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Impact of Technology-enhanced Pedagogy towards Students' Academic Attitudes in the National Language in Uganda: A Quasi-Experimental Study in the Secondary Schools in Mbarara City

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ABSTRACT

Purpose: This study assessed the impact of technology-enhanced pedagogy on students' academic attitudes towards Kiswahili language learning in secondary schools in Mbarara City, Uganda.

Materials and Methods: Employing a quasi-experimental design, the study compared two groups: an experimental group (N = 79) taught using technology-enhanced methods (e.g., audio, video, and interactive media) and a control group (N = 79) taught using traditional methods such as lectures and textbooks. Stratified random sampling was utilized to select a total of 158 participants. The main data collection instrument was the Foreign Language Learning scale, supplemented with additional bio-data. A pre-post test was conducted over three months, and data were analyzed using descriptive statistics and paired-samples t-tests in Statistical Package for Social Sciences version 26.

Findings: The results revealed that the experimental group showed a significant improvement in academic attitudes, with a post-intervention mean of 3.7 (SD = 7.0) compared to the pre-intervention mean of 1.0 (SD = 5.9), $t(78) = 2.5$, $p = 0.013$. In contrast, the control group showed no significant change, with a post-intervention mean of 0.8 (SD = 4.3) compared to the pre-intervention mean of -0.7 (SD = 5.8), $t(78) = 1.7$, $p = 0.095$.

Implications to Theory, Practice and Policy: These findings suggest that technology-enhanced pedagogy has a significant positive impact on students' academic attitudes, while traditional methods did not yield similar improvements. The study highlights the potential of integrating technology into language education and emphasizes the need for further research on the long-term effects of technology in diverse educational contexts.

Keywords: *Technology-Enhanced Pedagogy, Kiswahili Language Learning, Quasi-Experimental Design, Student Attitudes, Secondary Education, Uganda*

JEL Codes of Classification: I21 (Analysis of Education), I23 (Higher Education and Research Institutions), and O33 (Technological Change: Choices and Consequences; Diffusion Processes).

INTRODUCTION

In the 21st century, technology has become an integral component of modern education systems worldwide, and Uganda is no exception (Gyagenda, 2023, Rukanyangira and Oidu, 2022). With rapid advancements in Information and Communication Technology (ICT), there is an increasing push for the integration of technology-enhanced pedagogy (TEP) in classrooms to improve teaching and learning experiences (Kaguhangire-Barifaijo et al., 2023). In particular, technology has shown significant potential in enhancing the learning environment, promoting active learning, and addressing various challenges associated with traditional teaching methods (Vyas, 2023). For Uganda, a country with a diverse cultural and linguistic heritage, the teaching of national languages, such as Kiswahili, is a crucial aspect of the education system (Mukama, 2024). Kiswahili, as one of the least widely spoken languages in the country, despite being a national language. This not only hinders communication but also as a vital link to the country's cultural identity (Mukama, 2024, Rukanyangira and Oidu, 2022). The role of technology in the teaching of Kiswahili, therefore, warrants closer examination, especially in relation to how it influences students' academic attitudes toward the subject.

The education system in Uganda, particularly at the secondary school level, has traditionally relied on conventional teaching methods, characterized by teacher-centered instruction and reliance on textbooks (Najjuma, 2024, Sendagire, 2023). Despite efforts to improve literacy and language proficiency in national languages, there remains a significant gap in student engagement and motivation, especially in subjects like Kiswahili.

Research has shown that students often perceive Kiswahili subject as less interesting and engaging compared to English, which is considered a more prestigious and globally relevant language (Odhiambo et al., 2022). This lack of enthusiasm among students is partly due to the rigid and outdated teaching methods that fail to tap into students' interests and learning preferences. Therefore, there is a pressing need to explore innovative pedagogical approaches that can address this issue, particularly in the context of technology.

