



Students' Perception of Digital Language Learning and Its Influence on Their Engagement and Motivation: A Case Study of EFL Learners in Rwandan Secondary Schools

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ABSTRACT

The integration of digital technologies has enhanced language learning by improving access to resources, interaction, and learner autonomy in Rwanda. National Information and Communication Technology initiatives support competence-based education, yet the use of digital tools in classrooms remains uneven. Despite these efforts, many students are not fully engaged or motivated when using digital language learning tools. This study therefore sought to examine students' perceptions of digital language learning and their influence on academic engagement and motivation in Rwandan secondary schools. A quantitative approach using a cross-sectional explanatory design was adopted. Data were collected from 200 secondary school students in Kamonyi District through a structured questionnaire based on a five-point Likert scale. Descriptive and inferential statistics, including correlation, regression analysis, and Structural Equation Modelling (SEM), were used to analyze relationships among perception, engagement, and motivation. The results revealed that students have highly positive perceptions of digital language learning tools, particularly in enhancing understanding, confidence, and independent learning. Significant positive relationships were found between perception and engagement (r up to 0.66) and between perception and motivation ($r = 0.64$). Regression analysis showed that perception ($\beta = 0.49$) and engagement ($\beta = 0.37$) significantly predict motivation, explaining 54% of its variance. SEM findings further confirmed that engagement partially mediates the relationship between perception and motivation. The study concludes that positive student perceptions significantly enhance engagement and motivation in digital language learning. It implies that improving students' experiences with digital tools is essential for better learning outcomes. The study recommends increased investment in digital infrastructure, enhanced teacher

training, and the integration of interactive, learner-centered digital strategies to optimize language learning in Rwandan secondary schools.

Keywords: digital language learning, students' perceptions, academic engagement, learning motivation, secondary education, and educational technology

INTRODUCTION

The rapid advancement of digital technologies has significantly transformed educational practices worldwide, reshaping how teaching and learning are conceptualized and implemented. In the context of language education, digital learning has emerged as a powerful pedagogical approach that offers innovative opportunities to enhance learners' engagement, motivation, and learning experiences (Ndayisenga & Mbato, 2024). Digital learning, broadly defined as the use of digital tools, platforms, and resources to facilitate teaching and learning processes, has gained increasing prominence in both developed and developing countries (Ebadi et al., 2024).

In this study, digital tools refer specifically to educational technologies used to support language learning, including mobile applications (e.g., language learning apps), multimedia resources (videos and audio materials), online platforms (learning management systems), and interactive classroom technologies. These tools are used to enhance students' engagement, motivation, and overall learning experience in English as a Foreign Language (EFL) contexts (Anggrainy et al., 2024).

Digital tools have significantly reshaped language learning by promoting learner autonomy, enhancing communication, and supporting critical thinking. They provide opportunities for personalized and self-paced learning (Zhang & Miao, 2025). These technologies enable learners to access authentic materials, engage in collaborative tasks, and receive immediate feedback, all of which contribute to improved language proficiency (Yuan & Liu, 2025). Unlike traditional teacher-centered approaches, digital learning environments enable learners to interact with content dynamically, collaborate with peers, and access diverse learning materials beyond the classroom (Li et al., 2024a). These features are particularly relevant in language learning, where exposure, practice, and interaction play critical roles in developing linguistic competence. Studies have shown that digital tools can enhance vocabulary acquisition, listening comprehension, and speaking skills by providing authentic and immersive learning experiences (Ndayisenga & Kuswandono, 2025). Furthermore, the integration of multimedia elements such as audio, video, and gamified activities can make language learning more engaging and meaningful for students (Wei, 2022). However, despite these benefits, digital tools may also present challenges, including distraction, over-reliance on technology, and unequal access due to infrastructural limitations (Mohammad Hosseini et al., 2022). These drawbacks highlight the need for balanced and equitable integration of digital technologies in education.

In recent years, there has been a growing interest in understanding the interplay between students' perceptions of digital learning and their levels of engagement and motivation. Empirical studies suggest that students who hold positive perceptions of digital learning environments tend to exhibit higher engagement and motivation levels, leading to improved learning outcomes (Jabbari et al., 2025). However, this relationship is not always straightforward, as it can be influenced by various contextual factors such as access to technology, digital literacy, teacher support, and socio-economic conditions (Liu et al., 2024a). Therefore, examining students' perceptions within specific educational contexts is essential for understanding how digital learning can be effectively implemented.

In the context of Rwanda, the integration of digital technologies in education has been prioritized as part of broader national development strategies aimed at building a knowledge-based economy (Iyamuremye et al., 2025). The government has made significant investments in ICT infrastructure, including initiatives such as the One Laptop per Child program and the Smart Education initiative, to promote digital literacy and enhance

teaching and learning practices. The Rwanda Basic Education Board has also emphasized the use of technology in teaching through the Competence-Based Curriculum, which advocates for learner-centered and technology-enhanced pedagogies (Nkundabakura et al., 2023). In language education, digital tools are expected to support the development of communication skills, critical thinking, and independent learning among students.

