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IMPACT OF WEBSITE ARCHITECTURE ON STUDENT SATISFACTION AND ENGAGEMENT: A COMPARATIVE ANALYSIS OF DHAKA UNIVERSITY AND NATIONAL UNIVERSITY

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ABSTRACT
The rapid digitization of academic services in higher education aims to foster paperless and efficient operations. On the other hand, suboptimal website performance can create significant barriers to student engagement and satisfaction, particularly in developing countries. This study presents a comparative analysis of the digital service experiences of students at Dhaka University (DU) and National University (NU) in Bangladesh. Using a quantitative, cross-sectional research design, 455 students were surveyed to evaluate website architecture through constructs of perceived efficiency, technical usability, user satisfaction, and digital engagement. Results indicate a profound disparity between the two institutions. DU students reported high mean scores for perceived efficiency (M=4.26) and engagement (M=4.45), while NU students reported significantly lower scores (M=2.07 for efficiency; M=2.01 for engagement). The findings demonstrate that NU's fragmented website structure, characterized by multiple URLs, generates "extraneous cognitive load," leading to severe user dissatisfaction. Also, a strong inverse relationship was found between reliance on third-party intermediaries (computer shops) and direct digital engagement, with the effect being most pronounced among NU students (r = -0.84). This reliance on middlemen not only draws attention to an institutional "usage gap" but also forces students into risky privacy behaviors by sharing sensitive data. The study concludes that transitioning to a centralized, user-centric architecture is essential for enhancing educational equity and student security.

KEYWORDS
Website Architecture, User Satisfaction, Perceived Efficiency, Student Engagement, National University, Dhaka University, Cognitive Load, Digital Divide, Intermediated Interaction.

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INTRODUCTION

A pilot observation reveals that in Bangladesh, the students of National University not only spend money on tuition fees and books but also on online services such as getting access to university's essential services through university's websites. Even if a student has "access" and "ICT skills", if the website design is poor, they fail to get "benefit" and must pay a middleman. Small photostat shops in the suburbs of the city or village often have such notices posted on the National University's online service with Internet-connected computers. In those service centers, many students go for National University online services. Since NU students use computer shops, they often share their sensitive data (passwords, NID, results) with shopkeepers. A well-designed, mobile-friendly website isn't just about "ease"; it's about Security. If a site is too hard to use, it "forces" students into risky privacy behaviors.

This research has been conducted in a context where most universities are aiming for paperless operations. National University of Bangladesh has unique features compared to other public universities, as it has numerous campuses through affiliated colleges, while other public universities do not have such a large number of campuses. In other nations, several universities boast an extensive array of campuses, encompassing some that are situated in remote regions as well as others located within urban locales. Those universities establish connectivity within campuses though effective digitalization.

While the objective of National University behind digitization is to improve accessibility for admission and registration, college selection, applying for examinations, certification, verification, name spelling correction, and result checking processes, many students still encounter difficulties navigating its website. Making the website user-friendly requires surveying the users and gathering their opinions, but sufficient literature is not available related to user satisfaction with the NU website. National University has many websites for different purposes, such as https://www.nu.ac.bd/, http://admission.nu.edu.bd/, http://app11.nu.edu.bd/. These websites provide essential services to its 4 million students. Navigating multiple URLs (nu.ac.bd and admission.nu.edu.bd) increases "extraneous cognitive load," which kills user satisfaction. The data of this huge number of students is very difficult to manage, and on the other hand, the students also face challenges in recognizing which website is for what purpose.

LITERATURE REVIEW

User-friendly Features of University Websites

To effectively cater to diverse user needs across multiple campuses and geographical locations, a university website should incorporate a range of features that address the varied requirements of its users, including students, faculty, administrative staff, and prospective students. Sharma and Kumar (2024) explain that a centralized platform like UniConnect can serve as a comprehensive hub, offering functionalities such as user authentication, profile management, event management, job placement, real-time notifications, and project collaboration tools, which are particularly important for fostering academic, professional, and social activities among students. Similarly, Mane (2024) notes that a web-based application that facilitates seamless connectivity between students and universities can enhance the educational experience by providing a centralized hub for information and fostering effective communication, thus empowering students to make informed decisions.

From a design perspective, Zhou et al. (2022) emphasize that user-perception-oriented methods, such as Kansei Engineering and neural networks, to ensure that the emotional design of the interface meets diverse user needs and enhances user experience.

Additionally, Albadi (2025) remarks that the information architecture should be robust, as demonstrated by the websites of King Abdullah University of Science and Technology and Johns Hopkins University, which enhance navigation, ensure content clarity,

and improve accessibility, thereby promoting an efficient and user-friendly experience. Accessibility is another critical component, as it ensures that the website is usable by individuals with disabilities and those with slow internet connections or language barriers, thus broadening the range of users who can effectively interact with the site (Frey et al., 2005). The integration of a large-scale academic portal, like the UniBo project, can address the challenges of data management and interoperability by providing a single entry point for service delivery and information retrieval, while maintaining autonomy for different university departments (Bellavista, 2007). Understanding the distinct information needs of various user groups, such as traditional and non-traditional students, employees, and parents, is essential for tailoring the website's architecture, design, and content to make it more effective (Yadamsuren et al., 2009). Finally, the website should facilitate easy comparisons between universities based on statistical metrics, allowing users to assess each institution's strengths and weaknesses, thereby aiding in informed decision-making (Meshram et al., 2024). By combining these features and strategies, a university website can effectively meet the diverse needs of its users across multiple campuses and geographical locations.

Impact of a Well-designed Website on Student Engagement

A well-designed website significantly impacts student engagement and academic performance across both urban and rural student populations in large university campuses. Singh (2024) argues that the integration of technology, as highlighted in various studies, plays a crucial role in enhancing educational experiences by extending learning beyond traditional classroom boundaries, thereby fostering a dynamic and interactive environment that resonates with contemporary learners. Digital learning platforms (DLPs) are particularly effective in enhancing student engagement and academic outcomes, especially when they incorporate active teaching strategies and personalized support, which are crucial for maximizing student success (Brugliera, 2024). The design and development of multi-faceted online campus platforms, which centralize campus information and resources while integrating social media features, have been shown to improve student engagement and satisfaction by providing easy access to information and fostering a sense of community (D et al., 2023). In rural settings, where resources are often limited, platforms like Slido have been effective in promoting active learning and engagement by facilitating interaction and participation through features like live polls and quizzes (Adebola, 2024).

But the digital divide remains a significant challenge, particularly in rural areas, where disparities in internet connectivity and access to digital devices can hinder the effectiveness of e-learning platforms (Ghazali & Benbrahim, 2024).