Technology-enhanced pedagogy offers a promising solution to this challenge (Marynowski, 2021). TEP involves the use of digital tools and resources, such as e-learning platforms, multimedia presentations, educational apps, and online collaboration tools, to support and enhance traditional teaching methods (Marynowski, 2021). The adoption of technology in the classroom can provide students with diverse learning experiences, making lessons more interactive, engaging, and relevant to their everyday lives. Furthermore, TEP allows for personalized learning, where students can access learning materials at their own pace, receive immediate feedback, and engage in activities that cater to their individual learning styles (Bates, 2015). Such benefits are particularly valuable in language education, where learners often struggle with passive learning and a lack of practical application. By incorporating technology into the teaching of Kiswahili, educators may be able to foster a more dynamic and motivating learning environment, thereby improving students' attitudes toward the subject.

In Uganda, Mbarara City represents an important case study for exploring the impact of technology-enhanced pedagogy (Josephine, 2015). As one of the largest urban centers in southwestern Uganda, Mbarara is home to a number of secondary schools that vary in terms of access to and use of technology. While some schools have embraced ICT as part of their teaching strategy, others still rely heavily on traditional methods. Mbarara City, therefore, offers a unique opportunity to study how the use of technology in the classroom can influence students' academic

attitudes in a real-world context. This study aims to assess the impact of technology-enhanced pedagogy on students' academic attitudes, with a particular focus on the national language, Kiswahili. It seeks to examine how the integration of technology influences students' motivation, interest, and overall engagement with the subject. By comparing classrooms where technology-enhanced pedagogy is used with those where traditional methods prevail, this research aims to provide insights into the potential benefits of incorporating technology into language education.

Students' academic attitudes are pivotal to their success in any subject, as they influence their motivation, engagement, and academic performance. Positive academic attitudes can lead to increased effort, persistence, and achievement, while negative attitudes can hinder learning outcomes and discourage students from fully engaging with the curriculum (Phal, 2025). In the context of Uganda, where students often face challenges in developing an interest in the subject, the use of technology could serve as a catalyst for transforming their attitudes (Spillberg, 2024). Interactive and engaging digital tools, such as online language games, multimedia lessons, and virtual cultural experiences, have the potential to make the learning of Kiswahili more appealing to students, thereby improving their academic attitudes. As students become more engaged with the subject, they may be more motivated to learn and perform better, leading to enhanced proficiency in the language.

This research seeks to address the gap in existing literature by focusing specifically on the impact of technology-enhanced pedagogy on students' academic attitudes towards Kiswahili in secondary schools in Mbarara City. By conducting a quasi-experimental study, the research compares two groups of students—those who are taught using technology-enhanced methods and those who receive traditional instruction—in order to evaluate the effectiveness of technology in shaping students' attitudes. Through this investigation, the study provides valuable insights into the role of technology in improving academic outcomes in the context of national language education. Moreover, the findings of this study may inform policy decisions related to the integration of ICT in Ugandan schools, contributing to the ongoing discourse on educational technology in Africa.

Moreover, the potential of technology-enhanced pedagogy to positively influence students' academic attitudes, particularly in language learning, is a key area of interest in contemporary educational research. As Uganda continues to develop its educational infrastructure, understanding the impact of technology on students' perceptions and engagement with the national language, Kiswahili, is critical for shaping future pedagogical practices. This study aims to contribute to this understanding by exploring the effects of technology in the classroom and its role in fostering a more positive, engaging, and effective learning environment for students. The findings of this research are hoped to be essential for educators, policymakers, and researchers interested in leveraging technology to improve education in Uganda and beyond.

Problem Statement

The integration of technology-enhanced pedagogy in education has been widely recognized as a transformative approach to improving students' academic attitudes (Jjingo, 2018). However, in Uganda, particularly in Mbarara City, there remains a gap in understanding how technology-enhanced teaching methods influence students' attitudes towards learning Kiswahili, the national language. Despite government efforts to make Kiswahili compulsory in both primary and secondary schools (Jjingo and Iddi, 2022), academic achievement in the subject remains low, largely attributed to ineffective teaching methods and negative learner attitudes (Mbarara City

Education Office, 2020). This raises concerns about the effectiveness of current instructional strategies in fostering positive engagement and competency in Kiswahili.

