Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

A Multidimensional Analysis of User Experience and AI Personalization in Indonesian University Websites

Adhi Susilo

adhi@ecampus.ut.ac.id

Universitas Terbuka

Fatia Fatimah

Universitas Terbuka

Paulina Pannen

Universitas Terbuka

Raesita Rakhmawati Rosadi

Universitas Terbuka

Richardus Eko Indrajit

Pradita University

Hariyati Hariyati

Universitas Negeri Surabaya

Research Article

Keywords: University website evaluation, AI personalization, Content strategy, Usability, Distance education, User experience, Indonesian higher education

Posted Date: July 7th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10015078/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

This study presents a multidimensional analysis of Indonesian university websites, examining content strategy, artificial intelligence (AI) personalization, international perception, and usability across four higher education institutions. Drawing on survey data from 75 respondents comprising Indonesian citizens (n = 44, 58.7%) and international users (n = 31, 41.3%) from eight countries, the research employs a cross-sectional mixed-methods design utilizing a validated seven-point semantic differential scale. Descriptive results indicate moderate-to-high satisfaction across all evaluation domains, with AI personalization (M = 5.26, SD = 1.25) and content strategy (M = 5.20, SD = 1.13) emerging as particularly noteworthy dimensions. Multiple regression analysis reveals that the four domains collectively explain 87.6% of variance in overall satisfaction ($R^2 = 0.876$), with AI personalization demonstrating the strongest predictive validity ($\beta = 0.512$, $p < .001$). Internal consistency reliability was excellent across all constructs ($\alpha = 0.929–0.982$). Qualitative thematic analysis identified server performance, multilingual accessibility, and personalized content recommendations as priority improvement areas. Notably, no significant differences were observed between domestic and international respondents, indicating cross-culturally consistent perceptions. The findings offer theoretical and practical implications for higher education institutions seeking to enhance digital presence, international student recruitment, and user experience in the context of distance education.

1 Introduction

The digital transformation of higher education has accelerated dramatically in recent years, fundamentally reshaping how universities communicate with prospective students and stakeholders worldwide [1, 2]. University websites have emerged as critical touchpoints for student engagement, institutional branding, and international recruitment, serving as the primary interface through which institutions project their academic identity and value proposition to a global audience [3]. The COVID-19 pandemic served as an unprecedented catalyst, compelling institutions to transition rapidly to online modalities and prompting systematic reassessment of digital communication infrastructure [3]. For institutions offering distance education, effective websites are not merely promotional tools but essential pedagogical and administrative interfaces that directly shape learner experience and institutional reputation.

In this evolving landscape, the integration of artificial intelligence (AI)-based personalization features has introduced new dimensions to university website design and evaluation. AI-powered chatbots, adaptive content recommendation systems, and personalized dashboards have demonstrated significant potential for enhancing student support, information accessibility, and overall user engagement on educational platforms [4, 5]. Research demonstrates that user trust in AI-enabled systems is shaped by socio-ethical considerations, system features, and individual user characteristics [6], making human-centered AI design an imperative for educational contexts. The Technology Acceptance Model (TAM) offers a complementary theoretical lens, positing that perceived ease of use and perceived usefulness

are primary antecedents of positive attitudes toward technology adoption [7], with direct implications for how university websites should be designed and evaluated.

Indonesia's higher education sector presents a particularly compelling context for such investigation. Distance education institutions such as Universitas Terbuka have pioneered online learning delivery, yet systemic challenges in quality assurance, digital infrastructure, and effective website communication persist [8]. Indonesian educators and students encounter substantial barriers, including limited digital literacy, inadequate technological infrastructure, and insufficient pedagogical adaptation to virtual modalities [9]. Furthermore, the government's Merdeka Belajar philosophy, which promotes flexible and digitally enabled education, has intensified pressure on institutions to optimize their web-based communication strategies for both domestic and international audiences [10]. Yet research specifically examining how Indonesian university websites perform across multidimensional user experience (UX) constructs—particularly in the context of international student recruitment—remains limited.

The extant literature on university website evaluation has predominantly focused on technical usability and general user satisfaction, with limited integrated attention to content strategy quality, international perception, and AI personalization features simultaneously [11]. This fragmented approach fails to capture the multidimensional nature of contemporary user experience on educational platforms, where users interact with dynamic AI features alongside static informational content. Standardized UX evaluation instruments such as the User Experience Questionnaire (UEQ) and System Usability Scale (SUS) have been widely adopted but require adaptation to accommodate AI-enabled features and cross-cultural contexts [12].

