

Reflexive Thematic Analysis on Empathy Phase for Developing an Educational Website

Alharbi Faisal Bader¹, Rasimah Che Mohd Yusoff², Saharudin Ismail³, Norziha Megat Zainuddin⁴

Faculty of Artificial Intelligence, University Technology Malaysia, Malaysia

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ABSTRACT

The rapid expansion of digital learning has positioned educational websites as essential tools for knowledge delivery, yet many continue to fall short of learners' expectations. While previous studies have documented technical and usability challenges, less attention has been paid to how students interpret these experiences and how such interpretations can inform empathetic design. This study applied reflexive thematic analysis (RTA) within the empathize phase of Design Thinking (DT) to investigate learners' lived experiences with educational websites in higher education. Thirty-nine respondents from a public university in Saudi Arabia participated in semi-structured interviews, which were transcribed and analyzed using Braun and Clarke's six-phase RTA framework. Four interrelated themes were identified: navigation, design, layout, and compatibility. Navigation difficulties, such as broken links and inconsistent menus, eroded trust in websites as reliable learning platforms. Poor design, including lack of responsiveness and accessibility, was experienced as exclusionary, while cluttered layouts increased cognitive load and disrupted concentration. Compatibility failures across devices and browsers were interpreted as barriers to equitable participation, particularly for mobile-first learners. The study contributes methodologically by demonstrating how DT and RTA can be integrated to capture both the functional and symbolic meanings learners assign to digital design. Practically, the findings highlight that clarity, inclusivity, simplicity, and cross-platform reliability should be treated as foundational requirements in educational website development. By centering empathy and reflexivity, this research reframes usability not only as a technical concern but as a pedagogical and ethical responsibility in digital education.

Keywords: Empathy; Design thinking; Educational website; Thematic; Web based learning

INTRODUCTION

The increasing ubiquity of digital technologies has transformed the global education landscape, with web-based learning (WBL) becoming a central mode of delivering knowledge in both formal and informal settings. WBL can be defined as the delivery of educational resources and instruction through internet-enabled platforms that allow learners to access content asynchronously, interact with peers and instructors, and develop skills at their own pace and place. Recent reviews confirm that WBL supports flexibility, accessibility, and learner autonomy while maintaining comparable learning outcomes when designed effectively (Iyamuremye et al., 2023; Mahdavi Ardestani et al., 2023). Comparative research indicates that these benefits are recognized worldwide but are realized unevenly across contexts. In Europe and North America, WBL has been integrated into blended models that improve engagement and outcomes (Johnson, Veletsianos, & Seaman, 2022). In contrast, studies from South Africa and East Africa highlight that limited digital literacy, infrastructural constraints, and weak instructional design continue to hinder student participation (Mpungose, 2020; Mtebe & Raisamo, 2014). These findings show that while WBL holds universal promise, its effectiveness depends heavily on cultural and institutional conditions.

The momentum of WBL has accelerated under the pressures and opportunities of Industry 4.0, where automation, artificial intelligence, and the Internet of Things are reshaping not only industrial practices but also educational demands. Scholars have highlighted the significance of aligning digital learning platforms with Industry 4.0 technologies to ensure that education remains relevant and prepares learners for increasingly

digitized economies (Kandemir, Ulusoy, & Kandemir, 2024; Ahmad, 2024). Educational websites, in this context, have become indispensable tools for supporting lifelong learning and professional development. Yet, cross-regional evidence shows uneven readiness. While universities in technologically advanced regions invest in adaptive and personalized digital learning (Alamri et al., 2020), studies from developing contexts emphasize ongoing difficulties related to usability, device compatibility, and equitable access (Al-Emran, Elsherif, & Shaalan, 2016). Within Saudi Arabia, national digital transformation initiatives have expanded access to WBL, but there is limited empirical research on how students actually experience these websites. This makes the Saudi context a valuable case for generating locally grounded insights that also contribute to global debates.