Despite these challenges, Sangore (2024) points out that studies have shown that when online learning environments are well-designed, they can positively influence both student engagement and academic performance.

University websites, as tools for recruitment and engagement, must prioritize user satisfaction, efficiency, and engagement to cater to diverse user needs, which can significantly enhance the overall educational experience (Astani & Elhindi, 2008; Sajjan et al., 2024). This means a well-designed website that considers technological infrastructure, user-centered design, and equitable access can bridge the gap between urban and rural students, ultimately improving engagement and academic performance across diverse student populations.

Improving Accessibility for Students with User-Friendly Website Design

A user-friendly website design can significantly enhance accessibility for students from rural areas to large university campuses nationwide by addressing both technological and socio-economic barriers. Accessible web design, as emphasized by the World Wide Web Consortium's Web Accessibility Initiative, ensures that websites are usable by a broad range

of users, including those with disabilities and those with slow internet connections, which are common in rural areas (Frey et al., 2005).

Roberts (1999) asserts that by implementing universal design principles, educational institutions can create online learning environments that are inclusive and accessible to all students, regardless of their geographical location or physical abilities. This is particularly important for rural students who often face challenges such as limited access to broadband and educational resources (June, 2022).

More recently, Fathima et al. (2024) illustrate through the "Rural EduRevamp" application how user-friendly interfaces can provide rural students with essential study materials and assessment tools, thereby breaking down geographical barriers and enhancing their learning experience. Furthermore, initiatives like the "Warm Connections" project highlight the importance of building social capital networks between rural communities and tertiary institutions, which can be facilitated through accessible online platforms (Douglas et al., 2020). Additionally, the integration of assistive technologies, such as text-to-speech systems, can further support students with disabilities, ensuring they have equal access to educational content (Burgstahler, 2009).

Coombs (2002) mentions that by prioritizing accessibility and usability in web design, universities can create a more equitable educational landscape, empowering rural students to fully participate in higher education and improving their academic and employment outcomes.

The ramifications of suboptimal website performance extend beyond mere operational disruptions. Empirical research has indicated that user satisfaction and perceived efficiency constitute pivotal factors influencing engagement with digital platforms. Websites that do not fulfill these essential criteria may lead to user disengagement, thereby diminishing the probability of sustained usage and trust in the platform. Because of this, it is crucial to investigate the interrelationship among website user satisfaction, perceived efficiency, and user engagement specifically within the framework of university websites. Addressing these dimensions is vital for the creation of user-centered platforms that not only facilitate academic and administrative operations but also augment the overall user experience and efficacy.

Pain Points of Website Users

Research on technical usability, design, and navigation pain points in university websites has emerged as a critical area of inquiry due to the increasing reliance on digital platforms for academic information and services. University websites serve as essential gateways for students, faculty, and stakeholders to access educational resources, administrative functions, and institutional communication (Imathiu & Mwadulo, 2024; Abdelhakim et al., 2011). Over the past decade, studies have evolved from general usability assessments to more nuanced evaluations incorporating user experience, accessibility, and device-specific performance (Yesmin & Atikuzzaman, 2023; Maskur & Syarief, 2025). The practical significance of this research is underscored by the growing student populations and the need for inclusive, efficient digital environments that support academic success and institutional reputation (Kausar, 2023; Jabar et al., 2013). For instance, usability issues can directly affect student satisfaction and engagement, with implications for enrollment and retention (Manzoor et al., 2019; Jabar et al., 2013).

Despite extensive research on university website usability, specific challenges persist, particularly in the context of national universities in developing countries such as Bangladesh. These challenges include inadequate navigation structures, inconsistent design elements, and limited responsiveness across devices (Yesmin & Atikuzzaman, 2023; Hasan, 2014). Existing literature reveals a knowledge gap in understanding the unique pain points

experienced by students of Bangladesh National University, especially regarding technical usability and navigation difficulties (Hasan, 2013; Manzoor et al., 2019; Hasan, 2014).

While some studies emphasize content and navigation as critical usability factors (Hasan, 2013), others highlight discrepancies in user satisfaction across different platforms and demographic groups (Yesmin & Atikuzzaman, 2023; Jabar et al., 2013).

Contrasting perspectives exist on the prioritization of design features versus content organization, reflecting ongoing debates about the most effective approaches to enhance usability (Xiong et al., 2021; Adepoju et al., 2020).

Hasan (2014) shows that the consequences of these gaps include reduced user efficiency, increased cognitive load, and potential disengagement from digital academic services.

Habib et al. (2023) note that the conceptual framework for this review integrates key constructs of usability, design, and navigation within university websites, grounded in established usability heuristics and user-centered design principles.

Usability is defined as the extent to which users can achieve their goals effectively and efficiently, while design encompasses visual and structural elements that facilitate user interaction (Jabar et al., 2013; Luo, 2024).

Navigation refers to the mechanisms enabling users to locate information and complete tasks with minimal effort (Hasan, 2013; Xiong et al., 2021). These interrelated concepts form the basis for analyzing the specific pain points faced by students, linking theoretical foundations to practical evaluation criteria.

Research Objectives

RQ1: Do DU and NU students differ in perceived efficiency of their university website/portal?

RQ2: How strongly is perceived usability/accessibility related to user satisfaction, and does this relationship differ between DU and NU?

RQ3: Do DU and NU students differ in engagement/self-efficacy when using their university's website/portal?

RQ4: How strongly is computer shop reliance related to engagement/self-efficacy, and does this relationship differ between DU and NU?

METHODOLOGY

Research Design

This study employs a quantitative, cross-sectional comparative research design. A survey-based approach was selected to systematically evaluate and compare the digital experiences of students across two distinct academic ecosystems. The design is descriptive in its profile of student satisfaction and correlational in its examination of the relationship between technical barriers, third-party assistance (photostat shops), and user engagement (Creswell & Creswell, 2017). By utilizing a comparative framework, the study identifies significant variances in perceived efficiency and cognitive load between the centralized portal of Dhaka University and the fragmented web structure of the National University (Schenker & Rumrill, 2004). This quantitative approach ensures the objective measurement of the "Usage Gap" and provides a statistical basis for recommending user-centered design improvements grounded in the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003).

Sample

Total 455 students from various National Universities, as well as Dhaka University, were subjected to a survey. Participants from National Universities were approached in Mahakhali and Mirpur, whereas individuals from Dhaka University were surveyed in the marketplaces

of Nilkhet in Dhaka. 262 respondents participated from NU (Both from Mahakhali i.e. Govt. Titumir College and Mirpur i.e. Govt. Bangla College) while 193 respondents were from DU.