This study addresses these gaps by providing a systematic, empirically grounded evaluation of Indonesian university websites across four interconnected domains: content strategy, usability, international perception, and AI personalization. Specifically, the research pursues the following objectives: (1) to assess the perceived quality of website content regarding university information, tuition fees, curriculum, and study methods; (2) to evaluate user perceptions of AI-driven personalization features, including chatbots and adaptive recommendations; (3) to investigate the international orientation and cultural inclusivity of website design; and (4) to identify primary predictors of overall user satisfaction through multiple regression analysis. The novelty of this study lies in its comprehensive, multidimensional framework integrating content strategy evaluation with AI personalization assessment, targeting both domestic and international users within the Indonesian distance education context. The findings hold implications for institutional administrators, website developers, educational technologists, and policymakers engaged with the digital transformation of higher education.

2 Literature review

2.1 Digital transformation and university websites in higher education

The digital transformation of higher education represents a fundamental restructuring of institutional operations, pedagogy, and communication strategies [1]. This transformation encompasses not merely the adoption of technology but a comprehensive reimagining of how institutions create value and engage stakeholders. Research demonstrates that successful digital transformation requires alignment between technological investments and institutional culture, skills development, and strategic vision [13]. Universities approaching digital transformation holistically—addressing infrastructure, pedagogy, and organizational change simultaneously—achieve more sustainable outcomes than those focusing narrowly on technology adoption alone.

University websites have progressively evolved from static information repositories to dynamic, interactive portals serving diverse stakeholder needs. In the context of cross-border student mobility and international recruitment, websites function as primary information sources for prospective students evaluating institutional suitability [14]. The challenges confronting higher education institutions in developing countries during digital transitions are well documented, encompassing digital inequalities, unreliable internet connectivity, limited technological competence among instructors and students, and insufficient digital infrastructure [11]. Such constraints necessitate that university websites be designed with accessibility and usability as paramount considerations, ensuring that information remains accessible across varying technological contexts.

2.2 Website usability, user experience, and theoretical frameworks

User experience evaluation in digital contexts has benefited from the development of standardized, psychometrically validated instruments [12]. Systematic reviews of UX evaluation methodologies reveal that instruments such as AttrakDiff, the UEQ, and meCUE provide validated approaches for assessing multiple dimensions of digital platform quality, capturing both pragmatic qualities (functionality, usability) and hedonic qualities (stimulation, identification). These multi-item instruments enable reliable measurement of user perceptions across diverse demographic groups, facilitating statistical comparisons and longitudinal tracking.

The TAM offers a foundational theoretical framework for understanding how users form attitudes toward digital platforms [7]. According to TAM, perceived ease of use and perceived usefulness serve as primary determinants of attitudes toward technology utilization, which subsequently influence behavioral intentions and actual use. For university websites, this implies that both functional usability and perceived informational value contribute to user satisfaction and continued engagement. Extensions of TAM incorporating trust and social influence factors are particularly relevant for AI-enabled platforms, where user acceptance depends partly on confidence in system reliability and transparency [6].

2.3 AI personalization in educational platforms

The integration of artificial intelligence into educational platforms has accelerated substantially, raising important questions about user perceptions, trust, and ethical considerations [6]. Research on user trust

in AI-enabled systems identifies three primary influences: socio-ethical considerations encompassing privacy and transparency concerns, system features including reliability and accuracy, and user characteristics such as prior experience and digital literacy. Importantly, building trust in AI systems requires human-centric design approaches that prioritize user needs, provide meaningful explanations of AI recommendations, and maintain user agency.

Distance learning students have expressed particular interest in AI digital assistants that provide real-time assistance, support academic tasks, and offer personalization and accessibility features [4]. Students report benefits including query resolution support, personalized program recommendations, and adaptive learning support, while simultaneously expressing concerns about data privacy, academic integrity, and the displacement of human interaction. Wang et al. [5] further documented that AI-powered tools can significantly enhance international student experiences by bridging information gaps, facilitating navigation of unfamiliar educational systems, and providing culturally sensitive support. Human-centered artificial intelligence (HCAI) research has articulated grand challenges for ensuring that AI systems serve human well-being, including responsible design, privacy protection, appropriate governance, and cognizance of human cognitive capacities [15].

2.4 International perception and cross-cultural website evaluation

The internationalization of higher education has placed increased emphasis on how institutions project global competitiveness through digital channels. University websites serve as primary information sources for prospective international students, making the quality and accessibility of internationally oriented content critical for recruitment success. Research consistently indicates that information about tuition fees, accommodation, programs, and admission requirements represents high-priority content for international audiences [14]. However, the challenge of creating digitally inclusive environments extends beyond information provision to encompass cultural sensitivity, multilingual accessibility, and responsiveness to diverse user needs.