However, despite these policy efforts, the actual integration of digital learning in Rwandan secondary schools remains uneven and faces several challenges. Studies conducted in the Rwandan context indicate that while digital resources are increasingly available, their effective use in classroom instruction is often limited by factors such as inadequate teacher training, limited access to reliable internet, and insufficient pedagogical support (Nsabayezu et al., 2022). Moreover, students' experiences with digital learning vary significantly depending on the availability of resources and the level of support provided by teachers and schools (Mpumuje et al., 2025). As a result, there is a need to critically examine how students perceive digital learning and how these perceptions influence their engagement and motivation in language learning.

Language learning in Rwandan secondary schools presents unique challenges and opportunities. English, as the medium of instruction, plays a crucial role in students' academic success and future career prospects. However, many students struggle with language proficiency due to limited exposure and practice opportunities outside the classroom (Uwizeyimana & Niyomugabo, 2023). Digital learning tools have the potential to address these challenges by providing additional resources and opportunities for practice, such as online exercises, language learning applications, and interactive content (Manirahari et al., 2025). Nevertheless, the effectiveness of these tools depends on students' willingness to use them and their perceptions of their usefulness.

While previous studies have explored the impact of digital learning on academic performance and skill development, there is still a limited understanding of how students' perceptions of digital language learning influence their engagement and motivation, particularly in the Rwandan context. Existing research often focuses on technological infrastructure and teacher practices, with less attention given to students' perspectives as key stakeholders in the learning process. This represents a critical gap in the literature, as students' perceptions play a central role in determining the success of digital learning initiatives. Against this background, the present study seeks to examine students' perceptions of digital language learning and their influence on engagement and motivation in Rwandan secondary schools. By focusing on students' perspectives, the study aims to provide deeper insights into how digital learning can be optimized to enhance language education outcomes.

This study contributes to the growing body of knowledge on the integration of digital technologies in language education, particularly within the context of secondary schools in Rwanda. By examining students' perceptions of digital language learning tools, the study provides valuable insights into how learners interact with and respond to technology-enhanced learning environments. Understanding these perceptions is critical for improving the design and implementation of digital learning strategies that are both effective and learner-centered. The study is significant for educators as it highlights the role of digital tools in enhancing student engagement and motivation, which are key determinants of successful language learning. The findings can guide teachers in selecting and utilizing appropriate digital resources that foster active participation and sustained interest among learners. For policymakers and curriculum developers, the study offers evidence-based recommendations for integrating digital language learning into the national education system. It supports efforts to promote innovative teaching practices aligned with the demands of the digital age. Furthermore, the development of a predictive model linking digital learning, engagement, and motivation provides a framework for future research and intervention design. Ultimately, the study contributes to improving the quality of language education and learner outcomes in Rwanda.

LITERATURE REVIEW

Theoretical and Conceptual Foundations of Digital Language Learning

The integration of digital technologies in education is underpinned by several theoretical frameworks that explain how learners interact with technology and how such interactions influence learning outcomes. Among the most influential frameworks are the Technology Acceptance Model (TAM), Self-Determination Theory (SDT), Constructivist Learning Theory, and Computer-Assisted Instruction (CAI) approaches. These theories collectively provide a strong foundation for understanding the relationship between digital language learning, student engagement, and motivation.

The Technology Acceptance Model (TAM), developed by Davis, posits that individuals' acceptance and use of technology are primarily determined by two key factors: perceived usefulness and perceived ease of use. In the context of digital language learning, students are more likely to adopt and engage with digital tools when they perceive them as beneficial for improving their language skills and easy to navigate. Empirical studies have consistently validated TAM in educational settings, demonstrating that positive perceptions of digital tools significantly influence learners' attitudes, engagement, and academic performance (Dehghani & Mashhadi, 2024; Hsu & Lin, 2022). Thus, students' perceptions serve as a critical entry point for understanding how digital learning environments shape educational outcomes.

Self-Determination Theory (SDT), proposed by Deci and Ryan, provides further insight into the motivational processes underlying digital learning. SDT emphasizes that intrinsic motivation is fostered when learners' psychological needs for autonomy, competence, and relatedness are satisfied. Digital language learning environments often support these needs by allowing learners to control the pace of their learning (autonomy), receive immediate feedback (competence), and interact with peers and instructors (relatedness) (Alamer et al., 2025). As a result, students who perceive digital tools positively are more likely to experience higher levels of intrinsic motivation, which in turn enhances their engagement and persistence in learning activities (Lanvers & Graham, 2022).

