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The mediating effect of knowledge acquisition on the application of knowledge in interactions: Perceptions of ease of use, actual use, and behavioral intentions in e-learning platforms

Aleixandre Brian Duche-Pérez[1*], Olger Albino Gutiérrez-Aguilar[1], Cintya Yadira Vera-Revilla[1], Sandra Chicana-Huanca[1], Brizard Guadalupe Andía-Gonzales[1]
[1]Academic Department of Social Sciences and Humanities, Universidad Católica de Santa María, Arequipa, Peru; aduche@ucsm.edu.pe (A.B.D.P.), ogutierrez@ucsm.edu.pe (O.A.G.A.), cvera@ucsm.edu.pe (C.Y.V.R.), schicana@ucsm.edu.pe (S.C.H.), bandia@ucsm.edu.pe (B.G.A.G.).

Abstract: This study explores the mediating effect of knowledge acquisition on the application of knowledge within e-learning environments, focusing on key factors such as perceived ease of use, actual system use, and behavioral intention to use. In the post-pandemic context, e-learning has transitioned from a temporary solution to a fundamental aspect of higher education, necessitating an understanding of how these factors influence learning outcomes. The research employs a quantitative, non-experimental cross-sectional design, analyzing data from 235 students at the Catholic University of Santa María in Peru. Using structural equation modeling (SEM) techniques, the study reveals that perceived ease of use significantly enhances both knowledge acquisition and application, while actual use of the system has a complex relationship with learning outcomes. Behavioral intention to use the system also plays a crucial role, both directly and indirectly, in promoting effective knowledge acquisition and application. These findings underscore the importance of user-friendly e-learning platforms and proactive strategies to foster positive attitudes towards technology use, ensuring that students not only acquire but also effectively apply knowledge in their academic and professional lives. The results contribute to the ongoing discourse on optimizing e-learning systems for better educational outcomes.

Keywords: *Actual system use, Behavioral intention, E-learning platforms, Knowledge acquisition, Knowledge application, Perceived ease of use.*

1. Introduction

In the aftermath of the COVID-19 pandemic, e-learning has evolved from a temporary solution into a fundamental pillar of higher education. Educational institutions worldwide have recognized that e-learning is not merely a stopgap measure but a sustainable model that enhances learning outcomes and broadens access to education. According to Al-Emran et al. (2020), the effective integration of e-learning technologies has significantly influenced knowledge management practices and has garnered increased acceptance among students. This demographic now places a high value on the flexibility and accessibility offered by e-learning platforms, aligning seamlessly with contemporary educational expectations and the demands of an increasingly digitalized society. The shift towards e-learning reflects a broader transformation in educational paradigms, where technology-mediated learning environments are becoming the norm rather than the exception.

The perception of ease of use associated with e-learning platforms continues to be a pivotal factor influencing student engagement in the post-pandemic era. The user-friendliness of these technological tools plays a significant role in determining students' willingness to adopt e-learning as their primary mode of education. According to Reychav et al. (2015), the benefits of immediate access to educational

* Correspondence: aduche@ucsm.edu.pe

resources and the flexibility to study in diverse environments have become increasingly significant. This accessibility not only enhances student autonomy but also fosters a more personalized learning experience, thereby facilitating a deeper and more sustained integration of e-learning into higher education curricula. Furthermore, the perceived usefulness of these platforms reinforces students' perceptions of e-learning as a legitimate and effective form of education, ensuring their continued acceptance and utilization of e-learning systems, which can complement or even supplant traditional pedagogical approaches.

The practical application of knowledge acquired through e-learning platforms is essential for bridging the gap between theoretical understanding and real-world competencies. Advanced technologies, such as Augmented Reality (AR), have been instrumental in enhancing the experiential learning component of e-learning environments. Jang et al. (2021) emphasize that AR technologies enable immersive learning experiences, allowing students to interact with virtual objects and scenarios that simulate real-life contexts. Similarly, Cadavieco et al. (2012) highlight the significance of incorporating technological innovations to facilitate hands-on learning experiences within e-learning frameworks. In the post-pandemic context, the ability to apply learned concepts is highly valued in the job market, where employers seek graduates who are not only theoretically proficient but also adept at practical problem-solving. This underscores the imperative to design e-learning programs that transcend mere knowledge dissemination to include opportunities for practical application, thereby preparing students for the demands of professional environments.

Furthermore, the pandemic has amplified the significance of behavioral intention in the adoption and sustained use of e-learning technologies. Behavioral intention, as conceptualized in the Technology Acceptance Model (Davis, 1989), serves as a critical predictor of actual technology usage. Al-Nuaimi et al. (2022) provide empirical evidence that positive behavioral intentions, stemming from satisfactory user experiences and perceived ease of use, are indispensable for the continued adoption and success of e-learning platforms. The authors argue that when students exhibit a strong intention to use e-learning technologies, this intention is likely to manifest in actual usage behaviors. This correlation is crucial for maximizing the benefits of e-learning, particularly in terms of enhancing educational accessibility and flexibility. Reinforcing positive behavioral intentions can thus be seen as a strategic objective for educational institutions aiming to promote e-learning as a mainstream educational modality.

The integration of knowledge management practices within e-learning systems has emerged as a critical area of scholarly inquiry in recent years. Knowledge management involves the systematic processes of creating, sharing, utilizing, and managing organizational knowledge to achieve strategic objectives. Asari et al. (2020) investigated the impact of knowledge management integration on the performance of lecturers in Indonesian universities. Their study revealed that knowledge management practices indirectly influence lecturers' performance by enhancing the quality of teaching materials, fostering collaborative learning environments, and promoting continuous professional development. The findings underscore the importance of embedding knowledge management processes within e-learning systems to optimize educational outcomes. By facilitating the efficient dissemination and utilization of knowledge, e-learning platforms can enhance not only student learning but also faculty performance, thereby contributing to the overall effectiveness of higher education institutions.