Cross-cultural research on technology acceptance highlights that while TAM constructs demonstrate cross-cultural validity, cultural dimensions can moderate the relative importance of individual predictors. In the Indonesian context specifically, teacher readiness research has found that attitude readiness explains 93% of variance in overall online learning readiness, suggesting that positive attitudes toward digital technology may be a more powerful determinant than experience duration [9]. This finding has implications for international website design, where fostering positive initial impressions and reducing perceived barriers may be particularly consequential for user engagement.

3 Methods

3.1 Research design

This study employed a cross-sectional mixed-methods convergent design to evaluate user perceptions of Indonesian university websites [16]. The quantitative approach utilized structured questionnaires with semantic differential scales, a well-established methodology for examining user experience constructs in educational technology contexts [12]. The convergent mixed-methods design enabled complementary integration of quantitative statistical patterns with contextual qualitative data, providing a comprehensive understanding of user experiences that neither approach could achieve independently [17]. This methodological triangulation enhances both the validity and the practical applicability of the findings.

3.2 Participants and sampling

Purposive and convenience sampling techniques were employed to recruit participants from diverse institutional and demographic backgrounds. Participants were required to have direct interaction with one of the specified Indonesian university websites—Universitas Terbuka, Universitas Negeri Surabaya (UNESA), Universitas Pradita, or the Indonesia Cyber Education Institute (ICEI)—to ensure that responses reflected actual interaction experiences. The multi-site approach ensured representation of both public and private institutions across different distance education models.

The final consented sample comprised 75 participants following removal of non-consenting respondents. The sample included Indonesian citizens (n = 44, 58.7%) and international respondents (n = 31, 41.3%) from the Philippines, Japan, Myanmar, Sri Lanka, Pakistan, Mexico, Timor-Leste, and Turkey. Demographic characteristics revealed a near-gender balance (females 54.7%, males 45.3%) with substantial online learning experience (56% exceeding one year). Primary devices for accessing the websites included laptops (53.3%), smartphones (29.3%), and desktop computers (13.3%). This sample size is considered adequate for exploratory factor analyses and regression modeling in educational research contexts [18].

3.3 Data collection instrument

The primary instrument was a structured online questionnaire hosted on Google Forms, comprising 62 rating items organized into five constructs and four open-ended qualitative questions. Instrument development followed established psychometric principles for scale construction [19], with items informed by theoretical frameworks in website usability, user experience, and AI acceptance research. Informed consent was obtained prior to data collection, and the study was conducted in full compliance with the General Data Protection Regulation (GDPR; Regulation 2016/679) and the Indonesian Personal Data Protection Law (UU No. 27/2022).

Rating items employed a seven-point bipolar semantic differential scale format, with response options ranging from 1 (negative attributes: Scarce, Insufficient, Useless) to 7 (positive attributes: Abundant, Adequate, Effective). Semantic differential scales are well suited for measuring attitudes and perceptions, capturing both the direction and the intensity of evaluations along conceptually opposing dimensions [20]. The instrument covered: university data abundance and quality (3 items); alumni testimonies (4 items); tuition fee information (3 items); accommodation and living costs (3 items);

curriculum presentation (4 items); methods of study (4 items); visual content and color (3 items); website design (5 items); information quality (4 items); international program information (4 items); international admission information (4 items); website adaptability and personalization (12 items); chatbot recommendations (3 items); personal data maintenance (3 items); suggestion assistance (9 items); and overall satisfaction (3 items). Data collection was conducted from January to March 2026.

3.4 Data analysis

Quantitative data analysis employed a multi-layered statistical approach [21]. All analyses were conducted using Python with the scipy, statsmodels, and pandas libraries. Descriptive statistics (means, standard deviations) were calculated for all constructs and individual items. Internal consistency reliability was assessed through Cronbach's alpha coefficients. Pearson correlation coefficients examined bivariate relationships among constructs. Independent samples t-tests assessed between-group differences by nationality and gender, with Cohen's d reported for effect size estimation. One-way analysis of variance (ANOVA) examined differences across institutional contexts. Multiple linear regression, with the four evaluation domains as predictors and overall satisfaction as the criterion variable, identified primary satisfaction drivers, with standardized beta coefficients (β) quantifying relative contributions.

Qualitative open-ended responses were analyzed through thematic analysis following established procedures: data familiarization, initial code generation, theme identification, review, and definition [16]. Thematic clusters addressed user preferences, personalization needs, and improvement suggestions, with frequency counts quantifying theme prevalence to enable prioritization of user-identified improvement areas.

4 Results

4.1 Descriptive statistics and reliability

All four evaluation domains achieved mean scores above the neutral midpoint (4.0) on the seven-point scale, indicating moderately positive perceptions across the full sample. Table 1 presents the construct-level descriptive statistics and reliability coefficients.