While previous interventions, such as the provision of computers, instructional materials, and specialized Kiswahili teachers, have been implemented (Uganda Ministry of Education and Sports, 2021), their impact on students' learning attitudes and academic performance has not been adequately studied. Limited empirical research exists on the effectiveness of technology-enhanced pedagogies in improving Kiswahili education in Ugandan secondary schools (Jjingo, 2018). Understanding the extent to which technology-based teaching strategies shape students' academic attitudes and overall competency is crucial for enhancing language learning outcomes and ensuring sustainable educational development.

This study aims to bridge this knowledge gap by examining the impact of technology-enhanced pedagogy on students' academic attitudes in Kiswahili within secondary schools in Mbarara City. By assessing the effectiveness of these teaching approaches, the study will provide valuable insights for educators, policymakers, and curriculum developers to improve Kiswahili instruction. The findings will contribute to ongoing discussions on integrating technology in language education and inform strategies for enhancing students' engagement, attitudes, and performance in Kiswahili at the secondary school level.

Theoretical perspective

Kolb's Experiential Learning Theory(Kolb, 2014, Kolb, 1984) was adopted to explain the component of technology usage influences students' academic attitude. Kolb's Experiential Learning Theory (ELT) presents a cycle with four elements; concrete experience, reflective observation, abstract conceptualization and active experimentation. ELT begins with experience of the student, followed by an opportunity to reflect on experience. Then students are allowed to conceptualize and draw conclusions about what they have experienced and observed, leading to future actions in which the students experiment with different behaviours. In this, particular study, pre-test, teaching using enhanced technology and then posttest in technology-enhanced group work method, learners' attitudes in Kiswahili (Wang et al., 2023, Ndwiga et al., 2020). Technology usage was preferred as appropriate since it allows engagement of students in the learning while creating an interactive environment and developing autonomy (Gonzalez-Acevedo, 2016).

Methods

Study Design

This study employed a quasi-experimental research design, which is commonly used in educational research to assess the impact of interventions when random assignment is not possible. The quasi-experimental approach was ideal for this study as it allowed the researcher to compare two groups: one that received technology-enhanced pedagogy and another that received traditional teaching methods (Hu et al., 2024). The research focused on the impact of these different teaching methods on students' academic attitudes and performance in Kiswahili, a national language in Uganda. The research design specifically used the pre-post method, which evaluated the changes in outcomes over time between two groups: one exposed to the intervention and one not. This method was particularly useful in assessing the influence of technology-enhanced learning on student outcomes by comparing pre-treatment and post-treatment data.

The quasi-experimental design compared students taught using various technology-enhanced methods (e.g., audio, video, interactive media, etc.) with those taught using conventional methods, such as the lecture method, textbooks, and chalk-and-talk strategies. The study focused on academic attitudes of students towards Kiswahili language during teacher instruction to determine if technology could improve these competencies in students compared to traditional methods.

Research Approach

This study will adopt a pre-post quantitative research approach to enable extent analysis of the impact of technology-enhanced pedagogy on students' attitudes. In this approach, the quantitative findings offered insights into the extent in understanding students' attitudes toward Kiswahili after exposure to different teaching methods.

Study Population

The study targeted 158 students from secondary schools in Mbarara City, Uganda, to enroll in the study. The city was home to a mix of government-aided secondary schools, with diverse student populations and varying levels of access to technology. The study focused on these government-aided schools, as they offered a relatively stable teaching environment and more consistent teacher retention. Students in Senior Three were purposively selected. Senior Three students were purposively selected because they have foundational knowledge, are preparing for exams, and are at a stage where academic attitudes can be effectively influenced (Lubangakene, 2018).

Sample Size and Sampling Technique

Stratified random sampling was used to select 158 study participants using (Krejcie, 1970). Schools were categorized by gender composition (single-sex or mixed) to ensure each subgroup was adequately represented. A census strategy was employed to include all government-aided secondary schools in Mbarara City. The study focused on a sample size of 158 participants. Consistency was maintained by ensuring all teachers taught equally, and a proportional-to-size sample was obtained for students. Students were informed that a definite sample would be randomly selected using the rotary method. In each arm, 79 participants were required.