Similarly, Atanasova (2019) developed a comprehensive knowledge management tool designed to evaluate the efficiency and quality of learning resources in distance e-learning settings. This tool provides universities with a systematic approach to assess and enhance their educational offerings, ensuring that learning materials meet high standards of quality and relevance. By leveraging such tools, institutions can maintain competitive and sustainable educational practices in an increasingly crowded e-learning marketplace. The development of this tool underscores the pivotal role of knowledge management in the digital learning environment, where the curation, dissemination, and continuous improvement of knowledge assets are essential for institutional success. Effective knowledge management strategies enable universities to adapt to evolving educational demands and technological advancements, thereby sustaining their competitive edge.

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Gentile et al. (2016) conducted an extensive survey examining the utilization of e-learning and Massive Open Online Courses (MOOCs) within European universities. Their research revealed a growing reliance on digital technologies among these institutions to facilitate knowledge sharing and enhance the quality of education. The adoption of MOOCs represents a significant trend in higher education, enabling universities to reach a global audience and democratize access to high-quality educational resources. By offering courses online to a massive number of participants, institutions can disseminate knowledge on an unprecedented scale, contributing to lifelong learning and educational equity. The findings of Gentile et al. highlight the transformative impact of digital technologies on educational practices, emphasizing the necessity for universities to embrace e-learning platforms as integral components of their strategic initiatives.

The effectiveness of e-learning platforms is intrinsically connected to users' perceptions of ease of use and their behavioral intentions to adopt and utilize these technologies. Hargitai et al. (2021) conducted a study focusing on the e-learning preferences of business students in the post-pandemic era, underscoring the importance of comprehending students' learning habits and preferences to inform effective knowledge management strategies. Their research indicates that students' perceptions of the usability and utility of e-learning tools significantly influence their willingness to engage with these platforms. This engagement is critical for the successful acquisition and application of knowledge within digital learning environments. By tailoring e-learning platforms to align with students' preferences and learning styles, educational institutions can enhance student satisfaction, increase adoption rates, and ultimately improve educational outcomes.

Chandran and Alammari (2016) explored the factors influencing the adoption of knowledge-sharing practices among academic staff in Saudi universities. Their research underscores the pivotal role of knowledge sharing as a fundamental element of knowledge management, which is indispensable for the success of e-learning communities. The study identified several key factors affecting knowledge-sharing adoption, including organizational culture, technological infrastructure, and individual attitudes towards collaboration. By fostering an environment that encourages open communication and collaboration, universities can enhance the effectiveness of e-learning platforms. Knowledge sharing among faculty members not only enriches the educational content but also models collaborative behaviors for students, thereby fostering a more dynamic and interactive learning environment. The findings highlight the necessity for institutions to address barriers to knowledge sharing to fully leverage the benefits of e-learning systems.

Technological innovations, particularly the advent of Web 3.0, have profoundly transformed the e-learning landscape by enhancing user engagement and facilitating active learning. Hussain (2023) discusses the impact of Web 3.0 technologies on e-learning, emphasizing that these advancements offer unprecedented opportunities to improve classroom instruction and augment student participation. Web 3.0 technologies, characterized by semantic web capabilities, artificial intelligence, and immersive experiences, enable more personalized and interactive learning environments. The integration of technologies such as augmented reality and 3D visualization has made it easier for learners to apply theoretical knowledge to practical, real-world scenarios, thereby increasing the practical relevance and efficacy of e-learning. These innovations facilitate experiential learning, where students can engage with content in a more meaningful and engaging manner. The incorporation of such technologies into e-learning platforms represents a significant step towards creating more adaptive and responsive educational models.

The body of literature indicates that the integration of knowledge management practices, positive user perceptions of ease of use, and the adoption of advanced technological innovations are critical factors influencing the effectiveness of e-learning platforms. The synergistic implementation of these elements enhances the capacity of students to acquire and apply knowledge within digital learning environments. Effective knowledge management ensures that educational content is relevant, up-to-date, and accessible, while user-friendly interfaces and perceived usefulness encourage student engagement and continued use of e-learning systems. Technological advancements, such as augmented reality and AI-driven

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personalization, further enrich the learning experience by facilitating interactive and immersive educational activities. Collectively, these factors contribute to an enhanced overall learning experience and better prepare students for real-world applications of their knowledge and skills.

In summary, the perceived usefulness and ease of use of e-learning platforms have played a pivotal role in fostering positive attitudes towards these technologies among students and educators alike. These positive perceptions have been instrumental in ensuring the continued and effective use of e-learning systems in the post-pandemic era. The advantages conferred by e-learning—such as flexibility, accessibility, and the capacity for personalized learning—facilitate the advancement towards more adaptive and accessible educational models. These models are better equipped to address the current and future challenges facing higher education, including the need for lifelong learning and the integration of digital competencies into curricula.

Recognizing the critical importance of these factors, this leads us to our research hypotheses, which aim to explore the direct and indirect effects of various determinants on knowledge acquisition and application within e-learning environments:

- Direct Effects Hypotheses:

H_1: Actual use of the system (AU) has a positive effect on knowledge acquisition (KA).
H_2: Behavioral intention to use (BI) has a positive effect on knowledge application (KAP).
H_3: Behavioral intention to use (BI) has a positive effect on knowledge acquisition (KA).
H_4: Knowledge acquisition (KA) has a positive effect on knowledge application (KAP).
H_5: Perceived ease of use (PE) has a positive effect on knowledge application (KAP).
H_6: Perceived ease of use (PE) has a positive effect on knowledge acquisition (KA).

