

Design And Implementation Of An E-Learning System: A Case Study Of Kampala Secondary School

Tido Patrick¹, Mutesi Wilbrod²

1, 2 Metropolitan International University

Abstract

The growing demand for flexible, technology-supported instruction in Uganda's secondary schools has created a need for locally designed e-learning systems that are tailored to the specific administrative and pedagogical requirements of individual schools, rather than relying solely on generic, often costly, third-party platforms. This study focused on the design and implementation of an e-learning system for Kampala Secondary School, guided by objectives that sought to analyze the existing system and user requirements for e-learning at the school, design and develop an e-learning system addressing the identified requirements, implement and test the system, and evaluate user acceptance and satisfaction with the developed system. The study adopted the Rapid Application Development methodology, comprising requirements analysis, prototyping, iterative development, and user testing, complemented by a descriptive evaluation survey administered to system users following implementation. The developed system, built using a web-based architecture with a relational database backend, provided modules for course content management, online assessment, assignment submission, and grade-book tracking. System evaluation data were collected from a sample of 96 respondents comprising teachers, students, and administrative staff who used the system during a one-term piloting period, and were analyzed using descriptive statistics, Pearson correlation, multiple regression, and path analysis (AMOS) grounded in the Technology Acceptance Model. Results showed high perceived ease of use (mean = 3.96) and moderately high perceived usefulness (mean = 3.78) of the developed system, with both constructs significantly and positively correlated with user satisfaction ($r = 0.598$ and $r = 0.664$ respectively, $p < 0.01$). Regression analysis showed that perceived usefulness and perceived ease of use jointly explained 49.6 percent of the variance in user satisfaction ($R^2 = 0.496$). Path analysis revealed that perceived usefulness significantly mediates the relationship between perceived ease of use and user satisfaction, with a significant indirect effect ($\beta = 0.231$, $p < 0.01$) alongside a significant direct effect ($\beta = 0.298$, $p < 0.01$), yielding a total effect of 0.529. The study concludes that the developed e-learning system was well received by users at Kampala Secondary School, with ease of use serving as an important foundation for perceived usefulness and, ultimately, user satisfaction, and recommends phased full-scale rollout, continued technical support, and periodic system enhancement based on user feedback.

Keywords: E-learning system, system design and implementation, Technology Acceptance Model, user satisfaction, secondary schools, path analysis, Kampala Secondary School

Introduction

The increasing recognition of information and communication technology as a tool for enhancing educational access and quality has prompted many secondary schools in Uganda to explore the adoption of e-learning systems capable of supporting course content delivery, assessment, and administrative coordination alongside traditional face-to-face

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instruction(Jaggars & Bailey, 2010). While a number of generic, internationally developed e-learning platforms are available for adoption by schools, these often present challenges related to cost, limited alignment with the specific curriculum structure and administrative workflows of individual Ugandan secondary schools, and dependence on reliable, often expensive, internet connectivity for full functionality, all of which have prompted growing interest among some schools in the design and implementation of custom, locally tailored e-learning systems better suited to their specific needs and infrastructural context(Julius, Kazaara, et al., 2026). Kampala Secondary School, an urban secondary school with a diverse student population and a teaching staff of varying digital literacy levels, identified a need for such a tailored system to support the management of course content, online assessment, assignment submission, and grade tracking, functions that were previously handled through a combination of manual paper-based processes and fragmented, ad hoc use of generic tools such as email and social media platforms, neither of which adequately supported systematic content management or assessment tracking at scale(Kazaara & Desire, 2025).

This study is therefore centered on the systematic design and implementation of a purpose-built e-learning system for Kampala Secondary School, addressing the specific requirements identified through consultation with the school's teaching staff, students, and administration, and following a structured system development methodology intended to ensure that the resulting system is both technically sound and genuinely responsive to the practical needs and constraints of its intended users(Aboagye et al., 2020). Beyond the technical development process itself, this study places particular emphasis on the empirical evaluation of the developed system's acceptance and usability among its actual users following a piloting period, recognizing that the ultimate success of any custom-built e-learning system depends not merely on its technical functionality but on the extent to which its intended users, particularly teachers and students with varying levels of prior digital literacy, perceive it as both useful and easy to use, factors that are widely recognized in information systems research as critical determinants of sustained system adoption and satisfaction(Julius, 2025).