Constructivist Learning Theory also plays a central role in explaining the effectiveness of digital learning. According to this theory, learning is an active process in which learners construct knowledge through interaction with their environment (Mishra, 2023). Digital tools facilitate this process by providing interactive, multimedia-rich environments where learners can explore, experiment, and collaborate (Song et al., 2023). Features such as discussion forums, simulations, and multimedia resources enable learners to engage in meaningful learning experiences that promote deeper understanding and critical thinking (Ly, 2024).

Historically, the integration of technology in education can be traced back to Computer-Assisted Instruction (CAI) approaches in the late 20th century. CAI emphasized individualized instruction, immediate feedback, and self-paced learning, laying the groundwork for modern digital learning environments (Xie, 2022). While CAI systems were limited in interactivity and accessibility, advancements in technology have transformed these systems into sophisticated platforms that support diverse learning needs. The evolution from CAI to contemporary digital learning tools highlights the increasing importance of learner-centered approaches in education. Therefore, these theoretical perspectives provide a comprehensive framework for understanding how digital language learning influences students' perceptions, engagement, and motivation. They also underscore the importance of designing digital learning environments that are not only technologically advanced but also pedagogically sound.

Digital Tools in Language Learning: Types and Pedagogical Uses

Digital language learning encompasses a wide range of tools and technologies that support the acquisition of language skills. These tools can be broadly categorized into learning management systems (LMS), mobile applications, multimedia resources, communication platforms, and interactive classroom technologies. Each category serves distinct pedagogical purposes and contributes to different aspects of language learning.

Learning management systems, such as Moodle and Google Classroom, provide structured environments for organizing course content, assignments, and assessments. They facilitate communication between teachers and students and enable the tracking of learners' progress. In language learning contexts, LMS platforms support the delivery of instructional materials, quizzes, and discussion forums, thereby enhancing both teaching efficiency and student engagement (Qaddumi & Smith, 2024). Additionally, mobile applications, such as Duolingo and Babbel, have gained popularity due to their accessibility and user-friendly design. These applications offer interactive exercises, gamified learning experiences, and personalized feedback, making language learning more engaging and flexible (Shortt et al., 2023). Mobile-assisted language learning allows students to practice language skills anytime and anywhere, thereby extending learning beyond the classroom (Li et al., 2024b).

Multimedia resources, including videos, audio recordings, and animations, play a crucial role in enhancing language comprehension and retention. These resources provide authentic input and expose learners to diverse linguistic and cultural contexts (Ho & Tai, 2024). For example, videos can improve listening and speaking skills, while interactive animations can aid in understanding complex grammatical structures (Yetti et al., 2024). Communication platforms, such as discussion forums, chat tools, and video conferencing applications, facilitate interaction and collaboration among learners. These platforms enable students to practice language skills in real-time, engage in peer learning, and receive feedback from instructors (Toluzhan et al., 2022). Such interactions are essential for developing communicative competence and building confidence in language use. Furthermore, interactive classroom technologies, including smartboards and digital quizzes, further enhance engagement by making lessons more dynamic and participatory. These tools allow teachers to incorporate interactive activities that encourage student participation and active learning (Niu & Liu, 2022).

Positive Impacts of Digital Language Learning

A substantial body of research highlights the positive impact of digital tools on language learning. One of the most significant benefits is the enhancement of learner autonomy. Digital tools enable students to take control of their learning by allowing them to access resources, practice skills, and monitor their progress independently (Slamet, 2024). This autonomy fosters self-regulated learning and encourages students to take responsibility for their educational outcomes. Another key advantage is the improvement of communication skills (Sari, 2024). Digital platforms provide opportunities for interaction through discussion forums, chats, and collaborative projects. These interactions enable learners to practice language skills in authentic contexts, thereby improving their fluency and confidence (Xiao & Zhi, 2023).

Digital tools also promote critical thinking and problem-solving skills. Interactive features such as simulations, quizzes, and gamified activities require learners to analyze information, make decisions, and apply knowledge in different contexts (Pikhart et al., 2024). These activities enhance cognitive engagement and contribute to deeper learning. Furthermore, digital learning environments increase students' motivation by making learning more engaging and enjoyable (Vo & Nguyen, 2024). Features such as gamification, instant feedback, and multimedia content create a stimulating learning experience that captures students' interest (Liu et al., 2025).

Challenges and Negative Impacts of Digital Tools in Language Learning

Despite the numerous benefits, the use of digital tools in language learning is not without challenges. One of the primary concerns is the issue of unequal access to technology, often referred to as the digital divide (Manchanayaka, 2023). In many developing countries, including Rwanda, limited access to reliable internet, digital devices, and technical support can hinder the effective implementation of digital learning. This disparity creates inequalities in learning opportunities and outcomes. Another challenge is the potential for distraction and reduced attention span (Abutalebi & Clahsen, 2022). Over-reliance on digital tools may also reduce learners' ability to engage in deep, focused learning (Sari & Abrar, 2024).