- Indirect or Mediating Effects Hypotheses:

H7: There is a mediating role of knowledge acquisition (KA) between perceived ease of use (PE) and knowledge application (KAP).
H8: Knowledge acquisition (KA) mediates the relationship between actual use of the system (AU) and knowledge application (KAP).
H9: Knowledge acquisition (KA) significantly mediates the relationship between behavioral intention to use (BI) and knowledge application (KAP).

2. Methodology

The present study employed a quantitative research methodology utilizing a non-experimental, cross-sectional design to examine the mediating role of knowledge acquisition (KA) in the application of knowledge (KAP). According to Creswell (2014), a quantitative approach is appropriate for studies aiming to test objective theories by examining the relationship among variables, which can be measured and analyzed using statistical procedures. The non-experimental design was selected because it allows for the observation of phenomena as they naturally occur without manipulation, which is essential when the variables cannot be ethically or practically manipulated (Bryman, 2016). A cross-sectional design was deemed suitable as it involves collecting data at a single point in time, providing a snapshot of the variables of interest and their interrelations (Levin, 2006).

This explanatory approach focused on understanding how knowledge acquisition mediates the relationship between factors such as perceived usefulness, perceived ease of use, and behavioral intention to use e-learning platforms, and the subsequent application of knowledge. The study was conducted with a sample of 235 undergraduate students from the Catholic University of Santa María, a prominent higher education institution located in the Arequipa region of Peru. This university is known for its commitment to academic excellence and innovation in education, making it an ideal setting for research on e-learning and knowledge management (Universidad Católica de Santa María, 2023).

The sample composition included a majority of male students, representing 56.1% of the participants, while female students accounted for 43.9%. This gender distribution is reflective of the university's enrollment demographics, as reported in institutional statistics (Ministerio de Educación del Perú, 2022).

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The participants' ages ranged primarily between 16 and 23 years, with an average age of 18.22 years (SD = 1.672). This age range corresponds to the typical university student population, which is significant because individuals in this demographic are often digital natives with substantial exposure to technology and e-learning environments (Prensky, 2001; Smith, 2012).

The selection of this particular sample was strategic for several reasons. First, undergraduate students are at a critical stage in their academic and professional development, where the effective acquisition and application of knowledge are paramount (Terenzini & Pascarella, 1991). Second, the Catholic University of Santa María provides a technologically advanced learning environment, incorporating e-learning platforms and digital resources extensively in its curriculum (Universidad Católica de Santa María, 2023). This context ensures that participants have firsthand experience with the variables under investigation, such as perceived ease of use and perceived usefulness of e-learning technologies.

By focusing on students from the Arequipa region, the study also contributes to the understanding of e-learning adoption in a Latin American context, which is often underrepresented in academic research (Sunkel & Trucco, 2012). The cultural, economic, and educational dynamics of Peru offer unique insights into how e-learning platforms are perceived and utilized in developing countries, where access to technology and educational resources may differ significantly from more developed regions (Hilbert, 2011).

The data collected from the participants were subjected to rigorous statistical analysis to test the hypothesized relationships between the variables. Descriptive statistics were used to summarize the demographic characteristics of the sample, while inferential statistics, including mediation analysis, were employed to examine the role of knowledge acquisition in the application of knowledge (Baron & Kenny, 1986; Hayes, 2018). The use of a quantitative approach allowed for the objective measurement of variables and the testing of theoretical models related to technology acceptance and knowledge management (Davis, 1989; Nonaka & Takeuchi, 1995).

Moreover, the study's methodological framework aligns with best practices in social science research by ensuring reliability and validity. The instruments used for data collection were adapted from established scales with proven psychometric properties, and appropriate procedures were followed to maintain the integrity of the data (Field, 2018). Ethical considerations were also addressed, with participants providing informed consent and assurances of confidentiality being upheld in accordance with the American Psychological Association's ethical guidelines (APA, 2020).

Data collection was carried out using a polychotomous questionnaire adapted from a 5-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). This type of scale is widely used in social and educational research to quantify participants' perceptions and attitudes, allowing for detailed statistical analysis of the responses.

The original questionnaire came from the study conducted by M. Al-Emran, V. Mezhuyev, and A. Kamaludin, titled "Towards a conceptual model for examining the impact of knowledge management factors on mobile learning acceptance" (Al-Emran et al., 2020). This study addresses the influence of knowledge management factors on the acceptance of mobile learning, a topic of increasing relevance in the digital age.

The adaptation of the questionnaire was carried out by an expert in foreign languages, ensuring that the translations accurately reflected the original meaning of the questions. This step was crucial to maintain the validity and reliability of the instrument, especially when considering the sociolinguistic context of Peruvian culture. Adapting the questionnaire to the local context involved taking into account idioms, cultural expressions, and levels of comprehension, ensuring that participants interpreted the questions consistently.

Data collection was conducted through an online survey in April 2024, which facilitated effective and diverse participation of the students. The use of online surveys offered several advantages. In terms of accessibility, it allowed participants to respond in their own time and from any location with internet access. Regarding efficiency, it reduced the time and resources needed for data collection and processing.

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Additionally, it provided an expanded reach, making it possible to access a broader and more diverse sample, which can improve the representativeness of the results.