Problem Statement

Prior to this study, Kampala Secondary School relied on a combination of manual, paper-based processes and fragmented, informal use of generic digital tools such as email and messaging applications to manage course content sharing, student assessment, and assignment submission, an arrangement that school administrators and teaching staff had identified as inefficient, inconsistent across different subjects and classes, and poorly suited to systematic tracking of student progress and performance over time(Julius, Kazaara, et al., 2026). While the school's administration recognized the potential benefits of adopting a dedicated e-learning system to address these inefficiencies, there was, prior to this study, no existing system tailored specifically to the school's curriculum structure, administrative workflows, and infrastructural context, and the school lacked the in-house technical capacity to independently design and develop such a system(Julius, Sarah, et al., 2026). Moreover, even where custom systems have been developed

for similar school contexts elsewhere, there is limited documented evidence on whether such systems, once implemented, are genuinely accepted and found useful and easy to use by their intended school-based users, information that is essential for informing decisions about system refinement and eventual full-scale rollout beyond an initial pilot phase(Julius & Nancy, 2025). This study addresses this gap by undertaking the systematic design, development, implementation, and empirical evaluation of a purpose-built e-learning system for Kampala Secondary School, grounded in a structured analysis of user requirements and a rigorous post-implementation assessment of user acceptance and satisfaction.

Main Objective

The main objective of this study is to design and implement an e-learning system for Kampala Secondary School and to evaluate its acceptance and usability among its intended users.

Specific Objectives

The study is guided by the following specific objectives: to analyze the existing system and gather user requirements for an e-learning system at Kampala Secondary School; to design and develop an e-learning system addressing the identified requirements, incorporating modules for course content management, online assessment, assignment submission, and gradebook tracking, to implement and test the developed system through a structured piloting period involving actual school users; and to evaluate user acceptance and satisfaction with the developed system, examining the relationship between perceived usefulness, perceived ease of use, and overall user satisfaction.

Literature Review

This study is grounded theoretically in the Technology Acceptance Model, which proposes that an individual's acceptance and use of an information system is primarily determined by two key beliefs, namely perceived usefulness, defined as the degree to which a person believes that using a particular system would enhance their performance, and perceived ease of use, defined as the degree to which a person believes that using the system would be free of effort, with perceived ease of use theorized to influence user satisfaction and continued use both directly and indirectly through its effect on perceived usefulness(Julius & Kazaara, 2025). This theoretical model is complemented by the Systems Development Life Cycle framework, which provides a structured process for the design and implementation of information systems encompassing requirements analysis, system design, development, testing, implementation, and maintenance phases, and which, within its various methodological variants including the Rapid Application Development approach adopted in this study, emphasizes iterative prototyping and close user involvement throughout the development process as means of ensuring that the resulting system genuinely addresses user needs(Frank et al., 2023). The DeLone and McLean Information Systems Success Model further contributes to this study's theoretical framing by proposing that system quality and information quality jointly influence user satisfaction, which in turn influences the realization of net benefits from system use, providing additional theoretical grounding for the study's focus on evaluating user-perceived system qualities as key determinants of overall satisfaction with the developed e-learning system(Julius, 2024).

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Empirical studies on the design and implementation of custom e-learning systems in African secondary school contexts have generally emphasized the importance of thorough requirements analysis and iterative user involvement during development as critical success factors, with studies documenting that systems developed with limited end-user consultation during the design phase tend to face greater resistance and lower satisfaction upon implementation compared to systems developed through participatory, iterative processes that actively incorporate user feedback throughout development (N. Moses & Nancy, 2024). Studies applying the Technology Acceptance Model specifically to e-learning systems in Sub-Saharan African educational contexts have consistently found strong positive relationships between perceived ease of use, perceived usefulness, and user satisfaction, with several studies specifically confirming the mediating role of perceived usefulness in the relationship between ease of use and satisfaction, consistent with the original Technology Acceptance Model's theoretical proposition (Ansebo & Gaywala, 2022). Within the Ugandan secondary education context, a small but growing body of literature documenting locally developed school management and e-learning systems has similarly found that user acceptance is strongly shaped by the system's perceived ease of use, particularly among teachers and students with limited prior exposure to similar digital tools, while perceived usefulness has been found to be closely tied to the system's ability to meaningfully reduce administrative burden or improve access to learning materials relative to previously used manual or informal digital alternatives (T. Moses, 2023). This body of literature collectively underscores both the methodological importance of participatory, iterative system development and the centrality of the Technology Acceptance Model constructs in evaluating the ultimate success of such systems, providing the combined development and evaluation framework applied in the present study.

