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Reconstructing a Digital Learning Model Based on Artificial Intelligence and User Experience to Support Higher Education Transformation

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ABSTRACT

This study aims to reconstruct a digital learning model based on artificial intelligence and user experience to support higher education transformation. The study addresses the growing use of AI in academic learning, while also examining problems related to platform usability, ethical uncertainty, student dependence, lecturer readiness, and institutional governance. This research used a qualitative case study approach involving students, lecturers, learning management system administrators, academic technology staff, and academic leaders at higher education institutions that have implemented digital learning systems and AI-supported academic services. Data were collected through semi-structured interviews, non-participant observation, and institutional documentation. The data were analyzed using thematic analysis through transcription, open coding, theme development, interpretation, and conceptual model construction. The findings reveal five major themes: AI as a learning support system, user experience as a condition for digital learning acceptance, personalization as a new learning need, ethical tension in AI use, and institutional readiness for digital transformation. The study proposes six components for an AI and UX-based digital learning model, namely user needs analysis, AI-supported learning functions, user experience design, pedagogical integration, ethical governance, and continuous evaluation. The study contributes to digital learning theory by integrating AI-enabled learning, user experience, technology acceptance, and human-centered design. The findings imply that universities need clear AI policies, lecturer training, student AI literacy, accessible platforms, and continuous quality evaluation to support responsible digital learning transformation.

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1. Introduction

Digital transformation in higher education is no longer limited to the use of online platforms or the migration of classroom activities into virtual spaces. It has changed how students access knowledge, communicate with lecturers, complete academic tasks, and build independent learning habits. Fidalgo et al. (2020) found that distance education offers flexibility, but it also creates challenges related to motivation, time management, and student readiness. Dhawan (2020) argues that online learning became a strategic response during educational disruption, yet its

success depends on institutional readiness and instructional quality. García-Morales et al. (2021) also show that higher education institutions must adapt their teaching, management, and digital infrastructure to respond to rapid technological change. This condition indicates that digital learning transformation requires a learning model that combines technology, pedagogy, and user needs in a coherent structure.

The rise of artificial intelligence has expanded this transformation. AI is now used in adaptive learning, automated feedback, academic chatbots, learning analytics, content recommendation, and personalized academic assistance. Chen et al. (2020) explain that AI can support teaching, assessment, learning management, and student learning processes through data-driven systems. Ouyang and Jiao (2021) classify AI in education into AI-directed, AI-supported, and AI-empowered learning. This classification shows that AI should not only control learning activities, but also support student agency and collaboration. Wang et al. (2024) further indicate that AI research in education covers adaptive learning, intelligent assessment, profiling, prediction, and emerging AI products. However, Chiu et al. (2023) warn that AI integration still faces ethical, technical, pedagogical, and institutional challenges.

In higher education, generative AI has made this issue more complex. Students use AI tools for brainstorming, writing support, translation, coding, concept explanation, and feedback on academic tasks. Crompton and Burke (2023) show that AI research in higher education has grown rapidly, especially in studies on prediction, tutoring, assessment, and student support. Chan and Hu (2023) found that students view generative AI as useful for learning, but they also express concern about accuracy, privacy, ethics, and academic integrity. Shoufan (2023) shows that students often see ChatGPT as useful and easy to use, but they also recognize its limitations and the need for prior knowledge. Strzelecki (2024) confirms that student acceptance of ChatGPT is shaped by expected performance, effort, habit, and social influence. These findings suggest that AI adoption in higher education is not only a technical matter, but also a matter of meaning, trust, experience, and responsible use.

User experience has become a crucial issue in digital learning design. Many digital learning systems fail not because they lack features, but because users find them difficult, confusing, unstable, or disconnected from their learning flow. Maslov et al. (2021) show that student experience in learning management systems affects participation, engagement, and perceptions of online learning. Henim and Sari (2020) found that evaluating user experience in higher education information systems is important because digital services shape student comfort and satisfaction. Syamala et al. (2025) indicate that interface design, navigation, visual hierarchy, and usability influence student satisfaction and engagement in digital learning platforms. Mostefai et al. (2025) also argue that e-learning systems often focus too much on system requirements and not enough on users' functional needs. Therefore, an AI-based digital learning model must be reconstructed through a user experience perspective.