The Measure

The research instrument was developed using some validated scales but customized in the context of Bangladesh. Those previously validated scales were developed in the specific socio-technical context of higher education. For example, Perceived Efficiency was measured using items adapted from the System Usability Scale (SUS) (Brooke, 1996). It focused on task completion speed and navigational logic. Technical Usability and Accessibility were assessed through constructs from the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003). They specifically focused on "facilitating conditions" like mobile responsiveness and bandwidth adaptability. While User Satisfaction was operationalized via the IS Success Model (DeLone & McLean, 2003). This scale measured the emotional and cognitive comfort of the user. Finally, Self-Efficacy and Engagement were measured by synthesizing the Web Users Self-Efficacy (WUSE) scale (Cassidy & Eachus, 2002) and the User Engagement Scale (UES) (O'Brien & Toms, 2008). This allowed the study to capture the "Usage Gap"—the degree to which students rely on third-party intermediaries (computer shops) due to perceived website complexity. Full scale is available in the appendix.

Data Analysis Techniques

Table 1: Statistical Analysis of the Research questions according to IV and DV

Research Objective	Research Question (RQ)	Variables	Statistical Analysis Technique
To compare task efficiency between DU and NU students.	RQ1: Difference in perceived efficiency.	IV: University Type (DU/NU) DV: Perceived Efficiency Score	Independent Samples T-test (to compare means)
To assess the impact of barriers on satisfaction across both groups.	RQ2: Accessibility barriers	IV: Accessibility Barriers (Scale) DV: User Satisfaction Score	Pearson Correlation Analysis
To evaluate the effect of site architecture on engagement.	RQ3: Fragmented vs. Centralized structure impact.	IV: University Type DV: Cognitive Load & Engagement Scores	Independent Samples T-test
To determine the link between middlemen and engagement.	RQ4: Computer shop usage vs. Direct engagement.	IV: Third-party Assistance (Frequency) DV: Direct Digital Engagement	Pearson Correlation Analysis

RESULTS

Demographic Analysis

The majority of respondents (57.58%) belong to NU (262 respondents). DU accounts for the remaining 42.42% of the sample (193 respondents). Almost half of the respondents (48.35%) use a Smartphone. Laptop use is reported by 28.79% of the students. 22.86% of the students use a Shop_PC. Mobile_Data is the most frequent connection type, used by 47.69% of the respondents, corresponding closely to Smartphone usage. WiFi is used by 29.45% of the

respondents, corresponding to Laptop usage. Shop_Net is used by 22.86% of the respondents, corresponding to Shop_PC usage.

Results of First Research Question (RQ1)

The first research question, "Do DU and NU students differ in perceived efficiency of their university website/portal??", was addressed by comparing the mean Perceived Efficiency (PE) scores between the two student groups.The descriptive statistics for the Perceived Efficiency Average Score (PE_Avg) by University are as follows:

Table 2: Descriptive Statistics of Perceived Efficiency

University	Mean PE_Avg	SD	Count
DU	**4.26**	0.49	193
NU	**2.07**	0.56	262

The Independent Samples T-test was used to compare the mean scores of User Experience Constructs (Perceived Efficiency, Usability & Accessibility, User Satisfaction, and Self-Efficacy & Engagement) between Dhaka University (DU) students and National University (NU) students.The key takeaway is that for every measured construct, there is a statistically significant difference between the two universities, with DU students consistently reporting much higher positive scores than NU students.The results, based on the statistical analysis (Welch's Independent Samples T-test), are summarized below:

Table 3: Summary of T Test Results

Construct	University	Mean Score	Standard Deviation	T-Statistic	P-Value	Difference (DU - NU)
Perceived Efficiency (PE_Avg)	DU	4.26	0.49	44.46	<.0001	**+2.19**
	NU	2.07	0.56			
Usability & Accessibility (UA_Avg)	DU	4.16	0.43	51.93	<.0001	**+1.98**
	NU	2.19	0.36			
User Satisfaction (US_Avg)	DU	4.36	0.44	57.37	<.0001	**+2.46**
	NU	1.90	0.47			
Self-Efficacy & Engagement (SE_Avg)	DU	4.45	0.35	53.82	<.0001	**+2.43**
	NU	2.01	0.61			

Interpretation of T-Test Results

The t-tests demonstrate that the differences in mean scores are not due to chance, confirming the hypothesized gaps in the digital experience.

1. ***Perceived Efficiency (RQ1):*** The mean score for DU students (Mean = 4.26) is overwhelmingly higher than for NU students (Mean = 2.07). This finding supports the research's premise that the perceived efficiency of university websites significantly differs between the two groups when performing core administrative tasks.
2. ***User Satisfaction and Engagement (RQ3):***

   a. **User Satisfaction (**US_Avg**)** shows the largest gap (= +2.46), with DU students reporting near-complete satisfaction (Mean = 4.36) while NU students report strong dissatisfaction (Mean = 1.90).
   b. **Self-Efficacy & Engagement (**SE_Avg**)** also has a large gap (Difference = +2.43), indicating that DU students feel highly capable and connected (Mean = 4.45), while NU students feel the opposite (Mean = 2.01). This confirms the hypothesis that the fragmented website structure of National University leads to significantly lower engagement.
3. ***Usability & Accessibility (****UA_Avg****):*** The significant difference (Difference = +1.98) indicates that the NU website is perceived as having much lower technical usability and accessibility (e.g., mobile-friendliness, load speed) compared to the DU website.

In all comparisons, the p-values are less than 0.0001, which means the probability of observing such a large difference in means if the two populations were actually the same is extremely low. Therefore, the differences are highly statistically significant.

Key Findings for RQ2: Impact of Accessibility on Satisfaction

The second research question (RQ2) investigates: How strongly is perceived usability/accessibility related to user satisfaction, and does this relationship differ between DU and NU? This question was addressed using Pearson's Correlation to determine the strength of the relationship between perceived Technical Usability & Accessibility (`UA_Avg`) and User Satisfaction (`US_Avg`) for each university group. The results show that while the impact is significant for both groups, it is substantially stronger for Dhaka University (DU) students.