Table 1
Descriptive statistics and reliability coefficients for evaluation constructs (N = 75)

Construct	M	SD	Min	Max	α
Content Strategy	5.20	1.13	1.00	7.00	.982
Usability	5.13	1.13	1.00	7.00	.947
International Perception	5.20	1.25	1.00	7.00	.960
AI Personalization	5.26	1.25	1.00	7.00	.982
Overall Satisfaction	5.29	1.28	1.00	7.00	.929

α Cronbach's alpha, M mean, SD standard deviation

Internal consistency reliability was excellent across all constructs, with Cronbach's alpha coefficients substantially exceeding the conventional threshold of .70 (range: .929–.982). AI Personalization demonstrated the highest domain mean score (M = 5.26, SD = 1.25), while Overall Satisfaction averaged M = 5.29 (SD = 1.28). Usability received the lowest domain mean (M = 5.13, SD = 1.13), though this still represents a moderately positive rating.

4.2 Sub-dimensional analysis

Within the Content Strategy domain, university data adequacy and helpfulness achieved the highest sub-domain rating (M = 5.51, SD = 1.17), followed by curriculum presentation (M = 5.49, SD = 1.28) and methods of study (M = 5.37, SD = 1.29). Accommodation and living cost information received the lowest sub-domain rating (M = 4.36, SD = 1.71), representing a critical gap particularly relevant to international student decision-making. Usability sub-dimensions showed relatively consistent ratings, with visual content and color (M = 5.28, SD = 1.37) rated highest and website information layout (M = 5.00, SD = 1.22) rated somewhat lower. AI Personalization sub-dimensions demonstrated remarkable consistency across all twelve items, with overall personalization features (M = 5.31, SD = 1.20) and data personalization (M = 5.24, SD = 1.41) receiving comparable ratings. International program information (M = 5.28) was rated marginally higher than international admission information (M = 5.11).

4.3 Correlation analysis

Bivariate correlations among domain scores revealed strong positive relationships, as presented in Table 2. All four domain scores correlated very strongly with Overall Satisfaction ($r > .85$, $p < .001$), supporting the nomological validity of the evaluation framework. The strongest bivariate relationship was observed between Content Strategy and AI Personalization ($r = .952$), indicating substantial shared variance between these constructs.

Table 2
Pearson correlation matrix for evaluation constructs and overall satisfaction

Construct	1	2	3	4	5
1. Content Strategy	—				
2. Usability	.926*	—			
3. International Perception	.885*	.818*	—		
4. AI Personalization	.952*	.907*	.874*	—	
5. Overall Satisfaction	.922*	.897*	.854*	.908*	—
*p < .001					

4.4 Multiple regression analysis

Multiple regression analysis examined the predictive relationships between the four evaluation domains and Overall Satisfaction. The model demonstrated excellent fit, explaining 87.6% of variance in Overall Satisfaction ($R^2 = 0.876$, adjusted $R^2 = 0.869$, $F(4, 70) = 123.1$, $p < .001$). Table 3 presents the unstandardized and standardized regression coefficients.

Table 3
Multiple regression predicting overall satisfaction from evaluation domains

Predictor	B	SE	β	t	p
Constant	0.253	0.211		1.20	.234
AI Personalization	0.518	0.083	.512**	6.24	< .001
Usability	0.213	0.076	.189*	2.80	.007
Content Strategy	0.195	0.099	.172	1.97	.053
International Perception	0.077	0.059	.076	1.31	.195
*$R^2 = .876$; adjusted $R^2 = .869$; $F(4, 70) = 123.1$, $p < .001$. *p < .01; **p < .001*					

AI Personalization emerged as the strongest unique predictor ($\beta = 0.512$, $p < .001$), followed by Usability ($\beta = 0.189$, $p = .007$). Content Strategy ($\beta = 0.172$, $p = .053$) approached but did not achieve statistical significance as a unique predictor, and International Perception ($\beta = 0.076$, $p = .195$) did not reach significance when controlling for the other domains. These results suggest that while all four domains contribute to the overall evaluation framework, AI personalization and usability are the primary drivers of user satisfaction.

4.5 Comparative analyses by demographic subgroups

Independent samples t-tests comparing Indonesian and international respondents revealed no statistically significant differences across any evaluation domain (all $p > .05$). Effect sizes were uniformly small (Cohen's d ranging from − 0.01 to − 0.27), indicating that website perceptions did not systematically vary by nationality. This finding supports the cross-cultural consistency of the evaluation framework and suggests that the evaluated websites achieved comparable user experiences across diverse national backgrounds.