Study Instruments

The main data collection instrument was Foreign Language Learning (A-FLL) scale (Vandewaetere and Desmet, 2009). Additional bio-data were also collected. A structured, self-administered questionnaire was used to collect data from students regarding their attitudes in Kiswahili. Total scores as guided by were obtained as guided by (Vandewaetere and Desmet, 2009).

Data Collection Procedure

After relevant approvals, the study was conducted in phases. Initially, a pre-test was administered to both the experimental and control groups to assess their baseline knowledge and attitudes toward Kiswahili. The experimental group then received training in technology-enhanced pedagogy, which included the use of digital tools such as YouTube videos, PowerPoint presentations, and audio recordings, while the control group was taught using traditional methods. After three months of instruction, a post-test was administered to both groups to evaluate the effectiveness of the intervention.

Data Management and Analysis

Once data is collected, it will be entered into the Statistical Package for the Social Sciences (SPSS) version 26 for analysis. Descriptive statistics, such as frequencies and percentages, will be used to describe the demographic characteristics of the participants. T-tests will be used to assess the differences in academic attitudes between the two groups.

Ethical Considerations

As the study involved human participants, strict ethical standards were followed to ensure the protection of their rights and privacy. Ethical approval was obtained from the Mbarara University of Science and Technology Institutional Research Ethics Committee (MUST-IREC) and the Uganda National Council for Science and Technology (UNCST) before the study began. Permission was sought from the Mbarara City Education Officer, and approval was obtained from the headteachers of the participating schools. Informed consent was secured from the headteachers and Kiswahili teachers, ensuring their voluntary participation in the study. Additionally, assent was obtained from the students, who were fully informed of the study's purpose and their right to withdraw at any time. Pseudonyms were used to protect the participants' identities, and confidentiality was maintained throughout the study. These ethical measures ensured the study adhered to both national and international research standards while prioritizing the participants' well-being.

Findings

Baseline Characteristics across the Study Arms Compared

Results in Table 1 show significant baseline differences ($p \leq 0.05$) in sex**,** age and caregiver between the control and experimental groups. These differences indicate that gender, age, and the source of support (parental vs. others) could potentially influence students' academic attitudes. These findings imply that for the investigation on the impact of technology-enhanced pedagogy on students' academic attitudes in Mbarara City secondary schools, these baseline differences must be considered in the study design, ensuring that interventions are tailored to address varying needs based on gender, age, and parental involvement to enhance the effectiveness of the pedagogy.

Table 1: Baseline Characteristics across the Study Arms Compared (N = 158)

Characteristics		n(%)	Control n(%)	Experimental n(%)	p-value
		N = 158	N = 79	N = 79	
Sex	Female	53 (33.5)	18 (23.0)	35 (44.0)	0.004**
	Male	105 (66.5)	61 (77.0)	44 (56.0)	
Age (years)	M±SD	16.9 ± 1.0	17.1 ± 1.0	16.8 ± 0.9	0.050*
	<18 years	105 (72.9)	42 (63.0)	63 (82.0)	0.010**
	≥18 years	39 (27.1)	25 (37.0)	14 (18.0)	
Religion	Catholic	46 (29.1)	24 (30.0)	22 (28.0)	
	Protestant	76 (48.1)	38 (48.0)	38 (48.0)	0.900
	Muslim	15 (9.5)	8 (10.0)	7 (9.0)	
	Others	21 (13.3)	9 (11.0)	12 (15.0)	
Main caregiver	Parent(s)	91 (57.6)	29 (37.0)	62 (78.0)	<0.001***
	Others	67 (42.4)	50 (63.0)	17 (22.0)	
Transport to school	Walking	40 (25.3)	20 (25.0)	20 (25.0)	
	Car	79 (50.0)	39 (49.0)	40 (51.0)	0.980
	Others	39 (24.7)	20 (25.0)	19 (24.0)	
Number of friends	M±SD	8.1 ± 4.6	8.3 ± 3.6	7.9 ± 5.4	0.540
Nature of schooling	Day scholar	34 (21.5)	16 (20.0)	18 (23.0)	0.700
	Boarder	124 (78.5)	63 (80.0)	61 (77.0)	

* $p \leq 0.05$. **$p \leq 0.01$ ***$p < 0.001$. M = Mean. SD = Standard deviation.