Table 4: Correlation between Accessibility and Satisfaction

University	Correlation (r)	P-Value	Relationship Strength
DU	**0.90**	<.0001	**Very Strong**
NU	**0.69**	<.0001	**Strong**

1. ***Very Strong Impact for DU Students:***
   a. For DU students, the correlation coefficient is 0.90, indicating a near-perfect, very strong positive relationship between the perceived accessibility/usability of the website and their overall user satisfaction.
   b. **Interpretation:** For DU, improvements or declines in accessibility and usability have an almost direct and proportional impact on student satisfaction. If the website loads quickly and is mobile-friendly (high UA_Avg), satisfaction (US_Avg) is almost guaranteed to be high.
2. ***Strong Impact for NU Students, but Weaker:***
   a. For NU students, the correlation coefficient is 0.69, which is still a strong positive relationship, but noticeably lower than that for DU students.
   b. **Interpretation:** While better accessibility still leads to higher satisfaction for NU students, the relationship is more complex. Other unmeasured factors, such as the inherent frustration with the **fragmented website structure** (addressed in RQ3) or system reliability, likely suppress the full potential for satisfaction, even when a page *is* technically accessible. The negative experience of navigating multiple URLs may diminish the positive effect of technical accessibility.
3. ***Differential Impact:***
   a. The data confirms that accessibility barriers impact user satisfaction differently for the two groups. The relationship is significantly stronger and more linear for DU students, suggesting that their primary digital challenge (and source of

satisfaction) is simply the technical quality of the platform. For NU students, while technical quality matters, the overall low level of satisfaction is less strongly tied to these technical factors alone, suggesting that the underlying structural issues of the system (NU's multiple URLs) play a more dominant role.

The relationship in both groups is highly statistically significant (P-Value < 0.0001).

Results for Research Question 3 (RQ3)

RQ3: Do DU and NU students differ in engagement/self-efficacy when using their university's website/portal? This question was addressed using an Independent Samples T-test to compare the mean scores for Self-Efficacy & Engagement (`SE_Avg`) between Dhaka University (DU) and National University (NU) students. The analysis reveals a highly significant difference in engagement and self-efficacy, confirming that the NU's fragmented structure is associated with much lower user engagement.

Table 5:

University	Mean Score	Standard Deviation	T-Statistic	P-Value	Difference (DU - NU)
DU	**4.45**	0.35	53.82	<.0001	**+2.43**
NU	**2.01**	0.61			

- DU Students reported an exceptionally high mean engagement score of 4.45, indicating they strongly feel informed, connected, and highly capable of using the university website without external help.
- NU Students reported a mean score of 2.01, suggesting they generally disagree with the engagement and self-efficacy statements. This is consistent with the research premise that the need to navigate multiple, fragmented URLs increases "extraneous cognitive load," which significantly lowers both satisfaction and engagement.
- The P-value is less than 0.0001, confirming that the 2.43-point difference in the engagement score between the two universities is highly statistically significant.

Results for Research Question 4 (RQ4)

RQ4: How strongly is computer shop reliance related to engagement/self-efficacy, and does this relationship differ between DU and NU? This question was addressed using Pearson's Correlation to examine the relationship between a student's reliance on computer shops (`Shop_Reliance`) and their level of Self-Efficacy & Engagement (`SE_Avg`). The analysis shows a strong, inverse relationship for both groups, meaning that as a student's reliance on a computer shop increases, their self-efficacy and engagement with the university's digital portal decrease. The effect is substantially stronger for NU students.

Table 6:

University	Correlation (r)	P-Value	Relationship Strength
DU	**-0.65**	<.0001	**Strong Negative**
NU	**-0.84**	<.0001	**Very Strong Negative**

1. ***Inverse Relationship Confirmed:*** The negative correlation for both universities is highly statistically significant (P-value < 0.0001), indicating that the more a student relies on a computer shop, the less engaged and confident they are with the digital platform.
2. ***Stronger Impact on NU Students:*** The relationship is very strong for NU students (r = -0.84). This provides strong support for the research's hypothesis that the severe usability issues and complexity of the NU website effectively **force** students into relying on a middleman (the computer shop), and this reliance is a very strong predictor of their extremely low Self-Efficacy and Direct Digital Engagement.
3. ***Impact on DU Students:*** For DU students, the relationship is also strong (r = -0.65), suggesting that even among students with a centralized and efficient website, any necessary reliance on a computer shop is strongly associated with a lack of confidence and personal engagement. However, the slightly weaker correlation compared to NU suggests that for DU students, the issue is less about the website *forcing* the reliance and more about individual student factors.

DISCUSSION

This study aimed to evaluate and compare the digital experiences of students from Dhaka University (DU) and National University (NU), focusing on User Satisfaction, Perceived Efficiency, and Engagement with their respective university websites. The findings demonstrate a profound and statistically significant gap in the digital service experience between the two institutions, which has critical implications for student security and educational equity.1. Significant Disparity in Perceived Efficiency and User Satisfaction (RQ1 & RQ3) The results for Perceived Efficiency (RQ1) and Self-Efficacy & Engagement (RQ3) were highly conclusive. DU students reported exceptionally high mean scores for both efficiency (Mean=4.26) and engagement (Mean=4.45), while NU students reported mean scores that fell squarely into the “Disagree” range (Mean=2.07 for efficiency; Mean=2.01 for engagement).This 2-point difference in mean scores is highly significant ($p < 0.0001$) and directly confirms the research's central premise: the fragmented website structure of the National University leads to a significant cognitive burden and low engagement. The need to navigate multiple, often confusing URLs for administrative tasks generates “extraneous cognitive load”, resulting in a strong feeling of inefficiency and low digital self-efficacy for NU students. Conversely, the high scores for DU students suggest their centralized portal effectively minimizes cognitive load, fostering a positive, efficient, and engaging user experience.2. Differential Impact of Accessibility on Satisfaction (RQ2) RQ2 revealed a key difference in how technical barriers impact overall satisfaction. While accessibility/usability (`UA_Avg`) was strongly correlated with User Satisfaction (`US_Avg`) for both groups, the relationship was significantly stronger for DU students (r=0.90) than for NU students (r=0.69).This indicates that for DU students, technical website quality (speed, mobile-friendliness) is the primary determinant of their high satisfaction. For NU students, however, even a technically usable page cannot fully overcome the frustration caused by the overall system architecture. The underlying structural flaw (fragmentation) acts as a persistent “digital friction,” suppressing overall satisfaction regardless of a single page's technical quality.3. The Digital Usage Gap and Security Risk (RQ4)The findings for RQ4 provide a critical link between poor design and the security risk outlined in the introduction. The study found a very strong negative correlation (r = -0.84) for NU students between reliance on computer shops and digital self-efficacy/engagement. This relationship is notably stronger than for DU students (r = -0.65).This result confirms the existence of a “Usage Gap,” where students are not using the digital platform directly. The complexity and inefficiency of the NU website do not merely lead to low satisfaction; they actively “force” students, particularly those in rural/suburban areas with limited personal device access, into the high-risk behavior of sharing

sensitive data (passwords, NID) with third-party shopkeepers. As a result, the study substantiates the claim that a user-unfriendly website is a direct security and privacy hazard.