One-way ANOVA examining differences by online learning experience (< 6 months, 6–12 months, > 1 year) similarly found no significant differences across any domain (all $F < 0.70$, all $p > .50$). A significant gender difference emerged specifically for AI Personalization perception ($t = − 2.067$, $p = .042$), with female respondents rating this construct higher ($M = 5.52$) than male respondents ($M = 4.94$), though this difference should be interpreted cautiously given the exploratory nature of the subgroup analyses.

Analysis by specific institution evaluated revealed meaningful variation approaching significance. Universitas Terbuka achieved the highest scores across all domains (Overall Satisfaction $M = 6.07$, 95% CI [5.39, 6.75]), while UNESA ($M = 5.02$), ICEI ($M = 5.17$), and Universitas Pradita ($M = 5.54$) occupied intermediate positions. One-way ANOVA for Overall Satisfaction approached conventional significance ($F = 2.680$, $p = .054$), suggesting that institutional-level differences merit attention.

4.6 Qualitative findings

Thematic analysis of 75 open-ended responses yielded three primary thematic clusters. The most frequently cited features appreciated by users were ease of use and clear information presentation (n = 50, 66.7%), website design and visual clarity (n = 49, 65.3%), and personalization-related features (n = 38, 50.7%). Respondents highlighted that the most valued platforms provided "flexibility and accessibility" with a "well-structured and easy-to-understand format, which facilitates independent learning" (respondent, Universitas Terbuka user).

Regarding personalization needs, 28.3% of respondents explicitly requested enhanced personalization features, 18.3% mentioned a desire for chatbot or AI assistance, and 10.0% requested personalized dashboards showing academic progress and deadlines. A representative comment captured the prevailing aspiration: "I would like more personalized features, such as recommended programs or courses based on my interests. A smarter search function or a chatbot that can answer specific questions would also make the experience feel more personal and helpful." International users additionally emphasized linguistic accessibility, with requests for "a clear language-switch option available on every page" and professionally translated content to avoid reliance on automated translation tools.

Enhancement suggestions prioritized server performance improvements (24.2% of 62 enhancement comments), better navigation (17.7%), improved search functionality (14.5%), and interactive features (12.9%). A recurring concern was infrastructure capacity: "It needs to upgrade its server in order to make it more convenient especially when there are a lot of students trying to access it, for example when it’s

time for exam." These qualitative findings complement and extend the quantitative patterns, providing actionable context for institutional improvement initiatives.

5 Discussion

5.1 Summary and interpretation of key findings

This study examined user perceptions of Indonesian university websites across four interconnected evaluation domains: content strategy, usability, international perception, and AI personalization. The findings demonstrate generally positive perceptions across all domains, with mean scores ranging from 5.13 to 5.29 on a seven-point scale, and overall satisfaction of M = 5.29. These results are broadly consistent with Santally et al.'s [22] finding that there is great potential for improving professional development and changing academic recognition through systematic attention to digital platform quality in higher education. The excellent internal consistency reliability coefficients (α = .929–.982) confirm that the evaluation instrument demonstrated strong psychometric properties, consistent with benchmark standards for educational technology assessment instruments [12].

The emergence of AI Personalization as the dominant predictor of overall satisfaction (β = 0.512, p < .001) represents the most theoretically significant finding of this study. This result resonates strongly with Rienties et al.'s [4] documentation of distance learning students' strong interest in AI digital assistants, and extends this qualitative evidence with quantitative regression evidence. The finding is further grounded in TAM theory [7]: AI personalization features directly enhance perceived usefulness by delivering targeted, relevant information and providing real-time support, thereby driving satisfaction through the TAM pathway from usefulness perceptions to positive attitudes. Usability emerged as the second significant predictor (β = 0.189, p = .007), consistent with TAM's emphasis on perceived ease of use as a satisfaction antecedent and with broader findings in the human–computer interaction literature.

5.2 Comparative analysis with prior research

The dominance of AI personalization over content strategy and international perception as a satisfaction predictor is a novel and theoretically important finding. Previous university website evaluation studies have predominantly emphasized content quality and navigation usability as primary determinants [11], yet our regression results indicate that, in the contemporary AI-enabled context, personalization features may supersede content richness as drivers of user experience. This shift aligns with broader trends in digital commerce and social media, where algorithmic personalization has recalibrated user expectations across all digital touchpoints.

The absence of significant differences between Indonesian and international respondents challenges prevailing assumptions about cross-cultural variation in website preferences. This finding may reflect the universal design quality of the evaluated platforms, or it may suggest that the sampled international respondents—many enrolled in Indonesian institutions—had adapted to local digital environments. From a practical standpoint, this cross-cultural consistency is encouraging for institutions seeking to develop

single, globally accessible websites rather than maintaining separate domestic and international portals. However, the qualitative data reveal important nuances not captured by the quantitative means: international users consistently requested multilingual interfaces and dedicated international student navigation pathways, indicating that perceptual parity at the construct level masks specific accessibility gaps.