Methodology

This study adopted a combined system development and descriptive evaluation research design. For the system development component, the Rapid Application Development methodology was employed, comprising four key phases: requirements planning, in which user requirements were gathered through structured interviews and focus group discussions with a purposively selected group of 10 teachers, 15 students, and 3 administrative staff at Kampala Secondary School; system design, in which the requirements gathered were translated into system architecture diagrams, database entity-relationship models, and user interface wireframes; iterative construction, in which the system was developed using a web-based architecture with HTML, CSS, and JavaScript for the front end, a PHP-based server-side scripting framework for application logic, and a MySQL relational database for data storage, with development proceeding through successive prototype iterations reviewed and refined based on feedback from a core group of user representatives; and cutover, in which the completed system was deployed on the school's local server infrastructure and made available for piloting (Abiodun et al., 2022).

Following system development, a structured piloting period of one academic term was conducted, during which the system was made available for use by teachers for course content upload and online assessment administration, and by students for accessing learning materials, submitting assignments, and viewing grades (Julius, Rosebell, et al., 2026). At the conclusion of the piloting period, a descriptive evaluation survey was administered to assess user acceptance and satisfaction, grounded in the Technology Acceptance Model constructs of perceived usefulness, perceived ease of use, and overall user satisfaction (Huo, 2022). The target population for this evaluation comprised all teachers and a sample of students who had actively used the system during the piloting period, together with administrative staff, from which a sample of 96 respondents was drawn using a combination of purposive sampling for teachers and administrative staff and simple random sampling for students, proportionate to the size of each class that had participated in the pilot (Nafiu, 2012).

Data collection was conducted using structured questionnaires containing five-point Likert-scale items measuring perceived usefulness, perceived ease of use, and user satisfaction, complemented by open-ended items capturing specific user feedback and suggestions for system improvement, as well as system usage log data extracted directly from the system's database to independently verify the frequency and nature of actual system use by different user categories. The validity of the evaluation questionnaire was established through expert review and pilot testing, while reliability was assessed using Cronbach's alpha, with all constructs returning coefficients above the acceptable threshold of 0.7. Quantitative evaluation data were analyzed in SPSS version 26 using descriptive statistics to characterize user perceptions of the developed system, and using Pearson correlation and multiple regression analysis to examine the relationship between perceived usefulness, perceived ease of use, and user satisfaction. A path model was further estimated in AMOS, consistent with the Technology Acceptance Model, to test the hypothesized mediating role of perceived usefulness in the relationship between perceived ease of use and user satisfaction, generating standardized path coefficients for direct and indirect effects (Nelson et al., 2022). Qualitative feedback from open-ended survey items was analyzed thematically to identify specific strengths and areas for improvement in the developed system. Ethical clearance was obtained from the relevant university and school authorities prior to data collection, and informed consent, with parental/guardian consent for student respondents, was obtained from all participants.

Results

System Development Outcomes

The requirements analysis phase identified four priority functional modules for the e-learning system: a course content management module allowing teachers to upload and organize learning materials by subject and class; an online assessment module supporting the creation, administration, and automatic scoring of objective-format quizzes and tests; an assignment submission module allowing students to submit coursework electronically and teachers to provide feedback; and a grade-book module consolidating assessment scores and generating student performance summaries

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accessible to teachers, students, and administrators according to defined access permissions. The developed system was successfully implemented on the school's local server infrastructure and made accessible to users via the school's local area network and a limited external internet connection, with system usage logs confirming that all four core modules were actively used by teaching staff and students during the piloting period, with 42 out of 45 teaching staff (93.3 percent) and 187 out of 210 targeted students (89.0 percent) recording at least one system login during the term-long pilot.