Despite the advantages, research indicates that many educational websites continue to fall short of pedagogical expectations. Studies have shown that online learning platforms frequently lack features that encourage independent learning, evidence-based practice, critical thinking, and structured feedback, leading to reduced engagement and even abandonment of use (Fasihullah, Awan, & Hulio, 2023). Students often report feelings of frustration, loss of motivation, and isolation, which highlights the need for website development approaches that are not only technically sound but also pedagogically meaningful (Adedoyin & Soykan, 2020; Mahdavi Ardestani et al., 2023). Similar findings have been reported internationally. In Pakistan and Malaysia, learners identify weak interactivity and feedback as barriers to engagement (Hussain, Zhu, Zhang, & Abidi, 2021), while in South Africa, poorly structured content has been linked to disengagement and cognitive overload (Mpungose, 2020). By situating Saudi learners' experiences within these global comparisons, the present study highlights both the shared and unique challenges of educational website use.

In response to these challenges, user-centered design approaches have gained prominence in the development of educational websites. Design Thinking (DT) is one of the most widely adopted frameworks because it emphasizes iterative, human-centered innovation. It consists of phases such as empathize, define, ideate, prototype, and test, with the empathize phase regarded as foundational since it captures learners' authentic experiences, frustrations, and aspirations (Brown, 2009; Dam & Siang, 2021). Empathy-driven design ensures that platforms are not only technically functional but also relevant to learners' emotional and cognitive needs, thereby fostering inclusivity and engagement (Guaman-Quintanilla et al., 2023; Alvarado, 2025). Cross-cultural evidence further supports the relevance of DT. In Latin America, DT has been used to adapt e-learning systems to marginalized learners (Guaman-Quintanilla et al., 2023), while in Europe, DT-inspired interventions have enhanced accessibility for students with disabilities (Fernández-Batanero, Román-Graván, Reyes-Rebollo, & Montenegro-Rueda, 2021). These cases illustrate how empathy-driven approaches are critical for addressing both global and local barriers in digital education.

Qualitative research methodologies play a vital role in supporting this approach by revealing nuanced insights into learners' lived experiences with digital platforms. Reflexive thematic analysis (RTA), as developed by Braun and Clarke (2006, 2019), has proven to be a particularly robust yet flexible method for identifying patterns of meaning across qualitative data. Unlike descriptive approaches, RTA emphasizes reflexivity, encouraging researchers to acknowledge their interpretive role and situate analysis within social and cultural contexts (Byrne, 2022). When applied in the empathize phase of Design Thinking, RTA enables developers to translate students' narratives into actionable design requirements, such as clearer navigation, improved accessibility, and enhanced cross-device functionality. The fact that the educational website studied here was delivered in English adds further complexity, as language of instruction influences both usability and inclusivity (Klimova & Kacetl, 2017). This makes the Saudi case especially valuable for comparative scholarship, as it links local realities with global conversations on educational website design.

The present study contributes to this body of literature by applying reflexive thematic analysis within the empathize phase of DT to investigate learners' experiences with educational websites. By conducting semi-structured interviews and interpreting responses through RTA, the study identifies critical challenges and expectations that highlight barriers to engagement and opportunities for improvement. In doing so, the research advances methodological understanding of RTA in technology-enhanced learning and provides practical guidance for creating websites that are more accessible, engaging, and learner-centered. By situating its findings within the Saudi context and linking them to global perspectives, the study positions itself as both a locally grounded investigation and a contribution to international scholarship on user-centered digital design.

LITERATURE REVIEW

Web-Based Learning (WBL)

The rapid expansion of digital technologies has redefined how knowledge is accessed, delivered, and consumed, with web-based learning (WBL) becoming an increasingly prominent modality in higher education and professional training. WBL refers to the use of internet-enabled platforms to deliver course content, facilitate collaboration, and support both synchronous and asynchronous learner interactions (Soussi, 2020). One of its greatest advantages is flexibility, which enables learners to access resources at their own pace and from any location, overcoming traditional barriers of time and geography (Soussi, 2020). This flexibility has positioned WBL as a tool for lifelong learning, especially where rapid upskilling is needed to meet the demands of Industry 4.0 (Ratana-Ubol, 2021).

Despite these advantages, WBL's pedagogical effectiveness remains contested. Astuti, Wihardi, and Rochintaniawati (2020) found that many online learning environments fail to incorporate essential features such as independent learning, timely feedback, and evidence-based content delivery. Learners frequently report reduced motivation, diminished engagement, and even withdrawal when these mechanisms are absent (Muthuprasad et al., 2021). These observations align with constructivist theory, which emphasizes that learning is most effective when students actively construct knowledge through interaction and scaffolding (Jonassen, 1999). Without such design elements, WBL risks reinforcing passive consumption rather than promoting critical thinking and problem-solving.