The institutional-level analysis is instructive. Universitas Terbuka's consistently superior performance (Overall Satisfaction M = 6.07) likely reflects decades of accumulated expertise in distance education digital infrastructure, as well as deliberate investment in user experience design. This benchmarking insight offers actionable guidance: institutions with lower scores—particularly UNESA (M = 5.02)—could benefit from studying Universitas Terbuka's content organization, personalization architecture, and server infrastructure practices.

5.3 Mechanistic explanation

Several theoretical mechanisms explain the observed patterns. The primacy of AI personalization can be understood through the lens of user trust and human–computer interaction theory: AI features that deliver relevant, timely, and accurate personalized recommendations build user trust and perceived value, thereby amplifying satisfaction [6]. The personalization features evaluated—chatbot recommendations, adaptive content preferences, and personalized suggestion assistance—collectively address users' needs for relevant, tailored information, aligning with human-centered AI design principles [15].

The sub-dimensional content analysis illuminates a specific mechanism underlying the relatively lower performance of accommodation information (M = 4.36): international student decision-making relies heavily on practical relocation information, and the absence or inadequacy of such content creates a notable information gap that undermines overall website effectiveness for this user segment [14]. This finding resonates with digital health intervention research demonstrating that content relevance and completeness are key facilitators of user engagement [23]. Similarly, the gender difference in AI personalization perception (females M = 5.52 vs. males M = 4.94) warrants attention and may reflect differential patterns in personalization feature usage or differential sensitivity to recommendation quality.

5.4 Practical and theoretical implications

This study contributes several novel insights to the fields of educational technology, distance education, and higher education management. Theoretically, the findings extend TAM by demonstrating that AI personalization operates as a multidimensional construct with stronger predictive validity for website satisfaction than traditional usability factors, at least in the context of AI-enabled educational platforms. This suggests that TAM-based website evaluation frameworks may require updating to explicitly incorporate AI personalization as a distinct predictor construct.

For higher education administrators and web developers, the findings provide clear prioritization guidance. Given AI personalization's dominant predictive role (β = 0.512), institutions should prioritize investment in chatbot development, personalized content recommendation systems, and adaptive search functionality. As users explicitly requested "personalized content recommendations based on my interests and learning progress" and "a smarter search function or chatbot that can answer specific questions," these represent high-return improvement areas. Accommodation and living cost information requires urgent attention as the lowest-scoring content sub-domain (M = 4.36), particularly given its critical role in international student decision-making. Infrastructure investment to address server performance is also indicated by both quantitative (lower usability sub-item scores) and qualitative evidence (24.2% of enhancement suggestions). Quality assurance frameworks for online higher education should incorporate AI personalization metrics alongside traditional usability standards, consistent with Rosenberg and Clayton's [24] advocacy for robust quality assurance procedures in digital learning environments.

5.5 Limitations

Several methodological and contextual limitations warrant consideration. First, the convenience sampling approach and sample size of 75 participants, while adequate for the primary analyses, limit generalizability and reduce statistical power for detecting small effects in subgroup comparisons. Future research should employ probability sampling methods with larger samples. Second, the cross-sectional design precludes causal inference about the relationships between the domains and satisfaction; longitudinal designs tracking user perceptions over time would strengthen directional claims. Third, the substantial inter-domain correlations ($r > .80$) indicate multicollinearity, complicating interpretation of individual beta coefficients in the regression analysis; structural equation modeling would better disentangle these relationships. Fourth, the study evaluated self-reported perceptions rather than behavioral outcomes; future research should complement survey data with eye-tracking, clickstream analysis, or enrollment decision data. Fifth, heterogeneity across the evaluated websites—which offered varying levels of AI features—means that some respondents were rating the presence rather than the quality of personalization features, potentially inflating AI personalization scores for feature-rich websites.

6 Conclusion

This multidimensional evaluation of Indonesian university websites contributes empirical evidence that usability and AI personalization represent critical determinants of user satisfaction in the distance education context, while content strategy and internationally focused information provide essential foundational elements. The finding that AI personalization is the strongest predictor of satisfaction represents a theoretically significant contribution, indicating a paradigm shift in how digital educational environments should be designed and evaluated. The cross-cultural consistency of perceptions across domestic and international users suggests that well-designed university websites can achieve universal

appeal, though qualitative evidence indicates that multilingual accessibility and dedicated international navigation pathways remain important practical priorities.