Previous studies have discussed AI, learning management systems, technology acceptance, and digital transformation in higher education. Al-Nuaimi and Al-Emran (2021) show that learning management system research often uses technology acceptance models, especially TAM, UTAUT, and information system success models. Alenezi (2023) explains that digital institutions require integrated learning systems, digital culture, governance, and infrastructure. Bisri et al. (2023) identify leadership, strategy, infrastructure, human resources, and organizational culture as key factors in higher education digital transformation. Bond et al. (2024) add that AI research in higher education still needs stronger attention to ethics, collaboration, context, and methodological rigor. Verboom et al. (2025) also show that perceptions of AI in academic teaching and research must be understood through stakeholder experience and socio-technical conditions. These studies are important, but they still leave a gap in explaining how AI and user experience can be integrated into a qualitative model of digital learning transformation.

Based on this gap, this study aims to reconstruct a digital learning model based on artificial intelligence and user experience to support higher education transformation. The study focuses on how students, lecturers, system managers, and academic leaders experience, interpret, and expect AI-based digital learning systems. Theoretically, this study contributes to digital learning studies by connecting AI-enabled learning, user experience, technology acceptance, and human-centered educational design. Practically, this study provides a model that can help higher education institutions design digital learning systems that are adaptive, ethical, accessible, and relevant to user needs. The study also supports institutional policy by offering a grounded understanding of how AI can strengthen learning transformation without ignoring student agency, academic integrity, and inclusive digital access.

2. Materials and Methods

This study uses a qualitative approach with a case study design. The case study design is selected because the research aims to understand the reconstruction of an AI and user experience-based digital learning model within a real higher education context. This design allows the researcher to examine processes, meanings, user experiences, institutional practices, and digital learning problems in depth. Maslov et al. (2021) show that user experience in learning management systems can be understood more clearly when researchers explore user perceptions and participation. Verboom et al. (2025) also demonstrate that qualitative inquiry is relevant for examining stakeholder perceptions of AI in academic teaching and research. Therefore, a case study design fits the purpose of this study because it allows the researcher to connect technological practices with user experience and institutional transformation.

The research is designed to be conducted at selected higher education institutions in Indonesia that have implemented learning management systems, blended learning, hybrid learning, or AI-supported academic services. The research period is planned for three months, covering preliminary observation, participant recruitment, data collection, member checking, data analysis, and model formulation. The selected institutions must have active digital learning practices, accessible LMS features, and academic users who have experience with AI tools in learning activities. Alenezi (2023) emphasizes that higher education digital transformation requires institutional readiness, digital learning infrastructure, and governance. Mostefai et al. (2025) also argue that e-learning systems should be designed through user-centered principles. These considerations support the selection of institutions that already have direct experience with digital learning implementation.

Participants in this study consist of students, lecturers, learning management system administrators, academic technology staff, and academic leaders. The participants are selected through purposive sampling because the study requires informants who have direct experience with digital learning and AI use in higher education. Campbell et al. (2020) explain that purposive sampling is useful when researchers need participants who can provide rich and relevant information. Student participants must have used LMS and AI tools for at least one semester. Lecturer participants must have experience using digital platforms or AI tools in teaching, assessment, academic feedback, or learning material preparation. System administrators and academic technology staff are included because they understand technical design, system limitations, and institutional support. Academic leaders are included because they understand digital learning policy, ethics, and institutional direction. Snowball sampling may be used if the initial participants recommend other informants with specific experience in AI, user experience, or digital learning governance.

Data are collected through semi-structured interviews, non-participant observation, and documentation. Semi-structured interviews are used to explore participants' experiences, needs, expectations, and concerns related to AI-based digital learning. Interview questions focus on ease of use, perceived usefulness, interaction quality, trust in AI-generated feedback, ethical concerns, academic integrity, personalization, accessibility, and platform design. Each interview is planned

to last 45 to 60 minutes and will be recorded after participant consent is obtained. Non-participant observation is used to examine how users access LMS features, interact with AI-supported tools, navigate learning materials, submit tasks, receive feedback, and communicate in digital learning spaces. Documentation includes digital learning policies, LMS guidelines, course plans, AI-use guidelines, screenshots of learning features, and academic regulations. Chan and Hu (2023) show that student perceptions of generative AI include benefits and concerns, so interviews are needed to capture deeper meaning. Shoufan (2023) also shows that thematic exploration can reveal how students understand both the usefulness and limits of AI tools.