WBL also raises questions of learner motivation. Self-determination theory suggests that effective learning environments must support autonomy, competence, and relatedness to sustain engagement (Ryan & Deci, 2020). Platforms that fail to provide opportunities for choice, feedback, and meaningful social interaction may therefore undermine motivation. Evidence from South Asian contexts shows that learners disengage when online platforms lack mechanisms to foster collaboration or recognition of progress (Hussain, Zhu, Zhang, & Abidi, 2021), illustrating how motivational factors are intertwined with digital design.

Another critical dimension is cognitive load. While innovations such as adaptive algorithms and responsive design have been introduced to personalize learning and improve accessibility, poor interface design can increase extraneous cognitive load, making it harder for learners to focus on essential content. Cognitive load theory highlights that excessive or poorly structured information reduces working memory efficiency and hampers knowledge acquisition (Sweller, Ayres, & Kalyuga, 2011). Studies have confirmed that disorganized layouts, confusing navigation, and limited accessibility features directly affect student concentration and task completion (Corrales-Estrada, 2020). To optimize WBL, technological enhancements must therefore be integrated with user-centered and pedagogically informed design strategies that reduce cognitive burden while enhancing inclusivity.

In summary, while WBL provides unprecedented access and flexibility, its effectiveness depends on aligning technological features with sound pedagogical principles. Theories of constructivism, self-determination, and cognitive load offer useful frameworks for understanding why many platforms fail to engage learners fully. Addressing these shortcomings requires moving beyond access and innovation to designing online environments that are learner-centered, motivationally supportive, and cognitively sustainable.

Design Thinking (DT) in Website Development

Design Thinking (DT) has become an influential framework for guiding innovation in education and technology. Emerging from design sciences and popularized by Tim Brown, the method emphasizes empathy, creativity, and iteration as central components of solving complex problems (Brown, 2009). The framework is structured around five stages: empathize, define, ideate, prototype, and test as shown in Fig 1. These stages are not rigid steps but iterative cycles, allowing designers to refine ideas as new insights emerge (Panke, 2019). This flexibility makes DT particularly suited to educational contexts, where learner needs and technological environments are constantly evolving.

The empathize stage is foundational, requiring designers to engage with learners directly to uncover authentic experiences, frustrations, and aspirations. In educational website design, this aligns closely with constructivist

principles, which stress the importance of grounding learning environments in students' lived experiences (Jonassen, 1999). Global applications confirm its significance: in Latin America, DT has been used to redesign online platforms for marginalized students, enabling greater inclusivity (Guaman-Quintanilla, Everaert, Chiliza, & Valcke, 2023), while in Europe it has improved accessibility for learners with disabilities through universal design principles (Fernández-Batanero, Román-Graván, Reyes-Rebollo, & Montenegro-Rueda, 2021). These examples illustrate that empathy-driven approaches allow design to move beyond technical efficiency, ensuring pedagogical relevance across diverse settings.

The define and ideate stages synthesize learner insights into actionable challenges and encourage the exploration of creative solutions. This resonates with self-determination theory, which identifies autonomy and competence as essential drivers of motivation (Ryan & Deci, 2020). By involving learners in co-design activities during these stages, designers provide opportunities for student agency and problem-solving, which can foster deeper engagement. Research from Asia and North America shows that when learners participate in ideation workshops, they perceive greater ownership of digital platforms, leading to higher satisfaction and persistence (Liedtka, 2018; Razzouk & Shute, 2012). Such participatory approaches reflect DT's potential not only as a design method but also as a pedagogical strategy that empowers learners.

The prototype and test stages operationalize ideas through tangible outputs such as wireframes or interactive models, which are then evaluated with users. From a cognitive load perspective, iterative prototyping ensures that website designs are tested for clarity and usability before large-scale implementation. Poorly organized layouts or inconsistent navigation can impose extraneous cognitive load, reducing learning efficiency (Sweller, Ayres, & Kalyuga, 2011). By contrast, testing with learners helps identify and eliminate design flaws early, resulting in platforms that support concentration and reduce frustration. Cross-cultural evidence confirms this value: in the Middle East, iterative DT cycles have been used to adapt e-learning interfaces for mobile-first learners (Alamri, Watson, & Watson, 2020), while in the United States, DT-inspired prototyping has guided the creation of adaptive learning environments tailored to diverse student populations (Henriksen, Richardson, & Mehta, 2017).

