in this regard.

Discussion of findings

Collaborative learning and interactions are integral components of social learning, as advocated by the social-cultural theory (Anderson & Dron, 2011). This approach emphasizes group-based learning, where learners benefit from shared knowledge discovery. Information and Communication Technology (ICT) facilitates interactions and collaborations within the educational context (Tinio, 2020). The COVID-19 pandemic significantly disrupted traditional learning, leading to the closure of universities, and necessitating the deployment of ICT tools,

including the Internet, to support teaching and learning (Kiare & Muindi, 2020). In Higher Education Institutions (HEIs), ICT tools offer various opportunities to enhance learner engagement and communication. This chapter discusses the implications, practical application recommendations, and future research suggestions and concludes the study's findings.

The findings revealed that the adoption level of ICT tools slightly surpassed the average. This suggests that several ICT tools have been extensively incorporated into Kenyan higher institutions' teaching and learning processes, including laptops, smartphones, whiteboards, emails, and virtual learning environments. However, various untapped tools, such as tablets, mind-mapping tools, and iPads, still need to be added. The pattern of ICT adoption in teaching and learning follows an S-shaped curve, aligning with Roger's theory of diffusion of innovations, encompassing innovators, early adopters, late adopters, and laggards within Kenyan higher institutions.

Concerning the extent of collaborative learning within higher institutions, the findings indicated an evidence of collaborative learning practices in Kenyan higher education institutions. This assertion is substantiated by a mean score of 3.408 on a five-point Likert scale, surpassing the baseline mean of 2.500. This elevated mean signifies a strong consensus regarding the efficacy of collaborative learning within the instructional context. Correspondingly, Kim and Care (2020) endorse the positive impact of collaborative learning on fostering positive student relationships and amplifying critical thinking abilities.

The first hypothesis aimed to ascertain the relationship between the adoption of ICT for learning and collaborative learning. The results unveiled a strong positive correlation between hardware resources and the adoption of ICT for efficient collaborative learning. The sufficiency

of ICT hardware resources and their utilization rate play a pivotal role in shaping the efficacy of collaborative learning (Rutherford, 2015). Notably, utilizing tools such as Virtual Learning Environments (including platforms like Moodle) on both computers and smartphones contributes to enhancing collaborative learning.

The second hypothesis aimed to establish gender-based differences in responses related to the adoption of ICT for collaborative learning. The study findings revealed a significant difference in the responses between males and females regarding the integration of ICT for collaborative learning. Both genders exhibited strong competence and enthusiasm in adopting ICT for collaborative learning, suggesting they are equally engaged in leveraging these tools.

The third hypothesis explored gender-related variations in perceptions of collaborative learning within universities. The study's results unveiled a noteworthy contrast in how male and female respondents perceived the use of collaborative learning. Both genders reported experiencing a substantial level of collaborative learning. Both male and female students have been actively engaging in face-to-face and online interactions, utilizing collaborative learning methods. This outcome contradicts other studies examining receptivity toward ICT use in learning contexts (Zhang, 2005).

Conclusion

Collaborative learning has long been established as a valuable pedagogical approach within higher education classrooms (Chai & Tan, 2010). This study advocates taking this a step further by making collaborative learning a mandatory teaching strategy within the curriculum. Embracing private-public partnerships can further enhance the infrastructure and support needed

for successful implementation. However, participants in the study voiced concerns about various challenges impeding the smooth uptake of ICT tools for collaborative learning. These challenges span technical, organizational, and pedagogical domains. Insufficient access to tools and internet connectivity emerged as significant barriers. Additionally, there is a recognized need for more comprehensive technical training for both faculty and students. Administrative support, overloaded faculty workloads, the need for course outlines to explicitly address collaborative learning, and concerns about student engagement also feature prominently among the challenges identified. Furthermore, faculty members expressed a desire for more extensive training on pedagogical matters, indicating a willingness to adapt to new teaching methods but seeking the necessary guidance and resources. Addressing these challenges necessitates a concerted effort involving a wide range of stakeholders. Faculty members, as primary agents of educational delivery, play a central role in driving the adoption of ICT tools. However, they cannot do it alone. Parents, administrators, and service providers such as KENET and Safaricom also have a vital role to play in creating an environment conducive to collaborative learning. By working together, these stakeholders can contribute to a more inclusive and equitable educational experience.

One of the key recommendations stemming from this study is a call for investment in professional development opportunities for faculty members. Equipping educators with the skills and knowledge needed to design optimal learning environments is crucial for fostering collaboration. Additionally, participants highlighted the need for improved internet connectivity, which forms the backbone of any successful ICT-based learning initiative. Instructor support, course reviews, and the establishment of institutional policies governing ICT-based collaborative

learning were also cited as important steps in creating an enabling environment.