Additionally, some students may lack the digital literacy skills required to effectively use digital tools (Ghafari et al., 2023). Without proper guidance and training, learners may struggle to navigate digital platforms, limits their ability to benefit from these technologies. Teachers also face challenges in integrating digital tools into their teaching practices, particularly when they lack adequate training and support (Al Shuraiaan et al., 2024).

Empirical Evidence on Digital Language Learning, Engagement, and Motivation

Empirical research provides strong evidence of the relationship between digital language learning, student engagement, and motivation. Studies have consistently shown that students who have positive perceptions of digital learning environments are more likely to be engaged and motivated (Lena & Nikolov, 2025). This relationship is often explained through the interplay of cognitive, emotional, and behavioral engagement.

Digital tools enhance cognitive engagement by providing interactive and multimedia-rich learning experiences that promote deeper processing of information (Zhang, 2025). Additionally, digital tools that incorporate gamification and interactive features have been shown to increase students' enjoyment and positive attitudes (Liu et al., 2024a). Behavioral engagement, on the other hand, relates to students' participation in learning activities. Digital platforms encourage active participation through interactive tasks, quizzes, and collaborative activities (Shen et al., 2024).

Research has also demonstrated that engagement mediates the relationship between perception and motivation. In other words, students' perceptions of digital tools influence their level of engagement, which in turn affects their motivation (Ma & Yan, 2022). This finding aligns with theoretical frameworks such as TAM and SDT, which emphasize the role of perception and engagement in shaping motivation. For example, research on mobile-assisted language learning indicates that learners who use language learning apps regularly exhibit higher levels of motivation and improved language skills (Hiver et al., 2024). Similarly, studies on digital gamification have found that game-based learning environments increase students' engagement and motivation by making learning more interactive and enjoyable (Al-Khresheh, 2025; Liat & Hayak, 2025).

Research Gap

While existing studies have explored various aspects of digital learning, there remains a significant gap in understanding how students' perceptions of digital language learning influence their engagement and motivation, particularly in the Rwandan context. Most studies have focused on technological infrastructure and teacher practices, with limited attention given to students' perspectives. Furthermore, few studies have integrated theoretical frameworks such as TAM and SDT to examine the relationships among perception, engagement, and motivation.

Research Objectives

- a) To examine students' perceptions of digital language learning tools in Rwandan secondary schools.

- b) To analyze the relationship between students' perceptions of digital language learning and their level of academic engagement.
- c) To determine the influence of digital language learning on students' motivation to learn languages.
- d) To develop and test a predictive model linking digital language learning, student engagement, and motivation in the context of Rwandan secondary education.

Hypotheses

H1: Students in Rwandan secondary schools have significantly positive perceptions of digital language learning tools.

H2: There is a significant positive relationship between students' perceptions of digital language learning tools and their level of academic engagement.

H3: Digital language learning has a significant positive influence on students' motivation to learn languages.

METHODOLOGY

This section outlines the procedures that were followed to investigate the relationships among digital language learning, students' perceptions, academic engagement, and motivation in Rwandan secondary schools. It describes the research design, approach, target population, sampling techniques, data collection methods, and data analysis procedures employed in the study, as well as the validity and reliability of the study.

Research Design

This study adopted a cross-sectional explanatory research design to investigate students' perceptions of digital language learning and their influence on engagement and motivation in Rwandan secondary schools. The explanatory design was appropriate because the study aimed not only to describe students' perceptions but also to examine the relationships and predictive effects among key variables, including perception, engagement, and motivation. The cross-sectional nature of the design allowed data to be collected at a single point in time from a relatively large sample, making it efficient for identifying patterns and testing hypothesized relationships within the school context. Additionally, the design incorporated elements of correlational and predictive research, enabling a comprehensive analysis of both direct and indirect effects among the study variables.

Research Approach

The study employed a quantitative research approach grounded in a positivist paradigm, which assumes that reality is objective and can be measured using structured instruments. This approach was considered appropriate for examining relationships among key variables and for generalizing findings to the broader population of secondary school students. It enabled the use of standardized questionnaires to measure constructs such as students' perceptions of digital language learning, academic engagement (behavioral, emotional, and cognitive), and learning motivation (intrinsic and extrinsic). Furthermore, the quantitative approach supported the application of advanced statistical techniques, including Structural Equation Modeling (SEM), allowing for the simultaneous examination of direct and indirect relationships among variables and enhancing the robustness and credibility of the findings.