In the context of educational website development, DT's iterative nature ensures that design evolves in response to both technological change and shifting learner needs. By grounding the process in empathy and carrying insights through definition, ideation, prototyping, and testing, developers can create platforms that are not only technically functional but also pedagogically supportive and motivationally engaging. In this way, DT contributes to the creation of inclusive learning environments that align with constructivist, motivational, and cognitive frameworks, making it a valuable bridge between human-centered design and educational theory.

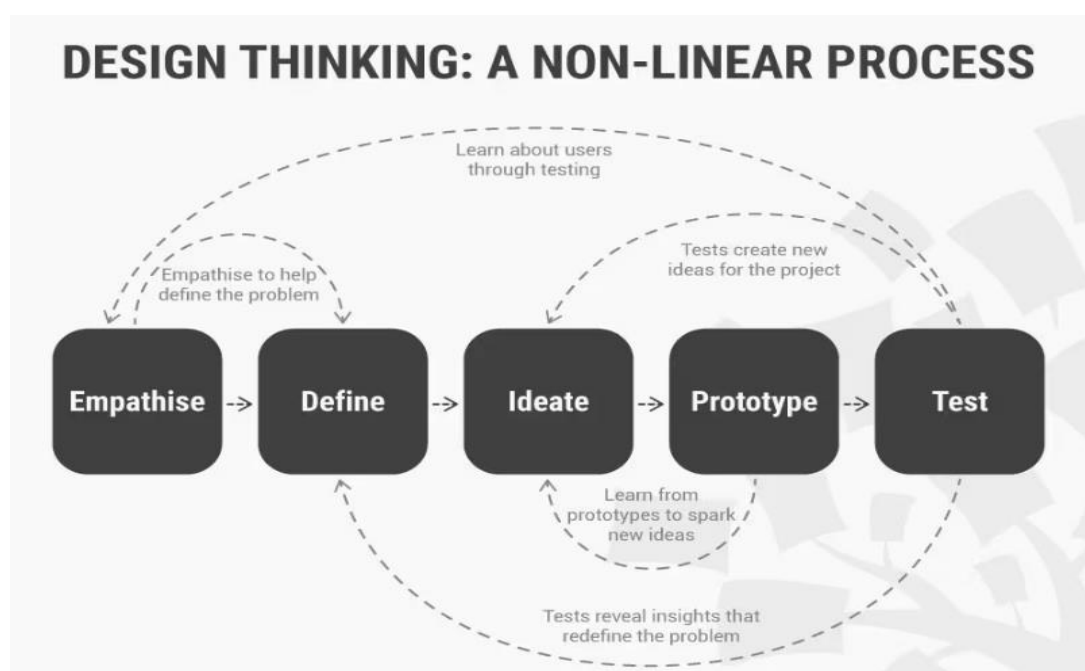


Fig. 1 Five phases in Design Thinking (Dam & Siang, 2021)

Reflexive Thematic Analysis (RTA) as a Complement to Design Thinking

Design Thinking provides a structured framework for engaging with learners during the empathize phase, but it requires a rigorous analytic method to interpret the qualitative data collected. Reflexive thematic analysis (RTA), introduced by Braun and Clarke (2006) and refined in their later work, has become one of the most influential approaches in qualitative research for identifying and interpreting patterns of meaning within complex datasets. Unlike prescriptive coding frameworks, RTA emphasizes reflexivity, transparency, and contextual interpretation. Rather than assuming that themes exist independently within the data, it views meaning as co-constructed through the researcher's active engagement with participant accounts (Braun & Clarke, 2019). This stance is particularly relevant when studying learners' interactions with educational websites, where usability and engagement are shaped not only by interface design but also by prior knowledge, motivation, and cultural expectations.