Furthermore, a shift in attitude towards the incorporation of ICT tools in education is imperative. This involves recognizing the transformative potential of these tools and viewing them not as a supplementary feature, but as an integral component of the educational landscape. By fostering a culture that embraces technology as a catalyst for learning, educational institutions can unlock new possibilities for collaboration and engagement. The study also illuminates a significant relationship between the adoption of ICT tools, the implementation of collaborative learning, and the challenges faced. The availability and utilization of ICT tools exert a positive influence on collaboration, enhancing the learning experience for both students and educators. Moreover, gender differences were observed, underscoring the critical role that all genders play in the adoption, effectiveness, and resolution of challenges associated with collaborative learning and the use of ICT tools. This highlights the importance of promoting fair access and skill acquisition for all genders. Finally, this study provides invaluable insights into the landscape of ICT tool adoption in collaborative learning within the higher education context in Kenya. It underscores the urgent need to address challenges through a combination of professional development initiatives and comprehensive strategies. The findings emphasize the indispensable role that ICT tools play in modern education and impel us to marshal collective efforts in propelling their integration for the betterment of higher education institutions. As we navigate the 21st century, the seamless integration of ICT tools will undoubtedly remain a cornerstone in cultivating effective and collaborative learning environments. The journey towards a more inclusive, technology-enhanced educational landscape is both a challenge and an opportunity—one that holds the promise of transforming the way we teach and learn.

Conflicts of Interest

The authors have disclosed no conflicts of interest.

Author's Affiliation

Dr. Misava Ombajo Edward, Dr Muraina Kamilu Olanrewaju

UNICAF UNIVERSITY-ZAMBIA

COPYRIGHT

© 2024 The Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC-BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited. See <http://creativecommons.org/licenses/by/4.0/>. Seybold Report is a peer-reviewed journal published by Seybold Publications.

HOW TO CITE THIS ARTICLE

Ombajo, M. E., & Olanrewaju, M. K. (2024). The adoption of ICT tools for collaborative learning among students in Kenyan higher education institutions. *Seybold Report Journal*, 19(7), 71-95. [DOI:10.511/77.1705](https://doi.org/10.511/77.1705)

REFERENCES

- Alam, M. (2016). Use of ICT in Higher Education. *The International Journal of Indian Psychology*; 3(4), 162-171. ISSN- 2348-5396. <http://dip.org/18.01.208/20160304>
- AlCattan, R. F. (2014). Integration of Cloud Computing and Web 2.0 Collaboration Technologies in E-Learning. *International Journal of Computer Trends and Technology*, 12(1), 46–55.
- Allsop, J., Young, S. J., Nelson, E. J., Piatt, J. & Knapp, D. (2020). Examining the Benefits Associated with Implementing an Active Learning Classroom among Undergraduate Students. *International Journal of Teaching and Learning in Higher Education*, 32(3), 418-426.
- Altunisik, A., Böhm, R., & Hackl, M. (2004). Sample size calculation for statistical tests—a practical approach. *Journal of Chemical Information and Modeling*, 44(3), 491-496. doi: 10.1021/ci034230k
- Ang'ondi, E. K. (2013). Teachers Attitudes and Perceptions on the Use of ICT in Teaching and Learning as Observed by ICT Champions. World Conference on Computers in Education. Retrieved from http://edu.rsei.umk.pl/wcce2013/publications/v1/V1.3_100-AngodifullRFPR.pdf
- Chai, C.S., and Tan.S.C. (2010). Collaborative Learning and ICT. In C. S. Chai & Q.Y. Wang (Eds.), *ICT for self-directed and collaborative learning* (pp 52-69). Singapore: Pearson/Prentice Hall.
- Dahal, N. (2022). Understanding and uses of collaborative tools for online courses in higher education. *Advances in Mobile Learning Educational Research*, 2(2), 435-442. <https://doi.org/10.25082/AMLER.2022.02.012>
- Ergado, A. A., Desta, A., & Mehta, H. (2022). Contributing factors for the integration of information and communication technology into Ethiopian higher education institutions teaching-learning practices. *International Journal of Education and Development using Information and Communication Technology*, 18(1), 275-292. Retrieved from <https://www.proquest.com/scholarly-journals/contributing-factors-integration-information/docview/2665652532/se-2>.

- Jowi, J.O. (2018). Deans in Kenyan Universities: Their leadership styles and impacts on staff commitment.
- Kashorda, M and Waema, T. (2014) E-readiness Survey of Kenyan Universities 2013 Report. Kenya Education Network, pp 116. [online] Available at:
https://www.kenet.or.ke/sites/default/files/Ereadiness%202013%20Survey%20of%20Kenyan%20Universities_Exec%20Summ.pdf
- Kaur, N. (2015). “Using ICT in Empowering Teachers for Quality Education.” International Journal of Scientific Research Engineering & Technology (IJSRET), Conference Proceeding, 14- 15 March, 2015.
- Kenya National Bureau of Statistics (2019) Economic Survey, 2019. KNBS, pp. 147-16. [online] Available at: <<https://www.knbs.or.ke/download/economic-survey-2019/>> [Accessed 10 April 2019]
- KNBS (2019). *Economic Survey 2019*. Kenya National Bureau of Statistics.
- Towndrow, P. A. (2007) Task design, implementation, and assessment: Integrating Information and communication technology in English language teaching and learning. Singapore: McGraw-Hill.
- UNESCO (2023). *Education in the Digital Age: Kenya*
- Vygotsky, L. (1978). Interaction between Learning and Development (pp. 79–91). Cambridge, MA: Harvard University Press.
- Vygotsky, L.S. (1978). *Mind in Society*. Cambridge, MA: Harvard University Press. White, (2005). Better Education via Effective Information & communications Technologies for Sustainable Development-ICT4Education. Retrieved on 05/05/2019 from <http://ict4d.co/research/better-education-via-effective-information-communications-technologies-for-sustainable-development-ict4education>.
- Zhang, Y. (2005). Distance learning receptivity: Are they ready yet? Quarterly Review of Distance Education. 6(1), 45-55.