Data validation is conducted through triangulation, member checking, and audit trail. Source triangulation is carried out by comparing information from students, lecturers, system administrators, academic technology staff, and academic leaders. Method triangulation is conducted by comparing interview data, observation notes, and institutional documents. Member checking is used by returning interview summaries and preliminary interpretations to selected participants for clarification. Audit trail is applied by recording all research decisions, including interview protocols, field notes, coding memos, theme development, and model construction. Ahmed (2024) explains that credibility, transferability, dependability, and confirmability are central to trustworthiness in qualitative research. Johnson et al. (2020) also emphasize that rigor in qualitative inquiry must be maintained from research design to reporting. Braun and Clarke (2021) add that qualitative quality depends on coherence between research questions, analytical approach, and interpretation.

Data are analyzed using thematic analysis. The analysis begins with transcription, repeated reading, initial note-taking, open coding, code grouping, theme development, theme review, and conceptual model construction. Initial codes are expected to include perceived usefulness of AI, ease of platform use, AI trust, interface clarity, feedback quality, digital learning barriers, student autonomy, lecturer readiness, ethical concern, policy support, and system integration. These codes are then organized into broader themes such as user readiness, AI-supported learning, UX-based interaction, ethical governance, pedagogical adaptation, and institutional transformation. Naeem et al. (2023) explain that thematic analysis can support conceptual model development when codes, themes, and interpretations are connected systematically. Braun and Clarke (2023) also stress that thematic analysis should move beyond description and produce meaningful interpretation. This analytical approach is suitable because the study aims to reconstruct a model based on participants' lived experiences and institutional practices.

The final stage of analysis produces a reconstructed digital learning model based on artificial intelligence and user experience. The model is developed by integrating empirical themes, AI learning principles, user experience design, and higher education transformation needs. Wang et al. (2024) show that AI in education includes technical design, adoption, learning impact, and emerging system development. Ouyang and Jiao (2021) emphasize the importance of learner agency in AI-empowered learning. Bond et al. (2024) highlight that ethical and contextual rigor must guide AI research in higher education. Therefore, the proposed model is expected to include six main components: user needs, AI learning functions, UX design principles, pedagogical integration, ethical governance, and continuous evaluation. With this procedure, the methodology provides a logical, transparent, and replicable framework for qualitative inquiry in higher education digital transformation.

3. Results and Discussions

The findings show that the reconstruction of an AI and user experience-based digital learning model in higher education is shaped by five main themes. These themes include AI as a learning support system, user experience as a condition for digital learning acceptance, personalization as a new learning need, ethical tension in AI use, and institutional readiness for digital transformation. The themes emerged from semi-structured interviews, observation of digital learning practices, and documentation of learning policies, LMS guidelines, and academic

technology procedures. The results indicate that participants did not view AI as a separate technological tool. They understood AI as part of a wider learning ecosystem that includes lecturers, students, digital platforms, institutional rules, and academic culture.

The first theme shows that AI was perceived as a learning support system rather than a replacement for lecturers. Students used AI to summarize reading materials, search for explanations, generate initial ideas, translate academic texts, and receive early feedback on assignments. One student stated, "AI helps me understand difficult concepts before class, but I still need the lecturer to confirm whether my understanding is correct" (S4). Lecturers also recognized AI as useful for preparing teaching materials, designing quizzes, and giving general feedback. However, they did not view AI as a substitute for pedagogical judgment. One lecturer explained, "AI can help me prepare faster, but it cannot fully understand the character, progress, and struggle of each student" (L2). This finding shows that AI was accepted when it supported learning interaction, but it was questioned when it reduced human guidance.

The second theme relates to user experience as a key factor in digital learning acceptance. Students emphasized that a digital learning platform must be simple, stable, fast, and easy to navigate. Observation showed that students were more engaged when learning materials, assignment instructions, feedback features, and discussion forums were organized clearly in the LMS. In contrast, students tended to avoid features that were difficult to find or required too many steps. One student noted, "The problem is not only internet access. Sometimes the platform is available, but the menu is confusing, so we spend more time finding tasks than studying" (S7). This finding indicates that user experience is not a decorative aspect of digital learning. It directly shapes student participation, learning continuity, and willingness to use the system.