A core strength of RTA lies in its flexibility. It can be applied across diverse epistemological positions, from essentialist approaches that focus on semantic meanings to more constructionist approaches that explore latent, underlying patterns (Byrne, 2022). This adaptability makes it especially suitable for technology-enhanced learning research, which often involves capturing both explicit complaints (e.g., broken links) and implicit concerns (e.g., loss of motivation). The interpretive orientation of RTA aligns with constructivist learning theory, which highlights that learners' experiences are mediated by their active construction of meaning (Jonassen, 1999). Similarly, by attending to how narratives reveal needs for autonomy, competence, and relatedness, RTA connects with self-determination theory as a way of understanding how design features influence student motivation (Ryan & Deci, 2020). The method also supports insights related to cognitive load theory, as participants' accounts often reveal how poorly structured websites increase extraneous demands on working memory (Sweller, Ayres, & Kalyuga, 2011).

The methodological value of RTA has been demonstrated across multiple disciplines. In health research, Campbell et al. (2021) applied RTA to digital health interventions, showing how patient narratives about anxiety, empowerment, and usability informed the creation of more responsive tools. In education, Corrales-Estrada et al. (2020) used thematic analysis to uncover barriers in e-learning platforms, such as accessibility gaps and navigation challenges, which directly guided iterative design improvements. In human-computer interaction, Nowell et al. (2017) highlighted RTA's role in ensuring credibility and trustworthiness in qualitative analysis, recommending its use for complex design contexts where user feedback must be systematically integrated. These examples confirm that RTA not only generates descriptive insights but also constructs interpretive themes that can be translated into actionable design requirements.

When combined with Design Thinking, RTA provides methodological depth to the iterative innovation process. Design Thinking offers a structured pathway for problem definition and solution generation, while RTA ensures that the voices of users are systematically interpreted rather than superficially acknowledged. Together, they create a robust framework for developing educational websites that are both technically efficient and pedagogically meaningful. By grounding design in empathic engagement and reflexive interpretation, this combination contributes to inclusive and sustainable innovation in digital learning.

METHODOLOGY

Research Design

This study employed a qualitative research design to explore the difficulties students encounter while using educational websites and to capture their expectations for improvement. Qualitative inquiry was deemed suitable because it allows the researcher to investigate respondents' lived experiences in detail, generating nuanced insights that cannot be adequately captured through quantitative methods (Creswell & Poth, 2018). The study was anchored in the empathize phase of the DT framework, which emphasizes understanding user perspectives as a foundation for problem identification and solution development (Dam & Siang, 2021). To guide data analysis, the study adopted reflexive thematic analysis (RTA) as developed by Braun and Clarke (2006, 2019). RTA was chosen for its flexibility and its explicit recognition of the researcher's interpretive role. Rather than seeking objective "truths," RTA acknowledges that meanings are constructed through the interaction between

researcher and data. This interpretive stance is particularly relevant to website development, where user experiences are shaped not only by design features but also by individual expectations and learning contexts (Byrne, 2022).

Sampling and Respondents

Respondents were selected through convenience sampling, which involves recruiting individuals who are accessible and willing to participate. This approach was appropriate given the study's exploratory focus and the need to gather rich data from learners with direct experience using educational websites. A total of 39 respondents from a public university in Saudi Arabia took part in the study, representing a range of demographic backgrounds in terms of age, gender, and education level. The demographic profile revealed that 54% of respondents were male and 46% were female, with most respondents below the age of 25. Educational levels varied, with representation from associate, bachelor's, master's, and doctoral programs. The majority had used educational websites for at least six months, providing them with sufficient experience to critically reflect on both strengths and limitations of such platforms. The diversity within the sample enhanced the credibility of findings by ensuring that the themes were informed by a wide range of perspectives (Patton, 2015).

Instrument

Data were collected using a semi-structured interview guide, chosen because it balances structure with flexibility. This approach ensured consistency across interviews while allowing respondents to elaborate on issues of personal significance and to raise perspectives that mattered most to them. The guide was organized into three sections. The opening section captured demographic information such as age, gender, and level of study. The core section contained questions on challenges experienced when navigating and interacting with educational websites, with a focus on usability, accessibility, and overall learning support. The closing section provided space for respondents to summarize their views, confirm or clarify earlier points, and highlight additional issues not covered during the interview.