This method allowed for an effective evaluation of how knowledge acquisition influences its practical application in technological educational contexts. By analyzing the responses, it was possible to identify patterns and trends that reveal the relationship between the theoretical knowledge acquired and its implementation in educational environments that incorporate technology.

The importance of the study lies in several aspects. The cultural contextualization, by adapting the questionnaire to the Peruvian context, ensures that the findings are relevant and applicable to that specific population. Understanding how students apply knowledge in technological environments is essential for developing effective educational strategies. Furthermore, the study contributes to the literature on how knowledge management factors impact the acceptance and use of educational technologies.

Regarding methodological considerations, special attention was paid to validity and reliability. The careful adaptation and translation of the questionnaire helped maintain the integrity of the measurement instrument. The use of a Likert scale allowed for statistical techniques such as frequency analysis, means, and correlation tests. Ethical aspects in the research were also considered, ensuring confidentiality and informed consent of the participants when conducting the online survey.

Tthe methodological approach described combines quantitative tools and cultural considerations to explore a relevant topic in modern education. By using a validated and culturally adapted questionnaire, and by implementing an efficient data collection strategy, the study positions itself to offer valuable insights into the interaction between knowledge acquisition and its application in technological educational contexts.

3. Results

In the exploratory phase of the research, a preliminary validation of the questionnaire was conducted using a sample of 80 students to establish the instrument's reliability. Data processing was carried out using the JASP software, and the initial exploratory analysis results indicated satisfactory reliability. Subsequently, the instrument was administered to the full sample, confirming the robustness of the model with a Cronbach's alpha of 0.941 and a McDonald's coefficient of 0.941, suggesting high measurement reliability.

Additionally, a factor analysis was performed to reduce the dimensionality of the original variables into smaller sets of components, as proposed by Hair et al. (1999). This process involved the use of the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity, based on the observed correlation coefficients. The analysis was conducted using the Principal Components Analysis (PCA) method, which seeks interrelationships among various numerical variables in a dataset. The KMO test result yielded a value of 0.937, indicating excellent suitability for factor analysis.

In the confirmatory analysis phase, the CB-SEM model was applied to examine the relationships between the exogenous and endogenous variables of the study, which include: Knowledge Acquisition (KA), Knowledge Application (KAP), Behavioral Intention to Use (BI), Perceived Ease of Use (PE), and Actual System Use (AU). The model fit criteria were evaluated through confirmatory fit indices (CFA) in JASP, resulting in the following indicators: $\chi 2 = 260.127$, degrees of freedom (df) = 125, $\chi 2/df = 2.081$, Comparative Fit Index (CFI) = 0.953, and Root Mean Square Error of Approximation (RMSEA) = 0.068. These results confirm that the measurement model presents a good fit to the collected data.

The model fit results presented in Table 1 show that both the saturated and estimated models provide a good fit to the data in a quantitative study on e-learning. The SRMR values (0.055 and 0.056) indicate minimal average discrepancy between the observed and predicted correlations, suggesting an adequate model fit. The small variations observed in the d_ULS values (0.640 vs. 0.658) and d_G values (0.402 vs. 0.404) between the saturated and estimated models also support the ability of the estimated model to accurately reflect the proposed theoretical structures without significant deviations from the ideal. Additionally, the Chi-square values being very close between both models and a constant NFI of

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0.841, although slightly below the desirable threshold of 0.90, still demonstrate an acceptable level of improvement compared to a null model. Overall, these indicators confirm that the estimated model fits the data well, supporting the validity of the theoretical interrelationships among the studied variables and providing a solid basis for valid inferences about the dynamics of knowledge acquisition and application in digital learning environments.

Table 1.
Model fit.

	Saturated model	Estimated model
SRMR	0.055	0.056
d_ULS	0.640	0.658
d_G	0.402	0.404
Chi-square	567.549	569.853
NFI	0.841	0.841

Table 2 details the factor loadings matrix from the study conducted using PLS-SEM, illustrating how each item contributes to its corresponding latent construct, which is crucial for validating the structure of the theoretical model. The items associated with actual system use (AU), with loadings ranging from 0.897 to 0.923, and behavioral intention to use (BI), with loadings from 0.869 to 0.935, exhibit strong correlations with their constructs, demonstrating precise and effective representation. The items for knowledge acquisition (KA) show a wider range of loadings, from 0.718 to 0.825, but still indicate a significant association. Knowledge application (KAP) and perceived ease of use (PE) also show high factor loadings, from 0.811 to 0.884 and 0.808 to 0.905, respectively, reinforcing the validity of these items in effectively measuring the proposed constructs. This analysis is essential to confirm that the selected items adequately reflect the theoretical aspects of each construct, providing a solid basis for reliable interpretations and practical applications in the context of digital education, thereby improving educational interventions and technology-based pedagogical practices.

Table 2.
Factor loadings matrix.

	Actual use of the system (AU)	Application of knowledge (KAP)	Behavioral intent to use (BI)	Knowledge acquisition (KA)	Perceive ease of use (PE)
AU1	0.923				
AU2	0.914				
AU3	0.897				
BI1			0.869		
BI2			0.904		
BI3			0.935		
KA1				0.821	
KA2				0.718	
KA3				0.817	
KA4				0.825	
KA5				0.816	
KAP1		0.826			
KAP2		0.848			
KAP3		0.884			
KAP4		0.811			
PE1					0.838
PE2					0.869
PE3					0.808

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PE4					0.905
PE5					0.839

In the study using a structural equation model, it was identified that perceived ease of use (PE) positively influences both knowledge acquisition (KA) and actual system use (AU), with coefficients of 0.515 and 0.404, respectively. This indicates that when students find the platform easy to use, they are more likely to use it frequently and more effectively in terms of acquiring knowledge. However, the analysis also reveals a negative relationship between actual system use and knowledge acquisition (coefficient of -0.110), suggesting that more frequent system use does not necessarily lead to better knowledge acquisition, which could indicate the presence of factors such as distraction or inefficiency in system design that negatively affect learning.