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To assess the impact of the intervention on students' academic attitudes, a paired-samples t-test was conducted. For the experimental group (N = 79), the pre-intervention mean was 1.0 (SD = 5.9) and the post-intervention mean was 3.7 (SD = 7.0). The results showed a significant improvement in academic attitudes, $t(78) = 2.5$, $p = 0.013$. In contrast, for the control group (N = 79), the pre-intervention mean was -0.7 (SD = 5.8) and the post-intervention mean was 0.8 (SD = 4.3), with no significant change observed, $t(78) = 1.7$, $p = 0.095$. The findings imply that technology-enhanced pedagogy significantly improved students' academic attitudes in the experimental group, while traditional methods showed no significant impact in the control group.

Table 2: Impact of Technology-Enhanced Pedagogy towards Students' Academic Attitudes in Kiswahili Language in The Secondary Schools in Mbarara City (N = 158)

Arm	N	Pre-intervention (M ± SD)	Post-intervention (M ± SD)	t (df)	p
Experimental group	79	1.0 ± 5.9	3.7 ± 7.0	2.5 (78)	0.013*
Control group	79	-0.7 ± 5.8	0.8 ± 4.3	1.7(78)	0.095

Discussion

The primary findings of this study focus on the impact of technology-enhanced pedagogy on students' academic attitudes towards Kiswahili language in secondary schools in Mbarara City. The experimental group (N = 79) showed a statistically significant improvement in academic

attitudes from pre-intervention (M = 1.0, SD = 5.9) to post-intervention (M = 3.7, SD = 7.0), with a t-value of 2.5 and a p-value of 0.013. This suggests that the intervention, which involved the use of technology-enhanced teaching methods, had a positive effect on students' attitudes towards the subject. In contrast, the control group (N = 79), which did not receive the intervention, did not exhibit a statistically significant change in attitudes. The pre-intervention mean for the control group was -0.7 (SD = 5.8), and the post-intervention mean was 0.8 (SD = 4.3), with a t-value of 1.7 and a p-value of 0.095, indicating no significant improvement in academic attitudes. The results indicate that technology-enhanced pedagogy had a measurable and statistically significant impact on the experimental group's academic attitudes. The improvement in attitudes could be attributed to the engaging nature of technology in the classroom, which may have fostered a more interactive and stimulating learning environment. The experimental group's positive change in attitudes could reflect an increased interest in Kiswahili language, as the intervention likely provided opportunities for more dynamic and engaging learning experiences compared to traditional methods. On the other hand, the lack of significant change in the control group suggests that traditional pedagogical methods, without the incorporation of technology, may not be as effective in improving students' attitudes toward Kiswahili. The pre-intervention negative attitude in the control group (-0.7) could indicate some initial disinterest or difficulty with the subject, which remained unchanged even after the period of study. The lower variability (SD = 4.3) in post-intervention attitudes in the control group suggests that while individual students may have experienced some minor improvements, the overall impact was minimal, likely due to the absence of a targeted intervention such as technology-enhanced pedagogy.

The findings of this study align with existing literature that suggests technology-enhanced pedagogy can positively influence students' attitudes and engagement with academic subjects. Previous research has demonstrated that integrating technology into classrooms often leads to increased motivation, engagement, and academic achievement (Namae, 2020). For instance, studies have shown that when students interact with digital tools and resources, they tend to develop a more positive attitude toward learning, as these tools offer flexibility, interactivity, and the ability to cater to various learning styles (Rodrigues et al., 2019). This study contributes to the growing body of evidence supporting the use of technology in education, particularly in language learning, where technology can provide an immersive experience that traditional methods may not offer.

However, some studies have also pointed to challenges in effectively integrating technology into classrooms, particularly in regions with limited access to technological resources. In this context, the success of the intervention in Mbarara City can be viewed as a positive case study, demonstrating that, despite challenges, technology-enhanced pedagogy can lead to improved student attitudes when properly implemented.