The interview questions were explicitly designed to align with the objectives of the empathize phase of DT, ensuring that data collection foregrounded learners' lived experiences, frustrations, and expectations. By structuring the guide in this way, the instrument aimed to identify pain points and opportunities for improvement that could inform user-centered website development. To enhance clarity and reliability, the guide was piloted with a small group of learners before the main study. Feedback from the pilot led to minor refinements in wording and sequencing, which improved both the flow of questions and the ease of respondent responses.

Data Collection

Data collection was carried out using online video conferencing platforms, namely Google Meet and Zoom, which provided flexibility and convenience for both researchers and respondents. Each interview lasted between 30 and 45 minutes and was conducted in either Arabic or English, depending on the respondent's preference. For cases where other languages were used, responses were translated during transcription to ensure inclusivity.

Before each session, respondents were briefed about the purpose of the study and their rights, including the right to withdraw at any time. Informed consent was obtained both verbally and in writing. With respondents' approval, all sessions were audio- and video-recorded to ensure accuracy in transcription and analysis. Pseudonyms were assigned during transcription to protect confidentiality, and identifying details were removed. These measures reflect best practices in ethical qualitative research.

Data Analysis

The interviews were transcribed verbatim using Otter.ai, an AI-assisted transcription tool, and subsequently analyzed following the six-phase process of reflexive thematic analysis described by Braun and Clarke (2006, 2019). The process began with familiarization, during which the researchers immersed themselves in the transcripts by reading and re-reading them, making detailed notes about early impressions and recurrent issues. From this foundation, initial codes were generated to capture meaningful units of text. These codes were

descriptive and interpretive, and the coding process was carried out iteratively, with refinements introduced as the researchers became increasingly familiar with the data.

Once coding was complete, the analysis moved into the stage of constructing themes. Codes were clustered into broader categories that represented shared patterns of meaning, leading to the identification of candidate themes such as navigation difficulties, design challenges, layout issues, and compatibility concerns. These preliminary themes were then carefully reviewed against the dataset to ensure coherence and relevance. At this stage, redundant codes were merged, while themes that lacked clarity were refined to improve their consistency across the data.

After reviewing, each theme was clearly defined and named to capture its central meaning. This step involved articulating the scope and essence of each theme and supporting it with illustrative quotations drawn directly from respondents' accounts. The final phase involved producing the analytic narrative, in which the themes were woven into a coherent account that integrated respondents' experiences with existing literature and highlighted their significance for educational website design.

Reflexivity was maintained throughout the analytic process. The researchers critically examined their assumptions, disciplinary perspectives, and positionality, acknowledging how these factors influenced interpretation (Byrne, 2022). The lead researcher's prior experience in educational technology provided sensitivity to usability issues but also required deliberate reflection to avoid overemphasizing technical aspects at the expense of pedagogical concerns. To enhance credibility, an analytic memo trail was maintained to document coding decisions and theme development over time. In addition, intercoder dialogue was employed: a second researcher independently coded a subset of transcripts, and subsequent discussions were used to reconcile differences, refine code boundaries, and confirm the robustness of emerging themes. This process ensured that theme development was not driven by a single perspective but emerged through collaborative scrutiny and iterative refinement (Nowell, Norris, White, & Moules, 2017; Braun & Clarke, 2019).

In addition to standard ethical procedures, validation strategies were incorporated to strengthen trustworthiness. Member checking was conducted by sharing thematic summaries with a small group of participants, allowing them to confirm the accuracy of interpretations and provide clarifications where needed. An audit trail was also maintained, consisting of coded transcripts, reflexive memos, and decision logs, which provided transparency in the progression from raw data to reported themes. These practices reinforced the dependability and confirmability of the findings, ensuring that the analysis remained grounded in participants' accounts while being systematically documented (Lincoln & Guba, 1985; Byrne, 2022).

RESULTS

This section presents the results derived from semi-structured interviews with participants. Table 1 summarizes the demographic profile of the respondents. A total of 39 tertiary-level students from a public university in Saudi Arabia participated in the study. The majority were male (54%) and enrolled in bachelor's degree programs. Most respondents reported having used educational websites for more than six months, providing them with sufficient experience to critically evaluate their strengths and limitations.