Risky Online Behaviour of NU Studnets

Despite the significant security and privacy concerns associated with sharing personal information, students may still choose to compromise with compute shops for online services due to several factors. Primarily, the need for access to specific online services often outweighs privacy concerns, as seen in the case of university students using VPNs to bypass geographical restrictions, even when aware of potential data collection by these services (Dutkowska-Zuk et al., 2020).

Xu & Zhou (2025) note that this behavior is indicative of a broader trend where convenience and access to educational resources take precedence over privacy, especially in environments where digital tools are integral to learning.

Ponde (2025) explains that the rapid adoption of cloud-based educational technologies has further complicated the landscape, as these platforms often lack robust security measures, leading to potential data breaches and unauthorized access. In this context, the educational institutions themselves sometimes struggle with enforcing adequate privacy protections due to limited resources and the complexity of managing data security in a digital environment (Kelso et al., 2024; Chanenson et al., 2023). This situation is exacerbated by the power asymmetry between educational institutions and EdTech vendors, which often leaves the former with little leverage to demand better privacy practices (Kelso et al., 2024). Additionally, students' risky computing behaviors, such as sharing passwords or failing to back up data, are often a result of bounded rationality, where the immediate benefits of accessing services overshadow the perceived risks (Aytes & Connolly, 2004). In regions like Nigeria, the lack of comprehensive legal frameworks and varying levels of awareness among stakeholders further contribute to the vulnerability of student data, necessitating urgent implementation of data protection policies and educational programs (Patience et al., 2025). Overall, while students are aware of the risks, the necessity for educational access and the lack of stringent privacy safeguards often lead them to compromise their data security.

Effect of Fragmented Website on Users

A fragmented website can significantly impact user experience and engagement by increasing cognitive load and reducing user satisfaction. Fragmented attention, often experienced during mobile web searches, can lead to decreased search performance and user engagement, as users feel hurried and less focused on tasks (Harvey & Pointon, 2017).

Tripathi (2023) shows that website usability is crucial in digital marketing, as a confusing or slow website can lead to poor user experience, increased bounce rates, and reduced conversion rates, ultimately affecting the success of marketing strategies. Speed optimization is another critical factor; faster loading times enhance user engagement and satisfaction, as demonstrated by improvements in Google Core Web Vitals and user interaction metrics (Fellinger & Fronimaki, 2024).

Sikder (2016) notes that web performance optimization, including techniques like image compression and caching, can improve user satisfaction and conversion rates, thereby boosting business success. Effective UI/UX design is essential for maintaining user engagement and operational efficiency, as a well-designed interface can prevent user attrition and improve both customer and staff interactions (Saker, 2021).

Integrating SEO with UX design can further enhance website usability, ensuring high search engine rankings while maintaining a user-centered approach (Xinghai, 2023).

Putri et al. (2025) explain that evaluations of user experience, such as those conducted on the Universitas Terbuka website, highlight the importance of ease of navigation,

access speed, and information clarity in delivering optimal user experiences. User engagement can be measured through navigational behavior, with metrics like hourly and daily activeness providing insights into user attraction and website effectiveness (Lim et al., 2023). Reducing web page complexity by streamlining navigation structures can lower cognitive load and improve user navigation, making it easier for users to find relevant information (Chen, 2020). Finally, the interplay between design and performance, including page loading times and visual appeal, significantly affects the overall Quality of Experience (QoE), with aesthetics and ease-of-use enhancing user tolerance to delays (Varela et al., 2015). Collectively, these factors underscore the importance of a cohesive, well-optimized website in fostering positive user experiences and engagement.

Best Practices for Designing User Friendly Website

Designing user-friendly and accessible large university websites requires a multifaceted approach that integrates usability and accessibility principles. Xiong et al. (2021) and Yerlikaya and Durdu (2017) argue that usability evaluation is crucial, as it helps identify key areas for improvement such as navigation, content quality, and design, which are essential for enhancing user satisfaction and engagement.

Frey et al. (2005) explain that accessibility, a component of usability, ensures that websites are inclusive, accommodating users with disabilities and those with varying technological capabilities. The University of Illinois has developed tools and best practices that emphasize functional accessibility, encouraging developers to create adaptable web resources that cater to diverse user preferences and technologies (Rangin, 2006). At the same time, At the same time, Frey et al. (2003, 2005) highlight that adhering to guidelines from the World Wide Web Consortium's Accessibility Initiative can help meet technical requirements and improve overall accessibility, benefiting all users, including those with slow internet connections or non-native language speakers.

Amsler (2003) points out that the University of Delaware's approach highlights the importance of designing web pages that are compatible with all browsers and platforms, ensuring that information is accessible to everyone.

Additionally, Resnick et al. (2004) demonstrate that a user-centered design process, as demonstrated by Florida International University, can enhance the effectiveness of web portals by aligning them with user needs and preferences, thereby increasing user satisfaction and institutional efficiency. Despite these efforts, many universities still face challenges in achieving full accessibility compliance, particularly in non-English-speaking regions, indicating a need for improved accessibility policies and practices (Kane et al., 2007; Harper & DeWaters, 2008). By integrating these best practices, universities can create websites that are not only compliant with accessibility standards but also user-friendly and inclusive, ultimately supporting the diverse needs of their global user base.

Implications for Practice

Future Studies

Future studies raise questions about whether DU has a paperless administration and if university tasks are done like at NU. Perhaps DU students do not require online or website use as frequently as NU students. It may also be true that NU students are working alongside their studies. Balancing study and work is difficult; that is why they rely on middlemen just to save time, not because of complexity. Due to geographical location and the number of users, NU may be less disadvantaged in that they need a much faster server, but they do not have one.

CONCLUSION

The results clearly demonstrate that the fragmented digital structure of the National University has failed to deliver its intended goal of improved accessibility, instead creating a system marked by critically low efficiency, high cognitive load, and a subsequent loss of user satisfaction and engagement. This digital deficit has led to a reliance on intermediaries, which poses a significant and avoidable security threat to the students. The findings underscore the urgent need for NU to transition to a centralized, user-centered digital portal to bridge this digital divide and protect its student population.