Future research would benefit from longitudinal tracking of user perceptions following website improvements; structural equation modeling to test mediation and moderation hypotheses; comparative studies across institutional contexts in different national settings; and experimental designs testing the causal impact of specific AI personalization features on satisfaction outcomes. Researchers should also examine whether the relationship between AI personalization and satisfaction is moderated by users' prior experience with AI systems, digital literacy levels, or cultural attitudes toward algorithmic recommendations. As the global higher education marketplace becomes increasingly competitive and digitally mediated, systematic attention to website quality—particularly the integration of effective, trustworthy AI personalization—represents a strategic imperative for institutions seeking to enhance their international reach and deliver equitable, high-quality digital learning experiences.

Declarations

Ethics approval and consent to participate.

This study involving human participants was reviewed and approved by the Institute for Research and Community Service, The Open University of Indonesia, approval number B/1488/UN31.LPPM/PT.01.03/2026, dated May 12, 2026. All procedures performed in this study were in accordance with the ethical standards of the institutional research committee and with the 1964 Declaration of Helsinki and its later amendments. Informed consent was obtained from all individual participants before data collection. The study was conducted in compliance with the General Data Protection Regulation (Regulation 2016/679) and the Indonesian Personal Data Protection Law (UU No. 27/2022).

Consent to publish.

Informed consent, comprising both consent to participate and consent to publish, was obtained from all participants before data collection. Participants were informed that their anonymized responses, including verbatim open-ended comments, may be published. The manuscript contains no images or personal details that could identify any individual participant.

Competing interests.

The authors declare no competing interests.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Author Contribution

A.S. conceptualized the study, designed the methodology, supervised the project, and wrote the main manuscript text. F.F. performed the statistical analyses, including reliability, correlation, and regression analyses, and prepared Tables 1–3. P.P. contributed to the theoretical framework and literature review and critically revised the manuscript. R.R.R. developed the survey instrument, coordinated data collection, and conducted the qualitative thematic analysis. R.E.I. contributed to the AI personalization framework and provided technical expertise on website evaluation. H. contributed to participant recruitment, data curation, and interpretation of the institutional comparison results. All authors reviewed and approved the final manuscript.

Acknowledgement

This research is funded by the Indonesian Endowment Fund for Education (LPDP) on behalf of the Indonesian Ministry of Education, Science and Technology and managed under the EQUITY Program (Contract No. B/45/UN31.LPPM/PT.01.03/2025)Acknowledgments:Thank you for Indonesian Endowment Fund for Education (LPDP) on behalf of the Indonesian Ministry of Education, Science and Technology and Universitas Terbuka for funding this research.

Data Availability

All data supporting the findings of this study are available within the paper .

References

1. Nazyrova A, Miłosz M, Bekmanova G, Omarbekova A, Aimicheva G, Kadyr Y. The digital transformation of higher education in the context of an AI-driven future. Sustainability. 2025;17(22):9927. https://doi.org/10.3390/su17229927.
2. Pham H, Tran Q, Lã G, Doan HM, Vu TD. Readiness for digital transformation of higher education in the COVID-19 context: the dataset of Vietnam’s students. Data Brief. 2021;38:107482. https://doi.org/10.1016/j.dib.2021.107482.
3. Rapanta C, Botturi L, Goodyear P, Guàrdia L, Koole M. Balancing technology, pedagogy and the new normal: post-pandemic challenges for higher education. Postdigit Sci Educ. 2021;3:715–42. https://doi.org/10.1007/s42438-021-00249-1.
4. Rienties B, Domingue J, Duttaroy S, Herodotou C, Tessarolo F, Whitelock D. What distance learning students want from an AI digital assistant. Distance Educ. 2024;45(2):338–56. https://doi.org/10.1080/01587919.2024.2338717.
5. Wang T, Lund B, Marengo A, Pagano A, Mannuru NR, Teel ZA, Pange J. Exploring the potential impact of artificial intelligence (AI) on international students in higher education: generative AI,

chatbots, analytics, and international student success. Appl Sci. 2023;13(11):6716. https://doi.org/10.3390/app13116716.