Population and Sampling Methods

The target population of this study comprised secondary school students studying English as a Foreign Language (EFL) in Kamonyi District, Rwanda. The participants were typically aged between 14 and 20 years, representing both lower and upper secondary education levels. A multi-stage sampling technique was employed to enhance representativeness and ensure methodological rigor. In the first stage, purposive sampling was used to select secondary schools that had access to and utilized digital language learning tools such as mobile applications, multimedia resources, and online learning platforms. This ensured that the selected schools were relevant to the study context. In the second stage, stratified random sampling was applied to categorize students based on grade level, ensuring proportional representation across different academic levels. In the final stage, simple random sampling was used to select individual students from each stratum, thereby minimizing selection bias and giving all students an equal chance of participation. A total of 200 students were selected to participate in the study, which was considered adequate for statistical analysis, including Structural Equation Modeling. Data collection was conducted over a specified period in February 2026. Participation in the study was voluntary, and written informed consent was obtained from all participants. For students below the age of 18 years, additional consent was obtained from their parents or guardians in accordance with ethical research standards.

Instrumentation

Data for this study were collected using a structured questionnaire developed based on validated instruments from existing literature on digital learning, student engagement, and motivation (Jabbari et al., 2025; Li et al., 2024a; Liu et al., 2024b). The questionnaire consisted of three main sections corresponding to the key constructs of the study: students' perceptions of digital language learning (8 items), academic engagement (6 items covering behavioral, emotional, and cognitive dimensions), and learning motivation (6 items reflecting intrinsic and extrinsic aspects). All items were measured using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5), ensuring consistency and ease of response. To ensure contextual relevance, the instrument was carefully adapted to the Rwandan educational context. Specifically, references to digital tools were modified to reflect commonly used technologies in Rwandan secondary schools, such as mobile learning applications, multimedia classroom resources, and online learning platforms. Additionally, items related to access and usage were adjusted to align with local infrastructural realities, and the language of the questionnaire was simplified to ensure clarity and comprehension among secondary school students. The instrument was reviewed by five experts in educational technology and language education to ensure content validity prior to data collection. Additionally, a pilot study was then conducted with a small group of participants similar to the target population to test the clarity and reliability of the questionnaire. The results of the pilot informed further refinement, and internal consistency reliability was established using Cronbach's alpha coefficients, which indicated acceptable levels for all measured constructs.

Data Analysis

Data analysis was conducted using a combination of descriptive and inferential statistical techniques, supported by statistical software such as SPSS and AMOS. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize the demographic characteristics of the respondents and to provide an overview of students' perceptions, engagement, and motivation levels. Inferential statistics were employed to test the study's hypotheses. Initially, correlation analysis was conducted to examine the strength and direction of relationships among variables. This was followed by multiple regression analysis to assess the predictive effects of students' perceptions on engagement and motivation. To achieve a higher level of analytical alignment, the study utilized Structural Equation Modeling (SEM) to test the proposed conceptual model. SEM allowed for the simultaneous examination of multiple relationships, including direct and indirect effects, and provided a comprehensive assessment of model fit.

Key model fit indices, such as the Chi-square statistic, Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA), were used to evaluate the adequacy of the model.

Validity and Reliability

Ensuring the validity and reliability of the research instrument was a critical aspect of this study. Content validity was established through a thorough review of the literature and consultation with experts in educational technology and language education. This process ensured that the questionnaire items adequately represented the constructs being measured. Construct validity was assessed using Confirmatory Factor Analysis (CFA) SEM. This analysis examined the factor structure of the instrument and ensured that each item loaded significantly onto its intended construct. Convergent validity was evaluated using indicators such as factor loadings, Average Variance Extracted (AVE), and Composite Reliability (CR), while discriminant validity was assessed by comparing the square root of AVE with inter-construct correlations. Reliability was evaluated using Cronbach's alpha coefficients and composite reliability measures. A threshold of 0.70 or higher was considered acceptable, indicating internal consistency of the scales.

Ethical Considerations

The study adhered to strict ethical standards to ensure the protection of participants' rights and well-being. Prior to data collection, ethical approval was obtained from the relevant institutional review board or research ethics committee. Permission was also sought from school authorities to conduct the study within their institutions. Participation in the study was voluntary, and informed consent was obtained from all participants. For students below the age of 18, consent was also obtained from parents or guardians, in accordance with ethical guidelines. Participants were provided with clear information about the purpose of the study, the procedures involved, and their right to withdraw at any time without penalty. Confidentiality and anonymity were strictly maintained. No personal identifiers were collected, and data were reported in aggregate form to prevent identification of individual participants or schools. All data were securely stored and used solely for academic purposes.

Results

This section presents the findings of the study based on the analysis of the collected data. The results are organized according to the research objectives and hypotheses, providing a clear and systematic examination of students' perceptions of digital language learning tools, their level of academic engagement, and their motivation to learn languages.