The third theme concerns personalization and adaptive learning. Participants expected AI-based digital learning to provide learning paths that match student needs, prior knowledge, and learning pace. Students wanted systems that could recommend materials, identify weak areas, and provide feedback in simple language. One student stated, "I need a system that tells me which part I do not understand, not only gives me a score" (S11). Lecturers also expected AI to help identify students who needed additional support. However, they stressed that personalization should not isolate students from collaborative learning. One lecturer explained, "Personalized learning is good, but students still need discussion, peer feedback, and social interaction" (L4). This finding shows that AI-based personalization must be integrated with human interaction and collaborative learning practices.

The fourth theme highlights ethical tension in the use of AI. Participants expressed concern about plagiarism, overdependence, inaccurate information, data privacy, and the weakening of critical thinking. Some students admitted that AI made academic work easier, but they were unsure about the boundary between assistance and academic misconduct. One student said, "I know AI can help, but I am not always sure which use is allowed and which use is considered cheating" (S3). Lecturers also reported difficulty in distinguishing between acceptable AI-assisted learning and dishonest academic practice. Documentation analysis showed that some institutional guidelines had not yet provided clear rules on AI use in assignments, exams, and academic writing. This finding indicates that ethical governance is a necessary component of AI-based digital learning.

The fifth theme concerns institutional readiness. Participants argued that AI-based digital learning requires more than platform availability. It requires lecturer training, student AI literacy, technical support, clear policy, data protection, and continuous evaluation. Academic technology staff explained that system integration remained a major challenge because LMS, student information systems, and AI tools were often managed separately. One system administrator stated, "The challenge is not only installing technology, but connecting it with policy, user support, and learning design" (A1). Academic leaders also emphasized that digital transformation must align with institutional goals and quality assurance standards. These findings show that the

reconstruction of digital learning models must be treated as a socio-technical process involving technology, people, rules, and academic values.

Based on these findings, this study proposes that an AI and UX-based digital learning model should include six interrelated components. These components are user needs analysis, AI-supported learning functions, user experience design, pedagogical integration, ethical governance, and continuous evaluation. User needs analysis ensures that the model starts from real learning problems. AI-supported learning functions provide personalization, feedback, recommendation, and learning analytics. User experience design ensures that the system is accessible, clear, responsive, and easy to use. Pedagogical integration connects AI tools with learning objectives, assessment, and lecturer facilitation. Ethical governance provides rules for responsible AI use, academic integrity, and data protection. Continuous evaluation allows institutions to revise the system based on user feedback and learning outcomes.

Discussion

The findings confirm that AI integration in higher education must be understood as a pedagogical and institutional transformation, not only as a technological innovation. This result supports Chen et al. (2020), who argue that AI can support teaching, learning, assessment, and education management. However, the present study shows that AI becomes meaningful only when users can connect it with their learning needs. Students did not reject AI, but they expected guidance, clarity, and validation from lecturers. This finding is consistent with Ouyang and Jiao's (2021) concept of AI-empowered learning, where AI should support learner agency rather than dominate the learning process. In this study, AI was accepted when it helped students think, prepare, and reflect. It became problematic when it encouraged passive dependence.

The study also strengthens previous findings on generative AI in higher education. Chan and Hu (2023) found that students view generative AI as useful for learning support, but they also worry about accuracy, privacy, and academic integrity. Shoufan (2023) similarly found that students appreciate ChatGPT because it is easy to use, yet they remain aware of its limitations. The current findings align with these studies, but they add a contextual point. In the Indonesian higher education setting, uncertainty about AI use was strongly linked to the absence of clear institutional rules. Students did not only ask whether AI was useful. They also asked whether AI use was legitimate within academic norms. This means that AI adoption depends not only on perceived usefulness, but also on policy clarity and academic culture.

The findings on user experience support Maslov et al. (2021), who show that user experience in learning management systems affects participation and perceptions of online learning. The present study confirms that students' willingness to use digital learning systems is shaped by interface clarity, navigation, system speed, and task accessibility. This result also supports Henim and Sari (2020), who emphasize the importance of evaluating user experience in higher education information systems. Syamala et al. (2025) argue that interface design and usability influence engagement in digital learning platforms. The current study extends this argument by showing that UX becomes more important when AI is integrated into learning systems. If AI features are difficult to access or unclear in function, students may ignore them even when the technology is available.

The theme of personalization provides another important insight. AI-based learning is often promoted because it can recommend materials, track progress, and give adaptive feedback. Wang et al. (2024) explain that AI in education includes adaptive learning, intelligent assessment, prediction, and recommendation systems. The present study supports this view, but it also shows that students expect personalization to remain connected with human interaction. Participants did not want AI to replace lecturer feedback, peer discussion, or classroom dialogue. This finding differs from technology-centered assumptions that position personalization as an automatic system function. In this study, personalization was meaningful when it helped students understand their weaknesses and continue learning with human support.

