



Jumuga Journal of Education,  
Oral Studies, and Human Sciences (JJEOSHS)  
[editor@jumugajournal.org](mailto:editor@jumugajournal.org)  
<http://www.jumugajournal.org>  
Volume 7, Issue 2, 2024  
DOI: <https://doi.org/10.35544/jjeoshs.v7i2.87>

## **Student-Related Factors & Adoption of E-learning in Higher Educational Institutions: Show-casing Masinde Muliro University of Science and Technology, Kenya**

Cynthia Khayanga Chikamai

<https://orcid.org/0009-0000-8745-8919>

Masinde Muliro University of Science and Technology  
&

Pamela Buhere, PhD

<https://orcid.org/0000-0002-0017-994X>

Masinde Muliro University of Science and Technology  
&

Wekullo Caroline Sabina, PhD

<https://orcid.org/0000-0002-0148-9069>

Masinde Muliro University of Science and Technology

### **Abstract**

The adoption of e-learning in public higher education institutions has become essential, driven by technological advancements and the global pandemic (COVID-19). This research article examines student-related factors that influences e-learning adoption in the institutions of higher learning, with special reference to the Masinde Muliro University of Science and Technology. A correlational research design, framed within the Unified Theory of Technology Adoption, was employed. Further, logistic regression analysis was conducted on data from 322 fourth-year students across 10 faculties. Findings reveal that mature students, aged 31-35 and above, were 56% and 12% more likely to adopt e-Learning than younger students. Male students were twice as likely to adopt e-Learning as their female counterparts, while students from the School of Computer and Information were twice as likely to adopt it compared to those from the School of Education. Practical implications include promoting peer-to-peer tutoring and fostering a positive attitude toward e-learning. These findings offer valuable insights for enhancing the uptake of e-Learning, providing institutions with knowledge to support student engagement and inform policy development.

**Keywords:** Adoption of e-learning, Student related factors, Institutions of higher learning

### **Introduction**

The rapid integration of digital technologies into education has transformed learning experiences globally. In the 21st century, e-learning has become a vital part of educational delivery, allowing institutions to expand access, flexibility, and student engagement (Bates, 2015). The COVID-19 pandemic has further accelerated the shift to digital learning platforms, necessitating the adoption of e-learning in higher education, particularly in developing regions like Kenya (Mtebe & Raisamo, 2014). Public universities in Kenya, such as Masinde Muliro University of Science and Technology (MMUST), have implemented e-learning as a strategy to overcome physical and temporal limitations in traditional education. However, the adoption of e-learning has been with challenges, as it is largely

influenced by student-related factors, including demographic characteristics, motivation, usability perception, learning preferences, ease of use, and system quality.

In the context of public institutions of higher learning, e-learning provides students with a means to access quality education remotely, making it valuable for non-traditional learners such as mature students, working professionals, and those with geographic limitations (Mtebe, 2021). Nevertheless, the success of e-learning in such institutions is often dependent on the extent to which students embrace the technology. Research indicates that various student-related factors, including age, gender, discipline of study, and technological skills, play a pivotal role in determining the likelihood of students adopting and benefiting from e-learning (Jung, 2011). Understanding these factors is crucial for developing strategies to improve e-learning systems and ensure equitable access to education.

Several studies have emphasized the importance of demographic factors such as age and gender in shaping students' attitudes toward e-learning. Older students, for example, often demonstrate greater motivation and appreciation for the flexibility of e-learning due to their work and family commitments (Al-Adwan & Smedley, 2013). Conversely, younger students, while more comfortable with technology, may lack the self-discipline required for online learning (Liaw & Huang, 2013). Gender differences have also been noted, with male students often exhibiting higher levels of e-learning adoption than female students, potentially due to societal factors and perceptions of technology as a male-dominated field (Dulle & Minishi-Majanja, 2011). Furthermore, academic discipline has been identified as a significant factor influencing e-learning adoption, with students in technical fields, such as computer science, more likely to embrace e-learning platforms compared to those in non-technical fields like education (Cigdem & Topcu, 2015).