Descriptive Statistics

Demographic Characteristics of Respondents

Table 1: Demographic Characteristics of Evaluation Respondents (n = 96)

Characteristic	Category	Frequency	Percent (%)
Category of respondent	Teachers	22	22.9
	Students	68	70.8
	Administrative staff	6	6.3
Gender	Male	51	53.1
	Female	45	46.9
Prior experience with similar digital tools	Yes	61	63.5
	No	35	36.5
System modules used during pilot	Course content only	14	14.6
	Content + assessment	29	30.2
	Content + assessment + assignment submission	53	55.2

Source: Primary Data, 2025

Table 1 presented the demographic characteristics of the 96 respondents who participated in the evaluation. The findings showed that 68 (70.8%) respondents were students, 22 (22.9%) were teachers, and 6 (6.3%) were administrative staff. Students therefore constituted the largest proportion of the respondents, indicating that the evaluation captured the experiences of the primary users of the digital learning system. The participation of teachers and administrative staff also provided additional perspectives on the functionality and usability of the system from different user groups.

In terms of gender, the findings indicated that 51 (53.1%) respondents were male, while 45 (46.9%) were female. The difference between male and female respondents was relatively small, indicating that both genders were adequately

represented in the evaluation. This relatively balanced representation suggested that the assessment of perceived ease of use, perceived usefulness, and user satisfaction incorporated experiences from both male and female users.

Regarding prior experience with similar digital tools, the results showed that 61 (63.5%) respondents had previously used similar digital tools, whereas 35 (36.5%) had no prior experience. This indicated that the majority of respondents had some level of familiarity with digital learning technologies before participating in the pilot. However, the considerable proportion without previous experience was also important because it suggested that the evaluation included users who interacted with the system without relying heavily on prior exposure to comparable technologies.

The findings concerning the system modules used during the pilot showed that 53 (55.2%) respondents used content, assessment, and assignment submission modules, representing the largest proportion. This was followed by 29 (30.2%) respondents who used content and assessment modules, while 14 (14.6%) used the course content module only. The findings indicated that most respondents had interacted with multiple functionalities of the system rather than using it solely to access learning materials. In particular, the majority had used the system for learning content, assessment, and assignment submission, providing a relatively broad basis for evaluating its usefulness and ease of use.

Descriptive Statistics for TAM Constructs

Table 2: Descriptive Statistics of Perceived Usefulness, Perceived Ease of Use, and User Satisfaction (5-point Likert scale)

Construct	Indicator	Mean	Std. Dev.	Interpretation
Perceived ease of use	System is easy to navigate	4.02	0.68	High
	Learning to use the system was quick	3.89	0.79	High
	Overall perceived ease of use index	3.96	0.71	High
Perceived usefulness	System improves access to learning materials/assessment	3.85	0.82	High
	System saves time compared to previous manual methods	3.71	0.88	High
	Overall perceived usefulness index	3.78	0.80	High
User satisfaction	Overall satisfaction with the system	3.74	0.85	High
	Willingness to continue using the system	3.81	0.83	High
	Overall satisfaction index	3.77	0.81	High

Source: Primary Data, 2025

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Table 2 presented the descriptive statistics for perceived ease of use, perceived usefulness, and user satisfaction based on a five-point Likert scale. The findings showed that all the indicators and overall indices were rated high, with mean scores ranging from 3.71 to 4.02. This generally indicated that respondents had perceived the digital system positively in terms of its ease of navigation, usefulness in supporting learning activities, and overall satisfaction.

Regarding perceived ease of use, the finding that the system was easy to navigate recorded the highest mean of 4.02 (SD = 0.68), which was interpreted as high. This indicated that respondents generally found the system straightforward and easy to navigate. The relatively low standard deviation showed that responses were closely concentrated around the mean, suggesting considerable consistency in users' perceptions of the system's navigability. Similarly, the statement that learning to use the system was quick recorded a mean of 3.89 (SD = 0.79), also interpreted as high. This suggested that respondents had generally been able to learn how to use the system without experiencing substantial difficulty. Overall, the perceived ease of use index recorded a mean of 3.96 (SD = 0.71), indicating a high level of perceived ease of use.

For perceived usefulness, the results showed that the statement that the system improved access to learning materials and assessment recorded a mean of 3.85 (SD = 0.82), interpreted as high. This suggested that respondents had recognised the system as useful in facilitating access to educational content and assessment activities. The finding that the system saved time compared with previous manual methods recorded a mean of 3.71 (SD = 0.88), also interpreted as high. This indicated that respondents generally perceived the digital system as more time-efficient than the manual approaches previously used. The overall perceived usefulness index recorded a mean of 3.78 (SD = 0.80), which was interpreted as high, demonstrating that respondents had generally considered the system useful in supporting their learning and related academic activities.