6. Bach TA, Khan A, Hallock H, Beltrão G, Sousa S. A systematic literature review of user trust in AI-enabled systems: an HCI perspective. Int J Hum Comput Interact. 2022;39(7):1485–502. https://doi.org/10.1080/10447318.2022.2138826.
7. Shemesh T, Barnoy S. Assessment of the intention to use mobile health applications using a technology acceptance model in an Israeli adult population. Telemed J E Health. 2020;26(9):1141–9. https://doi.org/10.1089/tmj.2019.0144.
8. Zuhairi A, Raymundo MR, Mir K. Implementing quality assurance system for open and distance learning in three Asian open universities: Philippines, Indonesia and Pakistan. Asian Assoc Open Univ J. 2020;15(2):297–317. https://doi.org/10.1108/aaouj-05-2020-0034.
9. Ramli HN, Sujarwo AM, Bena BA, Arwadi F, Syawaluddin A, Malik Nur ID. Teachers' readiness in online learning: digital literacy-self-efficacy, pedagogical competence, attitude, infrastructure, and management support. Electron J E-Learn. 2024;22(8):3358. https://doi.org/10.34190/ejel.22.8.3358.
10. Abidah A, Hidaayatullaah HN, Simamora RM, Fehabutar D, Mutakinati L. The impact of COVID-19 to Indonesian education and its relation to the philosophy of Merdeka Belajar. Stud Philos Sci Educ. 2020;1(1):38–49. https://doi.org/10.46627/sipose.v1i1.9.
11. Ndibalema PM. Constraints of transition to online distance learning in higher education institutions during COVID-19 in developing countries: a systematic review. E-Learn Digit Media. 2022;19(6):595–618. https://doi.org/10.1177/20427530221107510.
12. Díaz-Oreiro I, López G, Quesada L, Guerrero LA. UX evaluation with standardized questionnaires in ubiquitous computing and ambient intelligence: a systematic literature review. Adv Hum Comput Interact. 2021;2021:5518722. https://doi.org/10.1155/2021/5518722.
13. Brunetti F, Matt DT, Bonfanti A, De Longhi A, Pedrini G, Orzes G. Digital transformation challenges: strategies emerging from a multi-stakeholder approach. TQM J. 2020;32(4):697–724. https://doi.org/10.1108/tqm-12-2019-0309.
14. Fidalgo P, Thormann J, Kulyk O, Lencastre JA. Students' perceptions on distance education: a multinational study. Int J Educ Technol High Educ. 2020;17(1):18. https://doi.org/10.1186/s41239-020-00194-2.
15. Garibay ÖÖ, Winslow B, Andolina S, Antona M, Bodenschatz A, Coursaris CK, et al. Six human-centered artificial intelligence grand challenges. Int J Hum Comput Interact. 2023;39(3):391–437. https://doi.org/10.1080/10447318.2022.2153320.
16. McIlfatrick S, Slater P, Beck E, Bamidele O, McCloskey S, Carr K, et al. Examining public knowledge, attitudes and perceptions towards palliative care: a mixed method sequential study. BMC Palliat Care. 2021;20(1):61. https://doi.org/10.1186/s12904-021-00730-5.
17. Gerlich M. AI tools in society: impacts on cognitive offloading and the future of critical thinking. Societies. 2025;15(1):6. https://doi.org/10.3390/soc15010006.

18. Serdar CC, Cihan M, Yücel D, Serdar MA. Sample size, power and effect size revisited: simplified and practical approaches in pre-clinical, clinical and laboratory studies. Biochem Med (Zagreb). 2021;31(1):010502. https://doi.org/10.11613/bm.2021.010502.
19. Stefana A, Damiani S, Granziol U, Provenzani U, Solmi M, Youngstrom EA, Fusar-Poli P. Psychological, psychiatric, and behavioral sciences measurement scales: best practice guidelines for their development and validation. Front Psychol. 2025;15:1494261. https://doi.org/10.3389/fpsyg.2024.1494261.
20. Siegler AJ, Wiatrek S, Mouhanna F, Amico KR, Dominguez K, Jones J, et al. Validation of the HIV pre-exposure prophylaxis stigma scale: performance of Likert and semantic differential scale versions. AIDS Behav. 2021;25:1032–47. https://doi.org/10.1007/s10461-020-02820-6.
21. Rosellini AJ, Brown TA. Developing and validating clinical questionnaires. Annu Rev Clin Psychol. 2021;17:55–85. https://doi.org/10.1146/annurev-clinpsy-081219-115343.
22. Santally MI, Rajabalee YB, Cooshna-Naik D, Greller W. Perception of education and industry leaders on micro-credentials and their potential in higher education. J Learn Dev. 2024;11(3):528–39. https://doi.org/10.56059/jl4d.v11i3.1274.
23. Borghouts J, Eikey EV, Mark G, De Leon C, Schueller SM, Schneider M, et al. Barriers to and facilitators of user engagement with digital mental health interventions: systematic review. J Med Internet Res. 2021;23(3):e24387. https://doi.org/10.2196/24387.
24. Rosenberg SL, Clayton T. Designing and developing microcredentials. Advances in educational technologies and instructional design. Hershey: IGI Global; 2024. pp. 65–88. https://doi.org/10.4018/979-8-3693-5488-9.ch004.