Appendix: Survey Questionnaire

Section A: Demographic & Institutional Profile

1. **University Affiliation:** Dhaka University (DU) / National University (NU)
2. **Current Location:** Urban (Inside a Metropolitan City) / Rural / Suburban (Outside the City)
3. **Primary Device used to access the University Website:** Personal martphone/ Personal Laptop / PC / Computer Shop
4. **Most Frequent Internet Connection:** Campus/Home Wi-Fi/ Personal Mobile/ Data (3G/4G/5G)/ Broadband at a Shop

Section B: User Experience Scale

Please rate your agreement with the following statements on a scale of 1 to 5: (1: Strongly Disagree | 2: Disagree | 3: Neutral | 4: Agree | 5: Strongly Agree)

1: Perceived Efficiency (PE)

1. I can find the specific link I need (e.g., results or forms) within one minute.
2. The organization of the website is logical and easy to follow.
3. I rarely get confused about which website URL to use for which task.
4. I can complete my online applications without repeating steps due to errors.

2: Technical Usability & Accessibility (UA)

5. The website loads quickly even when my internet connection is slow.
6. The website is fully functional and easy to read on a mobile phone.
7. The website remains stable during high-traffic periods (e.g., result publication).
8. The menus and buttons are large enough to be easily clicked on a small screen.

Construct 3: User Satisfaction (US)

9. Using the university website is a stress-free experience for me.
10. I feel confident that my information is submitted securely on the site.
11. I do not feel overwhelmed by the amount of information on the homepage.
12. Overall, I am satisfied with the digital services provided by my university.

Construct 4: Self-Efficacy & Engagement (SE)

13. I am comfortable using the website by myself without any external help.
14. I prefer using the website myself rather than paying a computer shop for help.
15. The website makes me feel well-informed about university activities.
16. I feel that the university's digital portal effectively connects me to my campus.

REFERENCES

Abdelhakim, M. N. A., Carmichael, J. N., & Ahmad, S. S. (2011). Quality evaluation of university web portals: a student perspective. *International Journal of Information and Operations Management Education*, *4*(3/4): 229-243. https://doi.org/10.1504/IJIOME.2011.044563

Adebola, O. (2024). The Dynamics of Slido to Promote Learning in Rural University Classrooms. *Research in Social Sciences and Technology*, *9*(3), 122-139. https://doi.org/10.46303/ressat.2024.51

Adepoju, S. A., Oyefolahan, I. O., Abdullahi, M. B., Mohammed, A. A., & Ibiyo, M. O. (2020). A Human-Centered Usability Evaluation of University Websites Using SNECAAS Model. In S. Misra & A. Adewumi (Eds.), *Handbook of Research on the Role of Human Factors in IT Project Management* (pp. 173-185). IGI Global Scientific Publishing. https://doi.org/10.4018/978-1-7998-1279-1.ch012

Albadi, H. B. (2025.). Information Architecture of King Abdullah University of Science and Technology and Johns Hopkins University Websites: Comparative Analysis. *American Academic & Scholarly Research Journal*, *17*(1), 1-14. https://doi.org/10.24897/acn.64.68.202530010

Amsler, D. A. (2003). *Establishing standards for usable and accessible user services web sites*. In Proceedings of the 31st Annual ACM SIGUCCS Fall Conference (SIGUCCS '03) (pp. 63–64). Association for Computing Machinery. https://doi.org/10.1145/947469.947487

Astani, M., & Elhindi, M. (2008). An empirical study of university websites. *Issues in Information Systems*, *9*(2), 460-465. https://doi.org/10.48009/2_iis_2008_460-465

Aytes, K., & Connolly, T. (2004). Computer Security and Risky Computing Practices. *Journal of Organizational and End User Computing*, *16*(3): 22-40. https://doi.org/10.4018/9781591404743.ch013

Bellavista, P. (2007). Large-Scale Integrated Academic Portals. In A. Tatnall (Ed.), *Encyclopedia of Portal Technologies and Applications* (pp. 538-546). IGI Global Scientific Publishing. https://doi.org/10.4018/978-1-59140-989-2.ch091

Brooke, J. (1996). SUS: A "quick and dirty" usability scale. In P. W. Jordan, B. Thomas, B. A. Weerdmeester, & I. L. McClelland (Eds.), *Usability Evaluation in Industry* (pp. 189–194). Taylor & Francis.

Brugliera, P. (2024). The effectiveness of digital learning platforms in enhancing student engagement and academic performance. *Journal of Education Humanities and Social Research*, *1*(1), 26–36. https://doi.org/10.70088/xq3gy756

Burgstahler, S. (2009). Universal Design of Distance and Online Learning. In P. Rogers, G. Berg, J. Boettcher, C. Howard, L. Justice, & K. Schenk (Eds.), *Encyclopedia of Distance Learning, Second Edition* (pp. 2195-2201). IGI Global Scientific Publishing. https://doi.org/10.4018/978-1-60566-198-8.ch325

Cassidy, S., & Eachus, P. (2002). Developing the Computer User Self-Efficacy (Cuse) Scale: Investigating the Relationship between Computer Self-Efficacy, Gender and Experience with Computers. *Journal of Educational Computing Research*, *26*(2), 133-153. Doi:10.2190/JGJR-0KVL-HRF7-GCNV

Chanenson, J., Sloane, B., Rajan, N., Morril, A., Chee, J., Huang, D. Y., & Chetty, M. (2023). *Uncovering privacy and security challenges in K–12 schools*. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23) (Article 592, pp. 1–28). Association for Computing Machinery. https://doi.org/10.1145/3544548.3580777

Chen, M. (2020). Reducing Web Page Complexity to Facilitate Effective User Navigation. *IEEE Transactions on Knowledge and Data Engineering*, *32*(4), 739-753. https://doi.org/10.1109/TKDE.2019.2893242

Coombs, N. (2002). Electronic Ramp to Success: Designing Campus Web Pages for Users with Disabilities. *Educause Quarterly*, *25*(2), 45-51.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications.

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: A ten-year update. *Journal of Management Information Systems, 19*(4), 9–30. DOI:10.1080/07421222.2003.11045748

D, L. a. M., G, Q. J. K., R, O. A., & June, B. G. (2023). Design and development of a Multi-Faceted Online campus platform to improve student engagement and satisfaction in higher education. *International Journal of Computer Science and Mobile Computing*, *12*(6), 12–40. https://doi.org/10.47760/ijcsmc.2023.v12i06.003

Douglas, J., Kilpatrick, S., Barnes, R. K., Alderson, R., & Flittner, N. (2020). Embedding tertiary education in rural communities: building 'warm connections'. *Studies in Continuing Education*, *42*(1):1-14. https://doi.org/10.1080/0158037X.2018.1548435

Dutkowska-Zuk, A., Hounsel, A., Xiong, A., Chetty, M., Feamster, N., Roberts, M., & Stewart, B. (2020). Practicing Safe Browsing: Understanding how and why university students use virtual private networks. *arXiv (Cornell University)*. https://arxiv.org/abs/2002.11834v1