Beyond demographic factors, students' perceptions of e-learning platforms, including their usability and system quality, are critical determinants of adoption. Usability refers to the ease with which students can navigate and use e-learning systems, and it significantly impacts their overall learning experience (Al-Fraihat et al., 2020). A system that is perceived as user-friendly, reliable, and efficient encourages higher adoption rates. On the other hand, systems that are difficult to navigate or prone to technical issues can deter students from fully engaging with online learning (Zawacki-Richter et al., 2015). Moreover, the quality of information provided through e-learning platforms, including the clarity of instructional materials and the responsiveness of the system, influences students' willingness to adopt and consistently use e-learning (Islam, 2016). Students who perceive the platform as providing comprehensive and well-organized content are more likely to invest time in learning through the system.

Motivation is another critical student-related factor influencing e-learning adoption. Students who are intrinsically motivated to learn tend to adopt e-learning more readily than those who are extrinsically motivated (Deci & Ryan, 2012). Intrinsic motivation arises from personal interest and the desire for knowledge acquisition, while extrinsic motivation is driven by external rewards such as grades or qualifications (Keller, 2010). The self-paced nature of e-learning requires students to be self-directed and intrinsically motivated to succeed. In the absence of a physical learning environment, students must develop a strong sense of discipline to engage with the material and meet academic deadlines (Islam, 2016). Consequently, institutions that wish to promote e-learning adoption must consider strategies that enhance student motivation, such as integrating interactive content and providing timely feedback.

Lecturer characteristics and their role in facilitating e-learning also contribute to student adoption. The presence of supportive, knowledgeable, and approachable lecturers is critical in ensuring that students feel confident using e-learning platforms (Sun & Chen, 2016). Lecturers who are proficient in using technology and who incorporate diverse digital teaching methods into their courses can enhance student engagement and adoption of e-learning. Furthermore, students are more likely to adopt e-learning platforms if they perceive their lecturers to be competent in delivering content online and in assisting with technical difficulties (Jung, 2011).

In Kenya, public institutions such as MMUST face unique challenges in the adoption of e-learning. While the country has made strides in increasing internet connectivity and access to digital devices, infrastructural barriers remain, particularly in rural areas (Mtebe & Raisamo, 2014). Additionally, the cultural context of education in Kenya, which traditionally values face-to-face learning, poses challenges to the widespread acceptance of e-learning. This underscores the need for a better understanding of the student-related factors that influence e-learning adoption in Kenyan universities, as these factors can inform institutional strategies aimed at improving the accessibility and effectiveness of e-learning systems.

This research aimed to investigate the student-related factors influencing the adoption of e-learning in public institutions of higher learning in Kenya, with a focus on Masinde Muliro University of Science and Technology. By examining demographic characteristics, motivation, usability perceptions, and other student-related variables, this research seeks to contribute to the body of knowledge on e-learning adoption and provide recommendations for improving e-learning implementation in Kenyan universities. The findings from this study will have practical implications for educators, policymakers, and university administrators, as they work to create more inclusive and efficient e-learning environments that meet the diverse needs of students.

### **Research Methodology**

This research article adopted a correlational research design to explore the influence of student-related factors on the adoption of e-learning. This design was chosen because it allows for the examination of relationships between variables, specifically how positive student-related factors impact e-learning adoption rates. This approach provided insights into how different student-related factors, such as age, gender, and discipline, affect e-learning adoption, facilitating a deeper understanding of the dynamics at play and validating the study's findings.

### **Target Population and Sample Size**

The research article used data from 7500 fourth year students from MMUST who had still enrolled and had experienced e-learning. Fourth year students were chosen because they were present when the institution quickly took up virtual learning and benefited on tokens given during the pandemic. A multi-stage sampling technique was used, with all schools within MMUST purposively selected and treated as strata. Students within each school were systematically sampled. The sampling interval was determined by dividing the population by the sample size, resulting in a sample size of 366 students, calculated with a 95% confidence level and a 0.05 significance level (Krejcie & Morgan, 1970).

### **Procedure**

The research article used structured questionnaire designed to capture information on various student-related factors, including age, gender, academic discipline, and perceptions of e-learning. The survey was administered both electronically and manually to accommodate the participants' schedules and facilitate data collection.