On the other hand, the analysis of the coefficients of determination (R^2) provides additional data on the effectiveness of the model. The R^2 for knowledge acquisition (KA) is 0.550, meaning that approximately 55% of the variability in knowledge acquisition is explained by the variables included in the model. This is a robust indicator that the selected variables are relevant to understanding how students acquire knowledge in an e-learning environment. Additionally, the R^2 for knowledge application (KAP) is 0.768, indicating that about 77% of the variability in how students apply their knowledge can be explained by the model. This high level of explanation underscores the model's relevance in predicting and understanding practical learning outcomes, reinforcing the importance of knowledge acquisition as a key predictor of the effective application of that knowledge (see Figure 1).

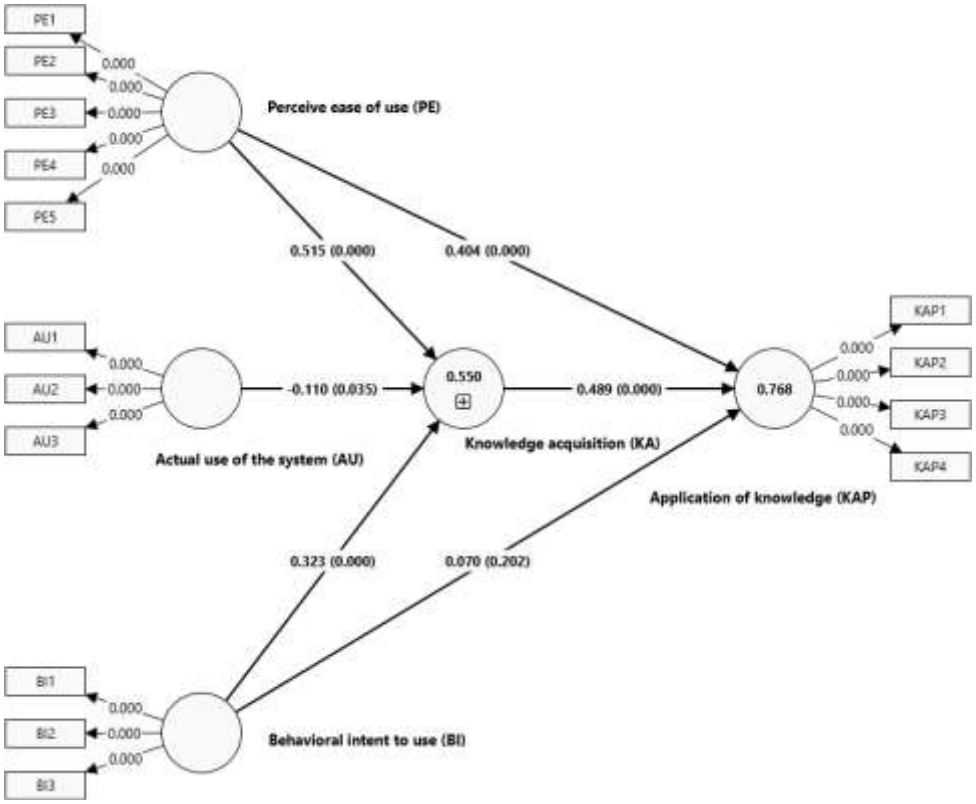

Figure 1.
Model outcome.
Note: $p < 0.05$.

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In Table 3, the reliability and validity of the constructs used in the study on e-learning systems are analyzed. The Cronbach's Alpha values range from 0.860 to 0.906, well above the 0.7 threshold, indicating high internal consistency of the items within each construct. The composite reliability, with rho_a values ranging from 0.866 to 0.908 and rho_c values from 0.899 to 0.936, also exceeds the suggested threshold of 0.7 (Hair et al., 2012), confirming the robustness of the measurement model. The average variance extracted (AVE) ranges from 0.641 to 0.830, all above the 0.5 criterion proposed by Fornell and Larcker (1981), ensuring adequate convergent validity and demonstrating that a significant amount of the variance of the items is attributed to their respective constructs rather than measurement errors. These results validate not only the internal consistency and structure of the constructs but also reaffirm the credibility of the measures used in the study, providing a reliable basis for the derived conclusions and their applicability in future research within the e-learning domain.

Table 3.
Construct reliability and validity.

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Actual use of the system (AU)	0.898	0.901	0.936	0.830
Application of knowledge (KAP)	0.863	0.866	0.907	0.710
Behavioral intent to use (BI)	0.886	0.892	0.930	0.815
Knowledge acquisition (KA)	0.860	0.866	0.899	0.641
Perceive ease of use (PE)	0.906	0.908	0.930	0.727

Table 4 uses the Fornell-Larcker criterion to evaluate discriminant validity in a study on e-learning by comparing the square root of the average variance extracted (AVE) of each construct with the correlations between the constructs. The results confirm adequate discriminant validity, as the square roots of the AVE for each construct—0.911 for actual system use (AU), 0.842 for knowledge application (KAP), 0.903 for behavioral intention to use (BI), 0.801 for knowledge acquisition (KA), and 0.853 for perceived ease of use (PE)—are consistently higher than the correlations between them. For example, the highest recorded correlation between PE and KAP is 0.795, which is lower than the square root of the AVE for both constructs. This clear differentiation ensures that each construct measures a distinct and relevant aspect of the e-learning phenomenon, which is crucial for drawing accurate conclusions about the influence of various factors on educational outcomes within digital platforms.