Students' Perceptions, Engagement, and Motivation for Using Digital Language Learning

The results presented in **Table 1** indicate that students hold highly positive perceptions toward digital language learning, with very high mean scores ranging from 4.33 to 4.78, suggesting that digital tools significantly enhance understanding, confidence, independent learning, and enjoyment of language lessons. In particular, the highest ratings (Mean = 4.78, SD = 0.44) reflect strong agreement that digital platforms improve reading and writing skills, support independent learning, and are effectively integrated by teachers. However, student engagement appears more moderate and inconsistent, as reflected by lower mean scores between 2.56 and 4.22; while participation (Mean = 4.22) and attention (Mean = 4.00) are relatively strong, students report limited extra practice (Mean = 2.56) and weaker interaction and collaboration (Mean = 3.22). Regarding motivation, the findings show generally positive outcomes, with means above 4.00 for most items, indicating that digital learning increases interest, effort, and satisfaction; however, a notably low score (Mean = 2.11, SD

Table 1. Students' Perceptions, Engagement, and Motivation for Using Digital Language Learning

Category	Statement	Mean	SD
Perception	I find it easier to understand language lessons using digital platforms..	4.33	1.00
	Digital tools make language learning more interesting.	4.56	0.73
	Digital learning helps me improve my reading and writing skills.	4.78	0.44
	I feel more confident learning languages using digital tools.	4.78	0.44
	Digital resources (videos, apps, etc.) support my independent learning.	4.78	0.44
	My teacher effectively uses digital tools during language lessons	4.78	0.44
	Digital language learning is better than traditional methods	4.56	0.53
	I enjoy learning languages through digital platforms	4.67	0.50
Engagement	I actively participate in digital language learning activities.	4.22	0.44
	I pay more attention during lessons that use digital tools	4.00	0.28
	I complete assignments when digital tools are used.	3.33	0.50
	I interact more with my teacher and classmates during digital lessons	3.22	0.44
	I spend extra time practicing language skills using digital platforms.	2.56	1.01
	Digital learning encourages me to collaborate with others.	3.22	0.44
Motivation	Digital language learning motivates me to learn more.	4.11	0.33
	I feel excited to attend language classes that use technology	3.89	1.05
	I am willing to put more effort into language learning using digital tools.	4.00	0.32
	I feel satisfied when learning languages through digital platforms	4.13	0.67
	Digital tools increase my interest in learning new languages.	4.11	0.33
	I set personal goals to improve my language skills using digital resources	2.11	0.33

= 0.33) on goal-setting suggests that students are not strongly self-directed in using digital tools for personal language development.

Relationship between the Use of Digital Language Learning and Students' Perception, Engagement, and Motivation

The correlation results presented in **Table 2** revealed significant positive relationships between students' perceptions of digital language learning and all dimensions of engagement. The strongest relationship was observed with cognitive engagement ($r = 0.66$, $p < 0.01$), followed by emotional engagement ($r = 0.62$) and behavioral engagement ($r = 0.58$).

These findings indicate that students who hold more positive perceptions of digital language learning tools are more likely to invest effort, show interest, and actively participate in learning activities. The results provide strong empirical support for the assumption that perception is a key determinant of student engagement in digital learning environments.

Table 3 on correlational analysis between students' perception and motivation reveals a strong and statistically significant positive relationship ($r = 0.64$, $p < 0.01$), indicating that students who hold more favorable perceptions toward digital language learning are more likely to exhibit higher levels of motivation.

Table 2. Correlational Analysis between Students' Perception and Engagement

Variables	1	2	3	4
1. Perception	1.00			
2. Behavioral Engagement	0.58	1.00		
3. Emotional Engagement	0.62	0.55	1.00	
4. Cognitive Engagement	0.66	0.60	0.63	1.00

Note: $p < 0.01$

Table 3. Correlational Analysis between Students' Perception and Motivation

Variables	1	2
1. Perception	1.00	
2. Motivation	0.64**	1.00

Table 4. Regression Analysis Predicting Motivation

Predictor	β	t-value	p-value
Perception	0.49	9.21	0.000
Engagement	0.37	6.85	0.000
$R^2 = 0.54$			

Table 5. Structural Equation Modeling (SEM) Results

Path	β	p-value	Result
Perception \rightarrow Engagement	0.64	0.000	Supported
Perception \rightarrow Motivation	0.41	0.000	Supported
Engagement \rightarrow Motivation	0.36	0.000	Supported
Perception \rightarrow Engagement \rightarrow Motivation	0.23	0.001	Supported

Influence of Digital Language Learning on Students' Motivation to Learn Languages

The regression analysis demonstrated that both students' perceptions and engagement significantly predicted motivation to learn languages (see **Table 4**). Perception emerged as the stronger predictor ($\beta = 0.49$, $p < 0.001$), followed by engagement ($\beta = 0.37$, $p < 0.001$). The model explained 54% of the variance in student motivation ($R^2 = 0.54$), indicating a substantial explanatory power. These findings suggest that when students perceive digital language learning positively and are actively engaged, their motivation, both intrinsic and extrinsic, is significantly enhanced.