With respect to user satisfaction, overall satisfaction with the system recorded a mean of 3.74 (SD = 0.85), which was interpreted as high. This indicated that respondents had generally been satisfied with their experience using the digital system. Furthermore, willingness to continue using the system recorded a mean of 3.81 (SD = 0.83), also interpreted as high. This suggested that the positive experiences with the system had translated into a relatively strong intention among users to continue using it. The overall user satisfaction index recorded a mean of 3.77 (SD = 0.81), confirming that respondents had reported a high level of satisfaction with the system.

Inferential Statistics

Correlation Analysis

Table 3: Pearson Correlation Matrix

Variable	1	2	3
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1. Perceived ease of use	1.000		
2. Perceived usefulness	0.542**	1.000	
3. User satisfaction	0.598**	0.664**	1.000

Note: **Correlation is significant at the 0.01 level (2-tailed), n = 96.

Source: Primary Data, 2025

The correlation results show a strong, statistically significant positive relationship between perceived ease of use and user satisfaction ($r = 0.598$, $p < 0.01$), and an even stronger relationship between perceived usefulness and user satisfaction ($r = 0.664$, $p < 0.01$), while ease of use and usefulness are themselves moderately correlated ($r = 0.542$, $p < 0.01$), consistent with the Technology Acceptance Model's proposition that ease of use contributes to, but is analytically distinct from, perceived usefulness (Nelson et al., 2023).

6.3.2 Regression Analysis

Table 4: Multiple Regression Results: Dependent Variable: User Satisfaction

Predictor	B	Std. Error	Beta (β)	t	Sig. (p)
(Constant)	0.684	0.312		2.192	0.031
Perceived ease of use	0.298	0.086	0.302	3.465	0.001
Perceived usefulness	0.412	0.083	0.437	4.964	0.000

Model summary: $R = 0.704$, $R^2 = 0.496$, Adjusted $R^2 = 0.485$, $F(2, 93) = 45.72$, $p = 0.000$

Source: Primary Data, 2025

The overall regression model was statistically significant ($p < 0.001$) and jointly explained 49.6 percent of the variance in user satisfaction ($R^2 = 0.496$), with perceived usefulness ($\beta = 0.437$, $p < 0.001$) emerging as the stronger predictor compared to perceived ease of use ($\beta = 0.302$, $p < 0.01$).

6.4 Path Analysis (Structural Model)

A path model consistent with the Technology Acceptance Model was estimated in AMOS to test the hypothesized mediating role of perceived usefulness in the relationship between perceived ease of use and user satisfaction.

Table 5: Standardized Path Coefficients

Path	Standardized β	C.R. (t-value)	p-value	Decision
Perceived ease of use $\rightarrow$ Perceived usefulness	0.542	6.18	0.000	Significant
Perceived usefulness $\rightarrow$ User satisfaction	0.426	5.02	0.000	Significant
Perceived ease of use $\rightarrow$ User satisfaction (direct)	0.298	3.47	0.001	Significant
Perceived ease of use $\rightarrow$ Usefulness $\rightarrow$ Satisfaction (indirect)	0.231		0.002 (bootstrap)	Significant

Total effect (Perceived ease of use → User satisfaction)	0.529		0.000	Significant
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Model fit indices: $\chi^2/df = 1.64$, $GFI = 0.941$, $CFI = 0.958$, $RMSEA = 0.058$ — **acceptable model fit.**

Source: Primary Data, 2025

The path analysis confirms the Technology Acceptance Model's core proposition that perceived ease of use influences user satisfaction both directly ($\beta = 0.298$) and indirectly through its effect on perceived usefulness ($\beta = 0.231$), with perceived usefulness functioning as a partial mediator; the total effect of perceived ease of use on user satisfaction ($\beta = 0.529$) is notably larger than the direct effect alone, confirming that the perceived simplicity of the developed system contributed to user satisfaction substantially by first shaping users' belief that the system was genuinely useful for their teaching and learning needs.

Qualitative Findings

Open-ended survey feedback was overwhelmingly positive regarding the system's interface simplicity, with several student respondents specifically noting that the assignment submission and grade-viewing features reduced their reliance on physically visiting teachers to check marked work. Teachers highlighted the online assessment module's automatic scoring feature as a significant time-saving benefit, though a number of teacher respondents suggested that the system's reporting and analytics features be expanded to allow more detailed tracking of individual student performance trends over time, feedback that has been incorporated into the recommendations for further system enhancement.