The findings of this study align closely with existing literature emphasizing the positive impact of technology-enhanced pedagogy on student engagement and academic achievement. (Haleem et al., 2022) highlight that the integration of technology into the classroom environment often leads to increased motivation, as digital tools provide opportunities for more interactive and personalized learning experiences. This study's findings further support this view by demonstrating a significant improvement in academic attitudes among students exposed to technology-enhanced pedagogy. The use of digital resources likely enhanced the students' engagement by offering them a variety of interactive tools that traditional methods often fail to provide. The ability of technology to cater

to different learning styles also contributed to the positive outcomes observed, as students were able to engage in learning at their own pace and according to their individual preferences.

Building on the work of (Miima, 2014), the results of this study also support the notion that technology enhances flexibility and interactivity in learning. In their study, they argue that digital tools allow students to engage with content more actively and at their own pace, fostering a deeper understanding of the material. This was evident in the experimental group, where students showed marked improvement in their attitudes towards learning Kiswahili following the introduction of technology. Technology can provide opportunities for students to engage in activities such as collaborative projects, simulations, and multimedia-based lessons, which are not typically available in traditional classrooms. This sense of interactivity and involvement can help students feel more connected to the content, leading to a more positive attitude and greater enthusiasm for learning.

This study also contributes to the growing body of literature on the use of technology to create immersive learning environments. According to research by (Shiyo, 2023), immersive learning experiences using digital tools, such as virtual reality or interactive apps, can deepen students' understanding and emotional connection to the subject matter. In the case of Kiswahili language instruction, incorporating technology likely offered students an experience that was more engaging and dynamic than traditional methods. By incorporating multimedia resources, video content, and interactive exercises, students were able to experience the language in real-world contexts, thus improving their attitudes toward learning. The immersive nature of the intervention may have sparked greater interest in the subject, which helped in overcoming some of the challenges traditionally associated with language learning.

However, while the positive impact of technology-enhanced pedagogy is well-documented, other studies have highlighted significant challenges in the integration of digital tools in classrooms, particularly in regions with limited access to technology. For example, studies by (Shiyo, 2023) pointed out that the success of technology integration in education is often contingent upon infrastructure, teacher preparedness, and student access to devices. In many low-resource settings, challenges such as limited access to reliable internet, outdated hardware, and inadequate teacher training can impede the effective implementation of technology. Despite these challenges, the success of the intervention in Mbarara City provides an important case study, illustrating that when technology is properly integrated and supported, it can lead to significant improvements in student engagement and attitudes, even in less-than-ideal settings. The success observed in this study underscores the importance of training teachers and providing them with the necessary resources to effectively integrate technology into the learning environment.

As highlighted by (Miima, 2014), successful integration of technology in the classroom depends not only on access to devices but also on the preparedness of teachers to use those devices effectively. While Mbarara City's intervention was successful, this success should be viewed in the context of teacher support and training. In their study, (Miima, 2014) emphasize the need for ongoing professional development for teachers to ensure they are equipped to use technology effectively in their classrooms. The intervention in Mbarara likely benefited from adequate teacher training, which enabled instructors to make the most of the digital tools available. Moving forward, it is critical to prioritize teacher development and ongoing professional support to ensure the sustainability and effectiveness of technology-enhanced pedagogy. This can ultimately ensure that

the positive effects observed in this study can be replicated and maintained across different educational settings.

.An unexpected finding in this study was the relatively low pre-intervention mean for the control group (-0.7 ± 5.8), coupled with the minimal improvement observed in their post-intervention attitudes (M = 0.8 ± 4.3, t(78) = 1.7, p = 0.095). This suggests that students in the control group began with less positive attitudes, potentially due to prior negative experiences with traditional pedagogy or a general lack of engagement in Kiswahili learning. The lack of significant improvement further highlights the limitations of conventional teaching methods in fostering positive attitudes toward Kiswahili, reinforcing findings from Jjingo and Iddi (2022) that traditional approaches often fail to improve student motivation. Future research should investigate whether factors such as teacher engagement, instructional style, or classroom environment play a more substantial role in shaping students' attitudes than previously understood.