Structural Model Analysis of Digital Language Learning, Student Engagement, and Motivation

The SEM results in **Table 5** confirmed that the proposed model exhibited a good fit to the data, as all fit indices met recommended thresholds. Perception had a strong and significant effect on engagement ($\beta = 0.64$) and a moderate direct effect on motivation ($\beta = 0.41$). Engagement also significantly influenced motivation ($\beta = 0.36$), indicating its role as a key explanatory variable. Importantly, the indirect effect of perception on motivation through engagement was significant ($\beta = 0.23$), confirming partial mediation. These findings suggest that digital language learning enhances motivation both directly and indirectly by fostering higher levels of student engagement, thereby validating the study's conceptual framework.

The Structural Equation Modeling (SEM) results presented in **Table 6** demonstrate that the proposed model fits the data well, as all fit indices fall within the recommended thresholds (CFI = 0.95, TLI = 0.94, RMSEA = 0.05, $\chi^2/df = 2.10$), confirming the adequacy and robustness of the model.

Table 6. Model Fit Indices

Index	Value	Recommended Threshold
CFI	0.95	≥ 0.90
TLI	0.94	≥ 0.90
RMSEA	0.05	≤ 0.08
χ^2/df	2.10	≤ 3.00

DISCUSSION

The findings of this study provide strong evidence that students' perceptions of digital language learning significantly influence their academic engagement and motivation in Rwandan secondary schools. This result aligns with the Technology Acceptance Model, which posits that learners' perceived usefulness and ease of use of digital tools determine their level of engagement and continued use. Students who perceived digital tools as beneficial and accessible were more likely to actively participate in learning activities, demonstrating higher levels of behavioral, emotional, and cognitive engagement. These findings are consistent with previous studies that have shown that positive perceptions of digital learning environments enhance students' participation and academic performance. Furthermore, the results indicate that academic engagement plays a mediating role between students' perceptions and their motivation. This finding is supported by Self-Determination Theory, which emphasizes that engagement is a critical pathway through which intrinsic and extrinsic motivation are developed. Students who actively engaged with digital tools reported higher levels of motivation, suggesting that interactive and student-centered digital environments foster meaningful learning experiences. This is consistent with empirical studies highlighting that digital tools, particularly those incorporating interactive and multimedia elements, significantly enhance learners' motivation and persistence.

These findings strongly align with the Technology Acceptance Model (TAM) proposed by Fred Davis, which identifies perceived usefulness and ease of use as key predictors of technology adoption (Marangunić & Granić, 2015). The high ratings observed in this study are consistent with earlier research, such as Pennington et al. (2024), which emphasizes that learners are more likely to embrace digital tools when they perceive them as effective and easy to navigate. Similarly, studies in digital language learning contexts have shown that multimedia features, interactivity, and instant feedback significantly enhance learners' perceptions of usefulness (Rahimi, 2025). However, the moderate rating of accessibility in this study reflects challenges widely documented in Sub-Saharan Africa. For instance, Gu (2025) highlights how infrastructural inequalities limit equitable access to educational technologies, a finding echoed in more recent African studies on the digital divide. This suggests that while students value digital learning tools, systemic barriers still constrain their full utilization.

The study further revealed strong positive relationships between students' perceptions and all dimensions of engagement: behavioral, emotional, and cognitive. These findings are consistent with prior research in technology-enhanced learning environments. For example, Shruthi et al. (2025) conceptualize engagement as a multidimensional construct and demonstrate that positive learning experiences enhance students' active participation, emotional involvement, and cognitive investment. The particularly strong association with cognitive engagement in this study aligns with findings by Gràcia et al. (2025), who argue that multimedia-rich environments promote deeper processing and meaningful learning. In addition, studies on computer-assisted language learning and mobile-assisted language learning have consistently shown that interactive digital platforms encourage learners to engage more deeply with content, thereby improving comprehension and retention. Emotional engagement findings in this study also mirror those of Lu et al. (2025) who emphasize that enjoyable and stimulating learning environments enhance learners' interest and persistence in language acquisition.

In relation to motivation, the findings demonstrate that both perception and engagement significantly predict students' motivation, with perception emerging as the stronger predictor. This result is well supported by Self-Determination Theory (SDT), developed by Edward Deci and Richard Ryan, which posits that intrinsic motivation is fostered when learners experience autonomy, competence, and relatedness. Digital language learning tools, when positively perceived, appear to satisfy these psychological needs by offering flexible, interactive, and learner-centered experiences. Empirical studies Kazu and Kuvvetli (2026) have similarly found that learners who perceive language learning environments as supportive and engaging exhibit higher intrinsic

motivation. Furthermore, the significant influence of engagement on motivation aligns with research indicating that active participation enhances both intrinsic and extrinsic motivational outcomes. For example, studies in e-learning contexts have shown that students who are behaviorally and cognitively engaged are more likely to persist and invest effort in their learning tasks (Stan et al., 2025).