Table 4.
Fornell-Larcker criterion analysis for verification and discriminant validity.

	(AU)	(KAP)	(BI)	(KA)	(PE)
Actual use of the system (AU)	0.911				
Application of knowledge (KAP)	0.223	0.842			
Behavioral intent to use (BI)	0.292	0.672	0.903		
Knowledge acquisition (KA)	0.186	0.817	0.652	0.801	
Perceive ease of use (PE)	0.392	0.795	0.701	0.698	0.853

In the study on e-learning systems, discriminant validity was evaluated using the Heterotrait-Monotrait (HTMT) criterion, following the method established by Henseler et al. (2016), which has proven to be highly effective in detecting the lack of discriminant validity. According to the thresholds recommended by Franke and Sarstedt (2019), an HTMT value below 0.85 indicates good discrimination between constructs. The results of this study reveal that most HTMT values meet this criterion, highlighting a clear distinction between constructs, with the exception of the KAP and KA pair, which

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exhibits a value of 0.941, suggesting possible conceptual overlap that requires further analysis. This method has been highly valued for its accuracy, achieving specificity and sensitivity rates between 97% and 99%, which surpasses methods such as cross-loadings and reinforces the reliability of the measurement model used in the research (see Table 5).

Table 5.
Heterotrait-monotrait criterion – HTMT.

	(AU)	(KAP)	(BI)	(KA)	(PE)
Actual use of the system (AU)					
Application of knowledge (KAP)	0.250				
Behavioral intent to use (BI)	0.331	0.768			
Knowledge acquisition (KA)	0.212	0.941	0.738		
Perceive ease of use (PE)	0.433	0.898	0.779	0.784	

Table 6 presents the results of the bootstrapping analysis, revealing significant direct effects on several key relationships within the e-learning model. A negative relationship was found between actual system use (AU) and knowledge acquisition (KA), with a coefficient of -0.110, indicating that increased use might not be aligned with effective learning practices ($\beta = -0.110$, $t = 2.113$, $p = 0.035$). On the other hand, behavioral intention to use (BI) showed a significant positive effect on both knowledge acquisition ($\beta = 0.323$, $t = 5.303$, $p < 0.000$) and its application ($\beta = 0.070$, although the latter was not statistically significant, $p = 0.202$). Knowledge acquisition (KA) positively influenced its application (KAP) with a robust coefficient ($\beta = 0.489$, $t = 7.588$, $p < 0.000$). Finally, perceived ease of use (PE) had a positive and significant impact on both knowledge acquisition ($\beta = 0.515$, $t = 7.723$, $p < 0.000$) and knowledge application ($\beta = 0.404$, $t = 6.441$, $p < 0.000$), underscoring the importance of user-friendly interfaces in fostering effective learning.

Table 6.
Direct effects hypothesis testing – bootstrapping.

	β	Sample mean (M)	Standard deviation (STDEV)	t values	p values
H1: Actual use of the system (AU) -> Knowledge acquisition (KA)	-0.110	-0.107	0.052	2.113	0.035
H2: Behavioral intent to use (BI) -> Application of knowledge (KAP)	0.070	0.068	0.055	1.275	0.202
H3: Behavioral intent to use (BI) -> Knowledge acquisition (KA)	0.323	0.324	0.061	5.303	0.000
H4: Knowledge acquisition (KA) -> Application of knowledge (KAP)	0.489	0.494	0.064	7.588	0.000
H5: Perceive ease of use (PE) -> Application of knowledge (KAP)	0.404	0.401	0.063	6.441	0.000
H6: Perceive ease of use (PE) -> Knowledge acquisition (KA)	0.515	0.512	0.067	7.723	0.000

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Table 7 presents the results of the research on the mediating effects of knowledge acquisition (KA) in an e-learning environment, showing how perceptions and uses of the e-learning system indirectly influence knowledge application through knowledge acquisition. Hypothesis H6 shows a significant and positive mediating effect of KA between perceived ease of use (PE) and knowledge application (KAP), with a coefficient of 0.252 and a p-value of 0.000. This indicates that when users perceive the system as easy to use, they not only acquire knowledge more effectively but are also able to apply that knowledge more efficiently. This finding underscores the importance of developing intuitive and accessible user interfaces that facilitate not only knowledge acquisition but also its application, a critical implication for e-learning system designers and educators seeking to maximize the educational benefits of their platforms.

In contrast, the analysis of hypothesis H7 reveals a negative mediating effect, although marginally significant ($p = 0.050$), of KA on the relationship between actual system use (AU) and knowledge application (KAP), with a coefficient of -0.054. This result suggests that greater use of the system does not necessarily facilitate knowledge application, possibly due to the quality or the way the system is used. Finally, hypothesis H8 highlights a positive and significant mediating effect of KA, with a coefficient of 0.158 and a p-value of 0.000, indicating that the intention to use the system positively contributes to both knowledge acquisition and application. This result reinforces the need to foster a proactive and committed attitude toward the use of the e-learning system, possibly through motivational and engagement strategies that directly link the intention to use with practical and applicable learning outcomes.

Table 7.
Indirect effects hypothesis testing – Bootstrapping.