### **Results:**

#### **Demographic Details**

A total of 322 out of the 360 targeted respondents participated in the study, representing an 89.44% response rate. Participants' demographic characteristics were assessed on items including Age, gender, name of school, and residence of the participants. The majority of the respondents were aged between 21-25 years old representing 59.3%, followed by 26-30 years representing 29.5% and the least were 36 years and above representing 2.79%. Female respondents were the majority 167 representing 52% of the participants and males were 155 representing 48% of the participants.

The participants in the study were drawn from the 10 schools at the university. The schools with the highest number of participants were SOBE and SEDU, each had 72 respondents representing a total of 44.72%. This was followed by SCI (41) representing 12.73% of the respondents. The school with the least respondents was SOM representing 4.04%. The majority of the participants resided in urban areas (192) representing 59.63% followed by Rural (76) representing 23.6%. Those who resided in per-urban were 54 representing 16.8% of the participants. Three approaches were employed to determine the number of factors to retain: eigenvalue, Velicer's Minimum Average Partial (MAP) test, and parallel analysis. Orthogonal varimax and oblique rotation were used to improve the interpretability of the factors. All factor loadings above 0.5, according to standard practice Stevens (2002), were used to determine the factors for analysis. The reliability of predictor factors was tested using Cronbach's alpha.

Logistic Regression analysis was then used to examine the research question because e-learning adoption as an outcome of interest is a dichotomous variable and logistic regression calculated the probability of success over the probability of failure. In the study the probability of e-learning to be adopted was coded as **1**, not adopted **0**. In the formula below **P** was the probability of the student adopting E-learning, **(P/1-P)** was the likelihood or odd ratio of acceptance and adoption. The general logistic module was expressed as follows.

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X$$

The odd ratio represented the odds of how likely an outcome will occur given a particular exposure, compared to the odds of the outcome occurring in the absence of exposure. In the study, the odd ratio was used to compare the relative odds of the occurrence in the outcome.

The model was fitted with student factors when controlling for demographic variables (i.e. age, gender, school type, and area of residence) The Chi-square test of the **model was significant** ( $p < .001$ ). The Nagelkerke  $R^2$  showed that the variables in the model accounted for a modest overall variation in retention ( $R^2 = 0.25$ ). While the model did not show the extent of adoption of e-learning (it correctly predicted 74.8% of the participants in this study), it correctly predicted 71.97% of non-adoption of e-learning. The results showed some student factors had a significant and positive influence on the adoption of e-learning. For instance, students whose ages ranged between 31-35 years old and 36 years and above were 56% ( $\text{Exp}(\beta) = .561$ ,  $p = 0.05$ ), and 12% ( $\text{Exp}(\beta) = 0.120$ ,  $p = 0.043$ ) more likely to adopt e-learning, respectively, than those whose age ranged below 20years, 21-25, and 26-30 years.

The results showed that male students were 2 times more likely to adopt to e-learning ( $\text{Exp}(\beta) = 2.129$ ,  $p = 0.026$ ) than female students. As Liaw and Huang (2013) mentioned male students showed more positive attitudes. The results showed that students belonging to the school of Computer and information were 2 times more likely to adopt e-learning ( $\text{Exp}(\beta) = 2.102$ ,  $p = 0.049$ ) than those belonging to School of Education. Similarly, students in the school of SONAS were 2 times more likely to adopt e-learning ( $\text{Exp}(\beta) = 2.246$ ,  $p = 0.017$ ) than those in SEDU. Also, the results showed that students in SOBE were 92% more likely to adopt e-learning ( $\text{Exp}(\beta) = 0.918$ ,  $p = 0.018$ ) than those in SEDU. While students in other schools such as SASS, SAVET, SOBE, SOM, SONMAPS, and SPHBTS showed a positive likelihood to adopt e-learning, the influence was not statistically significant.

Students residing in either rural or urban had no significant influence on the adoption of e-learning. While the eight student factors in the model, had a positive influence on e-learning adoption, only three factors: prefers e-learning to face-to-face ( $\text{Exp}(\beta) = 1.080$ ,  $p = 0.049$ ); environment for e-learning is conducive to learning ( $\text{Exp}(\beta) = 0.120$ ,  $p = 0.043$ ), and e-learning provides enough course content ( $\text{Exp}(\beta) = 0.120$ ,  $p = 0.043$ ) had a positive and statistically significant influence on e-learning adoption.