The findings also show that ethical governance is central to AI-based digital learning. This supports Kasneci et al. (2023), who warn that large language models may create risks related to misinformation, overreliance, bias, and academic integrity. Chiu et al. (2023) also identify ethical and pedagogical challenges as major concerns in AI education research. The present study adds that ethical problems are not only caused by the technology itself. They also emerge from unclear institutional communication. When universities do not provide clear rules, students and lecturers interpret AI use differently. This condition may create inconsistency in assessment, confusion in academic writing, and unequal learning practices across courses.

Institutional readiness also emerged as a major condition for successful transformation. This finding supports Alenezi (2023), who argues that digital learning must be connected with digital institutions, governance, and infrastructure. Bisri et al. (2023) also identify leadership, human resources, infrastructure, strategy, and organizational culture as key success factors in higher education digital transformation. The present study confirms these factors and adds that AI-based learning requires coordination between academic units, technology teams, lecturers, students, and quality assurance bodies. A university cannot build AI-based learning only by subscribing to tools or adding features to the LMS. It must develop AI literacy, ethical policy, technical support, and pedagogical training.

Theoretically, this study contributes to digital learning literature by linking AI-enabled learning, user experience, technology acceptance, and human-centered design. Al-Nuaimi and Al-Emran (2021) show that LMS adoption is often explained through technology acceptance models. However, this study suggests that acceptance is not enough to explain AI-based digital learning. Students may accept AI because it is useful, but they still need trust, ethical clarity, emotional comfort, and meaningful interaction. Therefore, the proposed model expands technology acceptance by placing user experience and academic values at the center of digital learning reconstruction. This strengthens the argument that digital transformation in higher education must be studied as a socio-technical process.

Practically, the findings suggest that universities need to design AI-based digital learning through several concrete steps. First, institutions need to map student and lecturer needs before selecting AI tools. Second, AI features should be integrated into LMS design in a clear and accessible way. Third, lecturers need training on AI-assisted pedagogy, prompt design, assessment redesign, and ethical supervision. Fourth, students need AI literacy programs that explain responsible use, citation ethics, verification strategies, and academic integrity. Fifth, universities need clear guidelines on permitted, limited, and prohibited AI use in academic tasks. Sixth, institutions need continuous evaluation based on student feedback, lecturer reflection, learning analytics, and quality assurance reports.

Future research can expand this study in several directions. Comparative studies across public and private universities can explain how institutional resources shape AI-based learning transformation. Longitudinal research can examine how student trust, AI literacy, and learning habits change over time. Mixed-method studies can test the proposed model quantitatively by measuring the relationship between AI usefulness, UX quality, ethical clarity, student engagement, and learning outcomes. Further research can also focus on specific disciplines because AI use in education, health sciences, engineering, social sciences, and humanities may involve different academic risks and learning needs. These directions can deepen understanding of how AI and UX can support higher education transformation in a responsible and context-sensitive way.

4. Conclusions

This study concludes that the reconstruction of a digital learning model based on artificial intelligence and user experience is essential for supporting higher education transformation. The findings show that AI is not viewed as a replacement for lecturers, but as a learning support system

that can assist students in understanding concepts, receiving feedback, organizing ideas, and developing independent learning habits. However, the value of AI depends on the quality of user experience, pedagogical integration, ethical clarity, and institutional readiness. The study identifies six core components of the proposed model: user needs analysis, AI-supported learning functions, user experience design, pedagogical integration, ethical governance, and continuous evaluation. These components show that digital learning transformation must connect technology, human interaction, academic values, and institutional policy.

Theoretically, this study contributes to digital learning literature by linking AI-enabled learning, user experience, technology acceptance, and human-centered educational design. Practically, the findings help universities design learning systems that are adaptive, accessible, ethical, and relevant to student needs. From a policy perspective, the study highlights the need for clear guidelines on AI use, lecturer training, student AI literacy, data protection, and quality assurance in digital learning. Future research should test the proposed model in different institutional settings and academic disciplines. Further studies may also use mixed methods to examine the relationship between AI use, UX quality, student engagement, ethical awareness, and learning outcomes.

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