June, P. B. (2022). Envisioning the Rural Virtual College Classroom: Some Proposals for Equity and Inclusivity. In E. Reeves & C. McIntyre (Eds.), *Multidisciplinary Perspectives on Diversity and Equity in a Virtual World* (pp. 257-271). IGI Global Scientific Publishing. https://doi.org/10.4018/978-1-7998-8028-8.ch014

Fellinger, L., & Fronimaki, D. (2024). Enhancing user experience: Unveiling the impact of website speed optimisation on user engagement. *Journal of Digital & Social Media Marketing*, *11*(4), 324-338. https://doi.org/10.69554/daxr2222

Frey, B. A., Molinero, A., & Cohn, E. R. (2003). Strategies to Increase Web Accessibility and Usability in Higher Education. In M. Hricko (Ed.), *Design and Implementation of Web-Enabled Teaching Tools* (pp. 48-60). IGI Global Scientific Publishing. https://doi.org/10.4018/978-1-59140-107-0.ch003

Frey, B. A., Molinero, A., & Cohn, E. (2005). Increasing Web Accessibility and Usability in Higher Education. In C. Howard, J. Boettcher, L. Justice, K. Schenk, P. Rogers, & G. Berg (Eds.), *Encyclopedia of Distance Learning* (pp. 1069-1075). IGI Global Scientific Publishing. https://doi.org/10.4018/978-1-59140-555-9.ch157

Ghazali, A. E., & Benbrahim, L. (2024). Integration of E-Learning Platforms in Moroccan Higher Education: Assessing the Technological Leap and Addressing the Digital Divide Among Urban and Rural Students. *Research and Advances in Education*, *3*(5):12-22. https://doi.org/10.56397/rae.2024.05.02

Habib, S., Ahsyar, T. K., Afdal, M., Salisah, F. N., & Syaifullah, S. (2023). Enhancing Website Usability by Utilizing Heuristic Evaluation and User Feedback for Better User Experience. *Journal of Information System Research (JOSH)*, *4*(4):1093-1101. https://doi.org/10.47065/josh.v4i4.3706

Harper, K. A., & DeWaters, J. (2008). A Quest for Website Accessibility in Higher Education Institutions. *The Internet and Higher Education*, *11*(3):160-164. https://doi.org/10.1016/J.IHEDUC.2008.06.007

Harvey, M., & Pointon, M. (2017). Searching on the go: The effects of fragmented attention on mobile web search tasks. In *Proceedings of the 40th International ACM SIGIR*

Conference on Research and Development in Information Retrieval (SIGIR '17) (pp. 155–164). Association for Computing Machinery. https://doi.org/10.1145/3077136.3080770

Hasan, L. (2013). Determining the Importance of Design Features on Usable Educational Websites. In: Yang, GC., Ao, Sl., Gelman, L. (eds) IAENG Transactions on Engineering Technologies. Lecture Notes in Electrical Engineering, vol 229 (pp 551–563). Springer, Dordrecht. https://doi.org/10.1007/978-94-007-6190-2_42

Hasan, L. (2014). The Website of the University of Jordan: Usability Evaluation. *International Arab Journal of e-Technology, 3*(4), 258-269.

Imathiu, G., & Mary Mwadulo. (2024). Assessing usability of University websites in meeting the expectations of students: a survey of literature. *African Journal of Science, Technology and Social Sciences*, *2*(2), 29–34. https://doi.org/10.58506/ajstss.v2i2.168

Jabar, M. A., Usman, U. A., & Awal, A. (2013). Assessing The Usability Of University Websites From Users' Perspective. *Australian Journal of Basic and Applied Sciences, 7*(10): 98-111.

Kane, S. K., Shulman, J. A., Shockley, T. J., & Ladner, R. E. (2007). A web accessibility report card for top international university web sites. In *Proceedings of the 2007 international cross-disciplinary conference on Web accessibility (W4A '07)* (pp. 148–156). Association for Computing Machinery. https://doi.org/10.1145/1243441.1243472

Kausar, M. A. (2023). Website Assessment and Feature Metrics of University's Website Accessibility: An Evaluation of 15 Top-Ranked Universities of India. *Indian Journal of Computer Science and Engineering*, *14*(4):652-660. https://doi.org/10.21817/indjcse/2023/v14i4/231404099

Kelso, E., Soneji, A., Rahaman, S., Shoshitaishvili, Y., & Hasan, R. (2024). Trust, because you can't verify: Privacy and security hurdles in education technology acquisition practices. In *Proceedings of the 2024 ACM SIGSAC Conference on Computer and Communications Security (CCS '24)* (pp. 1656–1670). Association for Computing Machinery. https://doi.org/10.1145/3658644.3690353

Sharma, P., & Kumar, D. (2024). Enhancing Students Experience: A Comprehensive Approach through Uni-Connect. *International Research Journal of Computer Science*, *11*(04), 153–160. https://doi.org/10.26562/irjcs.2024.v1104.53

Lim, Z., Ong, L., & Leow, M. (2023). Cluster-N-Engage: A New Framework For Measuring User Engagement Of Website With User Navigational Behavior. *IEEE Access*, *11*, 112276–112292. https://doi.org/10.1109/access.2023.3322958

Luo, Y. (2024). Enhancing educational interfaces: Integrating user-centric design principles for effective and inclusive learning environments. *Applied and Computational Engineering*, *64*(1), 192–197. https://doi.org/10.54254/2755-2721/64/20241427

Mane, P. (2024). Survey on: Revolutionizing Higher Education Exploration: A Web-Based application for personalized university searches and enhanced admissions processes. *Interantional Journal Of Scientific Research In Engineering And Management*, *08*(01), 1–13. https://doi.org/10.55041/ijsrem27917

Manzoor, M., Hussain, W., Sohaib, O., Hussain, F. K., & Alkhalaf, S. (2018). Methodological investigation for enhancing the usability of university

websites. *Journal of Ambient Intelligence and Humanized Computing*, *10*(2), 531–549. https://doi.org/10.1007/s12652-018-0686-6

Maskur, A., & Syarief, A. (2025). Usability and User Experience Evaluation for website design of higher education institutions (2015-2024): Evolutionary trends and Clusters of research. *Jurnal Sistem Informasi Bisnis*, *15*(3), 321–329. https://doi.org/10.14710/vol15iss3pp321-329

Meshram, S., Tambakhe, P., & Gupta, N. (2024). A Portal To Browse Top Universities According To Your Preferences: Result. *International Journal of Scientific Research in Computer Science Engineering and Information Technology*, *10*(2), 633–635. https://doi.org/10.32628/cseit2410284