**Table 1:** Summary of logistic regression for student factor variables associated with the adoption of e-learning in higher education

Variables	Odd ratio	SE	Sig	95% CI	
				LB	UB
<b>Age</b>					
21-25	.507	.387	.373	.113	2.262
26-30	.476	.369	.339	.104	2.177
31-35	.561	.518	.050*	1.092	3.432
36 and above	.120	.136	.043*	1.013	1.097
<b>Gender_</b>	2.129	.278	.026*	.6971	0.829
<b>School</b>					
SASS	1.551	.852	.425	.529	4.552
SCI	2.102	.946	.049*	.871	5.077
SAVET	3.301	2.796	.159	.627	1.362
SEBE	1.660	.7625	.270	.675	4.084
SOM	1.117	.708	.862	.322	3.871
SONAS	2.246	1.346	.017**	2.694	7.270
SOBE	.918	.3289	.018**	1.455	1.852
SPHBST	.723	.373	.530	.265	1.986
SONMAPS	1.796	.911	.240	.665	4.852
<b>Residence</b>					
Rural	1.201	.475	0.642	.554	2.606
Urban	1.029	.347	0.932	.531	1.994
<b>Student Factors</b>					

e-learning_ efficient teaching-app	1.086	.111	0.421	.888	1.327
e-learning helps_ manage Time	.984	.093	0.852	.815	1.184
Prefers e-learningtoF2F	1.080	.122	0.049*	.865	1.348
Envir4E-learning_ conducive	1.088	.1143	0.23**	.885	1.337
e-learning improved My grades	.898	.100	0.334	.722	1.117
e-learning_ affordable	.909	.0890	0.330	.751	1.110
e-learningrespondtoMyLearningNeeds	.930	.103	0.510	.749	1.154
e-learning provides enough content	.812	.0890	0.05*	1.056	1.698
Correctly predicted: adoption of e-learning			74.78%		
Correctly predicted: non-adoption			71.97%		
Correctly classified			70.1%		

Note: n = 322; OR = Odds ratio; Sig = Significance level (3 dp); CI = Confidence level; LB = lower bound; UB = Upper bound. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

## Discussions

The findings that mature students aged between (31-35 years and 36 years and above) are more likely to adopt e-learning is in line with (Jung, 2011) research which found out that mature students often value the convenience & flexibility offered by e-learning platforms. The findings that male students were more likely to adopt e-learning than female students are similar to those (Liaw & Huang, 2013) who indicated that male students tend to have more positive attitudes towards technology-based learning and are more likely to adopt it compared to female students, this suggesting male students might be more comfortable with technology and more inclined to explore and use new digital learning tools. However, the findings highlight the need for institutions to address potential barriers that female students may face in adopting e-learning, such as lower self-efficacy with technology or different learning preferences. (Liaw & Huang, 2013)

Students from the School of Computing and Informatics (SCI), School of Nursing, Midwifery and Paramedic Sciences (SONAS), and School of Business and Economics (SOBE) were significantly more likely to adopt e-learning compared to those from the School of Education (SEDU) aligns with the findings from Al-Azawei et al. (2017), who reported that students majoring in computer and information sciences tend to exhibit higher levels of perceived ease of use and perceived usefulness regarding e-learning systems. The technological proficiency typically associated with these fields likely contributes to a more favourable perception and subsequent adoption of e-learning platforms.

The analysis that students residing in either rural or urban had no significant influence on the adoption of e-learning follows (Singh & Thurman 2019; Li and Lalani 2020) previous research that both groups could benefit equally from e-learning opportunities when infrastructure barriers are addressed. While the eight student factors in the model, had a positive influence on e-learning adoption, only three factors: preferring e-learning to face-to-face, environment for e-learning is conducive to learning and e-learning provides enough course content had a positive and statistically significant influence on e-learning adoption this study confirms the findings of the previous work that perceived usefulness, which includes the adequacy of course content significantly influenced students intentions to use e-learning (Lee et al., 2013).