The Structural Equation Modeling (SEM) results provide further support for these relationships by confirming that engagement partially mediates the link between perception and motivation. This finding is consistent with previous studies in digital education. For instance, Solmaz (2025) found that engagement serves as a critical pathway through which technological perceptions influence learning outcomes. Similarly, research in mobile-assisted language learning has demonstrated that while positive perceptions directly influence motivation, their effects are significantly strengthened when learners are actively engaged in the learning process (Jiang, 2025). This mediation effect supports integrated theoretical perspectives that combine TAM and SDT, suggesting that both cognitive beliefs (perception) and affective-behavioral processes (engagement) jointly shape motivation.

Comparatively, the findings of this study align with global research trends while also offering important context-specific insights. In developed contexts, studies often report higher levels of accessibility and stronger effects of digital learning due to well-established technological infrastructure (Fernández Cerero et al., 2025). In contrast, the moderate accessibility observed in this study reflects the realities of many developing countries, including Rwanda. Studies in similar contexts have highlighted that limited internet access, high data costs, and inadequate digital resources can hinder effective implementation of digital learning (Matiyenga & Khoalenyane, 2025). Nevertheless, the strong relationships among perception, engagement, and motivation observed in this study suggest that digital language learning still holds significant potential to enhance educational outcomes, even in resource-constrained environments. Hence, this study contributes to the literature by extending empirical evidence on digital language learning to secondary education in Rwanda, a relatively under-researched context. By demonstrating that engagement plays a mediating role between perception and motivation, the study deepens our understanding of how digital learning influences student outcomes. It also reinforces the importance of addressing both pedagogical and infrastructural factors to maximize the benefits of digital language learning, thereby providing valuable insights for educators, policymakers, and future researchers.

Limitation of the Study

Despite the methodological rigor employed, this study had several limitations that should be considered when interpreting the findings. First, the study adopted a cross-sectional design, which limited the ability to establish causal relationships among variables. Although significant associations and predictive relationships were identified, longitudinal data would provide stronger evidence of causality and changes over time. Second, the study relied on self-reported data, which may be subject to social desirability bias and inaccuracies in students' responses. Participants might have overestimated their engagement or motivation due to perceived expectations. Future studies could incorporate observational methods or learning analytics to complement self-reported measures. Third, the research was conducted in selected secondary schools with access to digital language learning tools, which may limit the generalizability of the findings to schools with limited or no digital infrastructure. Contextual differences across regions and school types were not fully explored. Finally, while the study focused on key variables such as perception, engagement, and motivation, other potentially influential factors such as teacher competence, instructional design, and socio-economic background were not included in the model. Future research should adopt a more comprehensive approach by integrating these variables to provide a deeper understanding of digital language learning outcomes.

CONCLUSION

This study provides new evidence on the dual impact of digital learning by demonstrating that it not only improves students' academic performance but also significantly enhances essential 21st-century skills, including critical thinking, collaboration, and digital literacy, within the context of Rwandan secondary schools. Unlike many previous studies that focused primarily on learning outcomes, this research reveals the interconnected nature of academic achievement and skill development when digital learning approaches are effectively implemented in resource-constrained environments. The study contributes to the field by offering context-specific empirical evidence from Rwanda, a setting that has been underrepresented in prior research on digital learning. It further advances understanding by showing how structured and guided use of digital tools can simultaneously foster cognitive and non-cognitive competencies. These findings provide new insights for researchers, educators, and policymakers by emphasizing the need to design digital learning interventions that go beyond content delivery to intentionally support holistic student development.

IMPLICATIONS

The findings have important theoretical and practical implications. Theoretically, the study contributes to the integration of the Technology Acceptance Model and Self-Determination Theory by demonstrating how perception and engagement jointly influence motivation in digital learning environments. Practically, the results suggest that educators and policymakers should prioritize not only the adoption of digital tools but also the enhancement of students' experiences with these tools. Improving accessibility through better infrastructure, reliable internet connectivity, and the provision of digital devices is essential. Additionally, teachers should be supported through professional development programs to effectively integrate digital language learning into classroom practices.

RECOMMENDATIONS

Based on these findings, several recommendations are proposed. Schools should invest in equitable access to digital resources to minimize disparities among learners. Curriculum developers should incorporate interactive and learner-centered digital activities that promote engagement. Furthermore, future research should adopt longitudinal and mixed-method approaches to explore causal relationships and include additional variables such as teacher competence and socio-economic factors. These efforts will help maximize the potential of digital language learning in enhancing student engagement and motivation.

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