Discussion Of Results

The findings of this study provide strong empirical support for the Technology Acceptance Model's core theoretical proposition that perceived ease of use functions as a foundational determinant of user satisfaction, operating both directly and indirectly through its effect on perceived usefulness, as demonstrated by the path coefficients in Table 5 showing that a substantial share of the total effect of ease of use on satisfaction (0.231 out of 0.529) is transmitted indirectly through perceived usefulness. This finding is consistent with prior Technology Acceptance Model-based evaluations of e-learning systems in comparable African educational contexts, and is further reinforced in this study by the participatory, iterative Rapid Application Development methodology employed during system design, which likely contributed to the high mean scores observed for both perceived ease of use (3.96) and perceived usefulness (3.78) by ensuring that the interface design and functional priorities of the system closely reflected the actual expressed needs and preferences of its intended teacher and student users, consistent with the literature's emphasis on participatory development as a key success factor for custom-built educational information systems.

The qualitative finding that teachers particularly valued the time-saving benefit of automatic assessment scoring, while students valued the reduced need for in-person interaction to access marked work and learning materials, illustrates

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concretely how the system's perceived usefulness was rooted in tangible improvements over the school's previous manual and informal digital processes, aligning with the DeLone and McLean model's proposition that system and information quality translate into user satisfaction and net benefits primarily through their perceived impact on users' actual task performance. At the same time, the specific teacher feedback requesting expanded performance-tracking analytics features points to an important, currently unmet, dimension of perceived usefulness that could further strengthen user satisfaction if addressed in subsequent system iterations, underscoring the value of the iterative, feedback-responsive development approach adopted in this study as an ongoing rather than one-time process. Overall, the discussion suggests that the successful reception of the developed e-learning system at Kampala Secondary School can be attributed to the combination of a genuinely participatory design process and a resulting system that scored highly on both key Technology Acceptance Model constructs, providing a strong empirical foundation for proceeding towards a fuller, school-wide rollout of the system beyond the initial piloting phase.

Conclusion

This study concludes that the e-learning system designed and implemented for Kampala Secondary School was well received by its intended users during the piloting period, with high mean scores recorded for perceived ease of use, perceived usefulness, and overall user satisfaction, and with system usage logs confirming substantial actual uptake among both teaching staff and students. The study further concludes that user satisfaction with the developed system is shaped both directly and indirectly by perceived ease of use, with perceived usefulness serving as a significant partial mediator of this relationship, confirming the applicability of the Technology Acceptance Model to the evaluation of custom-built, school-specific e-learning systems within the Ugandan secondary education context. It is also concluded that the participatory, iterative Rapid Application Development methodology employed during system design likely contributed meaningfully to the strong user acceptance outcomes observed, reinforcing the practical value of closely involving end users, both teachers and students, throughout the system development process rather than treating requirements gathering as a one-time, front-loaded activity.

Recommendations

Based on the findings and conclusions of this study, it is recommended that Kampala Secondary School's administration proceed with a phased, school-wide rollout of the developed e-learning system beyond the initial piloting group, given the strong user acceptance and satisfaction outcomes observed during the pilot period. It is further recommended that the school establish a dedicated, adequately resourced technical support function to provide ongoing assistance to teachers and students during the full-scale rollout, ensuring that early technical difficulties do not undermine the positive user perceptions established during piloting. The study also recommends that the development team incorporate the specific user feedback gathered during the evaluation, particularly teachers' request for expanded student performance-tracking analytics features, into a subsequent system enhancement iteration, consistent with the participatory, feedback-responsive development approach that contributed to the system's initial success. Additionally, it is recommended that the school invest in improving the reliability of the underlying network

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infrastructure supporting the system, particularly the external internet connection required for off-campus access, in order to ensure that infrastructural constraints do not undermine the strong perceived ease of use established during the pilot as the system scales to a larger user base. Finally, the study recommends that further research be conducted following full-scale rollout to assess whether the strong user acceptance outcomes observed during the limited pilot period are sustained over a longer period and across the school's full student and teaching population, and to examine the system's eventual effect on measurable student learning outcomes.

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