	β	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
H6: Perceive ease of use (PE) -> *Knowledge acquisition (KA)* -> Application of knowledge (KAP)	0.252	0.254	0.052	4.871	0.000
H7: Actual use of the system (AU) -> *Knowledge acquisition (KA)* -> Application of knowledge (KAP)	-0.054	-0.053	0.028	1.958	0.050
H8: Behavioral intent to use (BI) -> *Knowledge acquisition (KA)* -> Application of knowledge (KAP)	0.158	0.160	0.035	4.458	0.000

4. Discussion

The findings of this study offer a comprehensive understanding of the dynamics between knowledge acquisition and its application within e-learning environments, highlighting the significant roles of perceived ease of use, behavioral intention to use, and actual system use. These results are particularly salient in the post-pandemic context, where e-learning has transitioned from a supplementary alternative to a foundational element of higher education (Hussain, 2023; Hargitai et al., 2021). The integration of e-learning platforms has reshaped educational paradigms, necessitating a deeper exploration of factors that enhance learning outcomes and student engagement.

The positive influence of perceived ease of use (PE) on both knowledge acquisition (KA) and knowledge application (KAP) is a critical outcome of this research. The significant coefficients ($\beta = 0.515$ for KA; $\beta = 0.404$ for KAP) indicate that when students perceive e-learning platforms as user-friendly, they are more likely to effectively acquire and apply knowledge. This aligns with the Technology Acceptance Model (TAM) proposed by Davis (1989), which posits that perceived ease of

use is a fundamental determinant of technology acceptance and usage behavior. The findings corroborate the assertions of Reychav et al. (2015), who emphasized that ease of access to educational resources enhances student autonomy and fosters personalized learning experiences. Moreover, Hussain (2023) highlighted that technological advancements such as Web 3.0 have the potential to transform students from passive recipients to active learners, optimizing participation and engagement in online learning environments.

Conversely, the unexpected negative relationship between actual system use (AU) and knowledge acquisition (KA) (β = -0.110) suggests that increased usage of e-learning platforms does not necessarily translate into enhanced knowledge acquisition. This finding may be attributed to factors such as cognitive overload, inefficient use of the platform, or distractions inherent in the digital environment. As Sweller's Cognitive Load Theory (1988) suggests, excessive information or poorly designed interfaces can impede learning by overwhelming the learner's cognitive resources. This result echoes the insights of Asari et al. (2020), who found that the integration of knowledge management practices indirectly affects lecturers' performance, implying that mere usage without effective knowledge management may not yield positive learning outcomes. Therefore, it is imperative to focus not only on promoting the use of e-learning systems but also on optimizing their design and functionality to enhance learning efficiency.

The strong positive relationship between behavioral intention to use (BI) and knowledge acquisition (KA) (β = 0.323), as well as the significant mediating effect of KA on the relationship between BI and KAP (β = 0.158), underscores the importance of fostering a positive attitude towards e-learning platforms. Behavioral intention is a critical predictor of actual usage behavior, as established in the TAM framework (Davis, 1989; Venkatesh et al., 2003). Al-Nuaimi et al. (2022) provided empirical evidence that positive behavioral intentions, stemming from satisfactory user experiences and perceived ease of use, are indispensable for the continued adoption and success of e-learning platforms. This finding also aligns with Chandran and Alammari (2016), who emphasized that knowledge-sharing intentions significantly influence the effective adoption of e-learning practices within universities. Enhancing students' behavioral intentions can be achieved through user-centric design, interactive content, and support systems that collectively enhance the learning experience.

The mediation analysis further reveals that knowledge acquisition (KA) plays a pivotal role in bridging the gap between perceived ease of use (PE) and knowledge application (KAP). The significant mediating effect (β = 0.252) indicates that PE enhances KA, which in turn facilitates KAP. This emphasizes the necessity of designing e-learning platforms that are not only easy to use but also effectively support the learning process leading to practical application. Atanasova (2019) highlighted the importance of knowledge management tools in evaluating and enhancing the quality of learning resources in distance e-learning settings. By incorporating features that promote efficient knowledge acquisition, such as interactive modules and real-world problem-solving activities, e-learning platforms can better prepare students for professional environments (Jang et al., 2021; Cadavieco et al., 2012).

The study's high convergent and discriminant validity, as demonstrated by reliability tests and the Fornell-Larcker criterion, reinforce the robustness of the constructs used. This methodological rigor ensures that variables such as perceived ease of use, behavioral intention, and actual system use are accurately measured and conceptually distinct, which is essential for drawing precise and generalizable conclusions (Hair et al., 2010). The strong internal consistency and validity of the measurement model enhance the credibility of the findings and their applicability in both academic research and practical implementations.

The negative mediating effect of actual system use (AU) on the relationship between KA and KAP (β = -0.054) warrants further investigation. While the effect is marginally significant, it suggests that increased system use may not facilitate, and may even hinder, the application of knowledge. This could be due to ineffective usage patterns, lack of engagement, or suboptimal features within the e-learning platform. Hargitai et al. (2021) emphasized the importance of aligning e-learning platforms with

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students' preferences and learning habits to enhance engagement and educational outcomes. Educational institutions should consider incorporating adaptive learning technologies and personalized feedback mechanisms to address diverse learning needs and optimize system usage.

Furthermore, the findings highlight the critical role of knowledge management practices in enhancing e-learning effectiveness. Effective knowledge management ensures that educational content is relevant, up-to-date, and accessible, which is vital for student engagement and learning success (Nonaka & Takeuchi, 1995; Asari et al., 2020). The integration of knowledge management systems within e-learning platforms can facilitate knowledge sharing among faculty and students, fostering a collaborative learning environment (Chandran & Alammari, 2016). Gentile et al. (2016a, 2016b) demonstrated that universities leveraging digital technologies and MOOCs have enhanced their capacity for knowledge dissemination and educational quality.