## Summary of the findings and implications

The results of the analysis that mature students are more inclined to adopt e-learning, is likely due to their need for flexibility, self-discipline, time management skills or a clearer focus on career development (Eom & Ashill, 2016). However, it implies that, younger students might be less engaged or face barriers in effectively using e-learning platforms. Therefore, there's need for; enhancing digital literacy for younger students for example, offer mentorship programs, workshop and training programs (Allcoat & Von Muhlenen, 2018). Increase engagement for younger learners that is interactive content. Establish stronger support systems such as readily available online tutors (Gonzalez et al., 2016). Encourage blended learning approaches to help ease younger students into e-learning while maintaining the benefits of face-to face interactions (Boelens et al., 2017).

The findings that male students show higher adoption rates compared to female students, suggests potential gender disparities in the adoption of e-learning. These disparities could be attributed to differences in attitudes towards technology (Al-Qudah et al., 2019). A valuable step would be; to enhance digital confidence

among female students, by establishing peer mentoring programs whereby female students who are proficient in e-learning can support others who may be less confident (Broadbent,2017).Address gender-specific attitudes towards technology by conducting workshops on technology perception(Garcia-Martin & Cantón-Mayo,2019) and create a supportive e-learning environment by increasing awareness of e-learning for female students as suggested by Shah and Barkas (2018).By implementing these strategies, educational institutions can work towards reducing the gender gap in e-learning adoption ensuring that all students have equal opportunity to benefit from e-learning environment.

Regarding students from the School of Computing and Informatics (SCI), School of Nursing, Midwifery and Paramedic Sciences (SONAS), and School of Business and Economics (SOBE) who are more likely to be exposed to technological tools and practices as part of their curriculum, explaining their higher adoption rates. In contrast to, students from the School of Education (SEDU) who might not have the same level of exposure, leading to lower adoption rates implies that the nature of the discipline plays a crucial role in students' willingness and ability to engage in e-learning. Institutions should therefore; promote interdisciplinary collaboration by encouraging collaboration between students from different schools who could help bridge the gap in e-learning adoption (Garcia-Martin & Cantón-Mayo, 2019). Increase faculty engagement with e-learning tools within the school of education. In doing this, the institutions will work towards reducing the disparities in e-learning adoption across different academic disciplines.

## Conclusion

This research article has highlighted several key student-related factors impacting e-learning adoption at Masinde Muliro University of Science and Technology. Findings reveal that older students, male students, and those in certain academic disciplines, such as Computer and Information Sciences, are more likely to engage with e-learning. Perceptions of system usability, content quality, and a supportive learning environment significantly influence adoption rates. These insights suggest that tailored support for different student demographics and improvements in e-learning systems can enhance engagement. Institutions should focus on addressing these factors to increase the effectiveness and accessibility of e-learning programs.

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#### **Acknowledgements**

I, Cynthia Khayanga Chikamai, the primary researcher, wishes to send special gratitude to the initial supervisors of the research project (Dr. Caroline Wekullo and Dr. Pamela Buhere). I am deeply grateful for their guidance, encouragement, and insightful feedback, which significantly enhanced the quality of this work. I would also like to extend my appreciation to the students who participated in the study for

their time and willingness to provide data. Finally, I am immensely thankful to my family and friends for their unwavering support and motivation during this research journey.

**Ethical Pledge**

I, the undersigned, hereby affirm that this study was conducted with the utmost integrity and adherence to ethical research standards. All participants in the research were fully informed about the study's purpose, and their consent was obtained prior to data collection. Confidentiality and anonymity were maintained throughout the process, ensuring the privacy of the participants. Furthermore, no harm or undue influence was exerted on participants during the study. All data collected were handled responsibly, and any findings have been presented accurately, without manipulation or bias.

**Competing Interests**

There were no competing interests that could have influenced the outcomes of this study. The research was conducted impartially, with no financial, professional, or personal interests that may have biased the results or interpretation. The study was initially conducted as a requirement for the award of a Master's Degree in education planning and management policy studies.

**Author Contributions**

The researcher is the sole author of this article

**Disclaimer**

The views expressed in this research article are those of the author and do not necessarily reflect the official policy or position of any affiliated agency of the authors or the journal itself.

**Ethical Consideration Statement**

This article adhered to all ethical guidelines for research involving human or animal subjects. Approval was given by Masinde Muliro University of Science and Technology and the National Commission for Science, Technology and Innovation.