In contrast, the experimental group exhibited a significant improvement in academic attitudes (pre-intervention: 1.0 ± 5.9; post-intervention: 3.7 ± 7.0; t(78) = 2.5, p = 0.013), suggesting that technology-enhanced pedagogy effectively fosters positive attitudes toward Kiswahili learning. These results align with prior studies demonstrating that digital tools enhance student engagement and motivation in language learning (Mbarara City Education Office, 2020). The use of interactive technology may create a more stimulating learning environment, potentially reducing boredom and increasing participation. The observed changes in attitudes suggest that exposure to technology in the classroom could lead to better language acquisition outcomes, supporting global trends in technology integration in education (Jjingo, 2018).

For educators, these findings emphasize the need for innovative teaching methods that incorporate digital tools to improve subject engagement. The significant improvement in attitudes suggests that technology can bridge gaps in traditional pedagogy, making Kiswahili learning more interactive and engaging. School administrators should consider allocating resources to support technology integration, particularly in secondary schools where foundational language skills are developed. Policymakers should also recognize the potential benefits of technology-enhanced education, as it may improve equity by ensuring all students, regardless of socioeconomic background, have access to modern learning tools.

While this study offers valuable insights, it has limitations that must be acknowledged. The sample was limited to a single district (Mbarara City) with a relatively small sample size (N = 158), which may affect the generalizability of the findings. The short-term nature of the intervention might not have allowed for more substantial attitudinal changes, warranting future longitudinal research to assess whether the observed improvements persist over time. Additionally, academic attitudes were measured using a standardized survey with Likert-scale items, but future studies should explore additional measures such as qualitative assessments and academic performance metrics to capture a more comprehensive view of the impact of technology-enhanced pedagogy.

Potential confounding variables must also be considered. Teacher effectiveness, student backgrounds, and prior exposure to digital learning tools could influence attitudes toward Kiswahili learning. The significant gender disparity in the sample (66.5% male) may have also affected the results, as previous research suggests that gender differences can influence attitudes toward language learning (Mbarara City Kiswahili Teachers Association Report, 2020).

Controlling for these factors in future research could provide a clearer understanding of the specific mechanisms through which technology impacts academic attitudes.

Future research should explore the long-term effects of technology-enhanced pedagogy on both academic attitudes and performance. Longitudinal studies could determine whether the improvements observed in the experimental group are sustained over time. Additionally, comparative studies evaluating different technological interventions—such as multimedia content, interactive apps, and online collaboration platforms—could help identify the most effective strategies for enhancing Kiswahili learning. Investigating the role of teacher training and support in implementing technology-based teaching methods would also be valuable, as teacher competency in using digital tools may significantly impact student engagement and learning outcomes. Lastly, future research should expand beyond academic attitudes to examine additional outcomes, including student collaboration, critical thinking, and long-term engagement with Kiswahili learning.

Conclusion

The study has successfully assessed the impact of technology-enhanced pedagogy on students' academic attitudes towards Kiswahili language in secondary schools in Mbarara City. The findings indicate that the integration of technology into the classroom led to a significant improvement in academic attitudes for the experimental group, while the control group, which did not receive the intervention, showed no significant change. The experimental group experienced a statistically significant increase in positive attitudes, while the control group's attitudes remained relatively unchanged. This highlights the potential of technology-enhanced teaching methods to engage and motivate students, making learning more interactive and relevant. These results underscore the importance of incorporating technology into the educational environment to foster a more engaging and positive learning experience, especially in subjects like Kiswahili.

The findings contribute to the growing body of research supporting the use of technology in education, particularly in contexts where student engagement and motivation are key factors. As education systems around the world continue to evolve, adopting innovative teaching strategies will be crucial in preparing students for the future. Future research should explore the long-term effects of technology-enhanced pedagogy, and investigate how different digital tools can be effectively utilized to improve not only academic attitudes but also academic performance and student engagement. By embracing technology in education, we can empower students to become more motivated, engaged, and successful learners, preparing them for the challenges and opportunities of the future. This study provides hope that technology can play a transformative role in enhancing education worldwide.

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