Technological innovations, such as augmented reality and Web 3.0 technologies, offer significant opportunities to enhance the practical application of knowledge. Jang et al. (2021) and Hussain (2023) discuss how these advancements enable immersive and interactive learning experiences, bridging the gap between theoretical knowledge and real-world application. Incorporating such technologies can enrich the learning experience, making it more engaging and effective.

5. Conclusion

The present study provides significant insights into the complex dynamics of knowledge acquisition and application within e-learning environments, particularly emphasizing the roles of perceived ease of use, actual system use, and behavioral intention to use. The findings underscore that perceived ease of use is a critical determinant in enhancing both knowledge acquisition and its subsequent application. Students who perceive e-learning platforms as user-friendly are more likely to engage effectively with the content, leading to improved learning outcomes. This aligns with the Technology Acceptance Model proposed by Davis (1989), which posits that ease of use significantly influences users' acceptance and utilization of technology.

An unexpected yet noteworthy finding is the negative relationship between actual system use and knowledge acquisition. This suggests that increased frequency of use does not necessarily equate to better learning outcomes and may, in some cases, impede the acquisition of knowledge. Possible explanations include cognitive overload, inefficient system design, or distractions inherent in digital platforms. This highlights the importance of not only promoting the use of e-learning systems but also ensuring that their design and functionality are optimized to facilitate effective learning. As Sweller's Cognitive Load Theory (1988) suggests, overwhelming learners with excessive information can hinder the learning process.

The study also reveals the pivotal role of behavioral intention in influencing knowledge acquisition and application. A strong behavioral intention to use e-learning platforms positively impacts knowledge acquisition, which in turn enhances the application of knowledge. This emphasizes the need for strategies that foster positive attitudes towards e-learning, such as user-centric design and interactive content, to increase student engagement and effective usage. This finding corroborates the assertions of Venkatesh et al. (2003) regarding the significance of behavioral intention in technology acceptance.

Furthermore, the mediating role of knowledge acquisition between perceived ease of use and knowledge application underscores the necessity of designing e-learning platforms that support not just the acquisition but also the practical application of knowledge. Incorporating features that promote active learning and real-world problem-solving can better prepare students for professional challenges. The importance of knowledge management practices is also highlighted, as effective management ensures that educational content remains relevant and facilitates collaborative learning environments (Nonaka & Takeuchi, 1995).

Overall, this study contributes to the literature by elucidating the relationships among key factors influencing e-learning effectiveness. It underscores the importance of perceived ease of use and behavioral intention in enhancing knowledge acquisition and application while drawing attention to the potential

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drawbacks of increased system use without effective design and knowledge management practices. These insights are particularly relevant in the current educational landscape, where e-learning has become an integral component of higher education.

Based on the findings of this study, several recommendations emerge for educators, e-learning platform designers, and policymakers. A paramount recommendation is the prioritization of user-friendly design in e-learning platforms. Simplifying navigation, enhancing interface intuitiveness, and ensuring accessibility can significantly improve perceived ease of use, thereby facilitating better knowledge acquisition and application. Designers are encouraged to engage in user-centered design processes, involving students in the development and testing phases to ensure that platforms meet their needs and preferences (Hussain, 2023). Additionally, strategies to foster positive behavioral intentions towards e-learning should be implemented. Educational institutions can provide training sessions, workshops, and demonstrations to showcase the benefits and functionalities of e-learning platforms. Incorporating interactive multimedia content, gamification elements, and collaborative tools can enhance engagement and motivation. By improving students' attitudes toward e-learning, institutions can increase the likelihood of effective usage and learning outcomes (Al-Nuaimi et al., 2022).

Furthermore, the negative relationship identified between actual system use and knowledge acquisition suggests that merely increasing usage is insufficient; thus, it is crucial to focus on optimizing the quality of system use. Educators should ensure that e-learning activities are purposeful, well-structured, and aligned with learning objectives. Incorporating adaptive learning technologies that tailor content to individual learners can address diverse learning needs and prevent cognitive overload, while providing timely feedback and support can enhance the effectiveness of e-learning experiences (Hargitai et al., 2021). Integrating effective knowledge management practices into e-learning systems is also essential. This includes curating high-quality educational content, facilitating knowledge sharing among students and faculty, and promoting collaborative learning environments. Tools such as discussion forums, wikis, and virtual workspaces can encourage interaction and collective knowledge construction. Institutions should invest in continuous updates and maintenance of e-learning resources to ensure their relevance and reliability (Atanasova, 2019; Chandran & Alammari, 2016). Lastly, future research should delve deeper into the factors contributing to the negative impact of actual system use on knowledge acquisition. Qualitative studies could provide richer insights into students' experiences, challenges, and perceptions of e-learning platforms. Investigating individual differences such as learning styles, motivation, self-regulation skills, and technological proficiency can further inform the development of more effective e-learning environments. Longitudinal studies could also examine the long-term effects of e-learning practices on knowledge retention and application.

By addressing these recommendations, educational institutions and platform developers can enhance the efficacy of e-learning, ensuring that students not only acquire knowledge but are also able to apply it effectively in real-world contexts. This is particularly crucial in an increasingly digitalized educational landscape, where e-learning is poised to play a central role in shaping future learning experiences. Emphasizing both technological advancement and pedagogical effectiveness will be key to maximizing the potential of e-learning in higher education.

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