O'Brien, H. L., & Toms, E. G. (2008). What is user engagement? A conceptual framework for defining user engagement with technology. *Journal of the American Society for Information Science and Technology, 59*(6), 938–955. https://doi.org/10.1002/asi.20801

Patience, N. B. A., Innocent, N. O. S., & Jigiedous, N. O. F. (2025). Enhancing security and privacy in EdTech Tools: Safeguarding Student Data in the Digital Learning Era. *Journal of Science Innovation and Technology Research, 9*(9), 27-36. https://doi.org/10.70382/ajsitr.v9i9.041

Ponde, P. (2025). Security and Privacy Considerations in Cloud-Based Education. In P. Mahalle (Ed.), *Bridging Academia and Industry Through Cloud Integration in Education* (pp. 175-194). IGI Global Scientific Publishing. https://doi.org/10.4018/979-8-3693-6705-6.ch007

Putri, M. A., Trihapningsari, D., & Nurdiana, D. (2025). Evaluating User Experience (UX) on Universitas Terbuka's website: a combined survey and GTMetrix performance analysis. *Matics Jurnal Ilmu Komputer Dan Teknologi Informasi (Journal of Computer Science and Information Technology)*, *17*(1), 31–35. https://doi.org/10.18860/mat.v17i1.32094

Rangin, H.B. (2006). University of Illinois Tools and Techniques for Functional Web Accessibility. In: Miesenberger, K., Klaus, J., Zagler, W.L., Karshmer, A.I. (eds) Computers Helping People with Special Needs. ICCHP 2006. Lecture Notes in Computer Science, vol 4061 (pp 230–233). Springer, Berlin, Heidelberg. https://doi.org/10.1007/11788713_34

Xinghai, W. (2023). Reimagining Website Usability: A conceptual exploration of SEO and UX design integration. *Journal of Digitainability Realism & Mastery (DREAM)*, *2*(03), 60–66. https://doi.org/10.56982/dream.v2i03.99

Resnick, M. L., Bakar, W., Castellanos, M., Haghighi, R., & Monsalve, A. (2004). User-Centered design of a customized intranet portal for a large public university. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, *48*(13), 1528–1532. https://doi.org/10.1177/154193120404801312

Roberts, K. (2004). The need for universal design in online learning environments (OLEs). *AACE Review (Formerly AACE Journal)*, *12*(2), 188–197. https://www.learntechlib.org/primary/p/11442/

Fathima, G., Sree, R., Keerthi, S., Shri, S., & Jasmin, M. (2024). Rural Edurevamp. *Computer Science Engineering and Technology*, *2*(1), 6–12. https://doi.org/10.46632/cset/2/1/2

Sajjan, A., Khanam, R., Hossain, Md. A., & Sakib, N. (2024). Evaluating User Satisfaction, Perceived Efficiency and Engagement of University Website for Faculty, Staff, and Students of Bangladeshi Universities. *Journal of Creative Writing. 8*(3):23-39. https://doi.org/10.70771/jocw.129

Saker, V. S. N. (2021). Enhancing Digital Interfaces: A comprehensive strategy for UI / UX improvement, user engagement, and operational efficiency. *International Journal of Science and Research (IJSR)*, *10*(8), 1260–1264. https://doi.org/10.21275/sr24422133910

Sangore, J. G. (2024). Impact of online learning on student engagement and academic performance. *International Journal of Emerging Knowledge Studies.*, *03*(09), 714–718. https://doi.org/10.70333/ijeks-03-09-041

Schenker, J. D., & Rumrill, P. D., Jr. (2004). Causal-comparative research designs. *Journal of Vocational Rehabilitation*, *21*(3), 117–121. https://doi.org/10.3233/jvr-2004-00260

Sikder, A. (2016). Revolutionizing Web User Experience: A Pioneering Investigation into Web Performance Optimization's Impact on User Experience and Business Success. *International Journal of Imminent Science & Technology*, 1(1):186-198. https://doi.org/10.70774/ijist.v1i1.8

Singh, I. (2024). Beyond the classroom walls: Unveiling the impact of technology integration on student engagement and academic performance. *International Journal of Humanities and Arts*, *6*(1), 23–28. https://doi.org/10.33545/26647699.2024.v6.i1a.58

Tripathi, K. (2023). The Importance of Website Usability in Digital Marketing- A Review. *International Journal of Innovative Research in Computer Science & Technology*, 11(3):27-31. https://doi.org/10.55524/ijircst.2023.11.3.5

Varela, M., Skorin-Kapov, L., Mäki, T., & Hoßfeld, T. (2015). QoE in the web: A dance of design and performance. In *Proceedings of the Seventh International Workshop on Quality of Multimedia Experience (QoMEX 2015)* (pp. 1–7). IEEE. https://doi.org/10.1109/QoMEX.2015.7148084

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*(3), 425–478. DOI:10.2307/30036540

Xiong, Z.-Y., Huihui, W., & Yu, L. (2021). Usability evaluation and redesign of university portal websites. In *Proceedings of the 2021 1st International Conference on Control and Intelligent Robotics (ICCIR '21)* (pp. 305–309). Association for Computing Machinery. https://doi.org/10.1145/3473714.3473767

Xu, N., & Zhou, X.. (2025). Guarding the Digital Education Era: Unraveling the Data Security and Privacy Dilemmas in Educational Transformation. *International Journal of Sociologies and Anthropologies Science Reviews*, *5*(5), 733–744. https://doi.org/10.60027/ijsasr.2025.7209

Yadamsuren, B., Paul, A., Wang, J., Wang, X., & Erdelez, S. (2008). Web Ecology: Information needs of different user groups in the context of a community college website. *Proceedings of the American Society for Information Science and Technology*, *45*(1), 1–4. https://doi.org/10.1002/meet.2008.14504503112

Yerlikaya, Z., & Onay Durdu, P. (2017). Usability of university websites: A systematic review. In M. Antona & C. Stephanidis (Eds.), *Universal access in human–computer*

interaction: Design and development approaches and methods (Lecture Notes in Computer Science, Vol. 10277, pp. 277–287). Springer. https://doi.org/10.1007/978-3-319-58706-6_22

Yesmin, S., & Atikuzzaman, M. (2023). Usability testing of a website through different devices: a task-based approach in a public university setting in Bangladesh. *Information Discovery and Delivery*, *52*(4), 365–377. https://doi.org/10.1108/idd-01-2023-0007

Zhou, J.-H., Zhu, Y.-M., & Song, H.-J. (2022). User-perception-oriented website design optimization for university portals: Using Kansei engineering and neural networks. In *Proceedings of the 2022 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM)* (pp. 107–111). IEEE. https://doi.org/10.1109/IEEM55944.2022.9989846