TABLE 1. Demographic Profile of Respondents (n=39)

Category	Sub-category	Frequency	Percentage (%)
Gender	Male	21	54
	Female	18	46
Age	Below 25	20	51
	35-44	11	38
	45-54	5	14
	Above 55	3	7
Education Level	Associate degree	11	27
	Bachelor's Degree	16	41
	Master's Degree	9	24
	Doctorate	3	8

Experience using educational websites	Less than 6 Months	11	29
	6-12 Months	14	36
	1 Year and Above	14	35

After the interview data were transcribed, organized and coded, the Reflexive Thematic Analysis have identified four themes: (i) Navigation theme regarding difficulties in locating information or navigating a website; (ii) Design theme which encompasses critical aspects that directly influence user experience, accessibility, and overall usability; (iii) Layout theme which pertains to the strategic arrangement of visual and interactive elements on a websites; and (iv) Compatibility theme which relate to a website's ability to function correctly and consistently across various browsers and devices.

Navigation

Navigation was identified as one of the most critical aspects influencing user experience, with students consistently highlighting it as a source of frustration when engaging with educational websites. Poor navigation not only created difficulties in locating information but also discouraged learners from further interaction with the platforms. Analysis of the interview data produced four main codes under this theme: broken links, inconsistent navigation design, complex structures, and confusing hierarchies.

Broken Links

Broken or outdated links were the most frequently mentioned navigation issue. Students described how these disrupted access to learning materials and created a sense of unreliability. Such experiences led learners to perceive the websites as poorly maintained.

“Frustrated when many webpage links were relocated without updating.” (Respondent 07, 11, 24) *“Many link modified but invalid since not updated.”* (Respondent 21, 27) and *“Cannot links to external sites since its content is moved.”* (Respondent 25, 31)

Inconsistent Navigation Design

Respondents also highlighted inconsistencies in the layout, terminology, and behavior of navigation elements across different pages. These variations caused disorientation and confusion, forcing students to relearn how to move through the site each time.

“Some navigation menus are displayed horizontally on the homepage but switch to a vertical layout on internal pages, causing disorientation.” (Respondent 35)

“Confusing when using different terms for the same category, like “Products” on one page and “Shop” on another.” (Respondent 02, 26)

“Difficult to locate when menus move from the top to the side or change locations between pages.” (Respondent 05, 15, 18)

“Misinterpretation when there are icons without accompanying labels or using different icons for similar actions (Respondent 15)

“Get lost without breadcrumb navigation since unsure of current location within the site hierarchy.” (Respondent 04, 14, 34)

Complex Structures

Another significant issue concerned overloaded menus and complex hierarchies. Respondents felt overwhelmed when confronted with too many options, excessive nesting, or cluttered arrangements, which distracted from learning tasks.

“Too many options in the main navigation can overwhelm users. It's recommended to limit the number of primary menu items to between 5 and 7 to prevent cognitive overload.” (Respondent 19, 27)

“It is difficult to find desired content quickly since menus with multiple nested levels.” (Respondent 08, 31)

“Get distracted with overcrowded menus with too many links or options.” (Respondent 20, 25)

“Using varying terms for similar sections or actions can confuse users.” (Respondent 23, 33)

Confusing Hierarchies

Finally, respondents noted that unclear or inconsistent hierarchies hindered their ability to find information. Poor distinctions between different levels of menus and hidden elements further complicated navigation:

“Menus with many layers can make it difficult to navigate.” (Respondent 16, 35)

“Not clear visual distinctions between different levels of navigation, so struggle to understand the site's structure.” (Respondent 25)

“Too many options in the navigation can overwhelm users.” (Respondent 05, 20, 20)

“Menus that are not immediately visible or require extra steps to access can hinder users from finding desired content. Ensuring that navigation elements are easily accessible is crucial.” (Respondent 10, 12, 27).

Design

Design elements were another major area of concern that shaped students' experiences with educational websites. Visual aesthetics, layout, and accessibility were all highlighted as influential factors. Disorganized content, lack of responsive design, inconsistency, insufficient accessibility features, and non-intuitive structures were the main issues identified. These concerns demonstrate that design flaws are not simply aesthetic shortcomings but barriers that undermine usability, inclusivity, and sustained learner engagement.

Disorganized Content

Several respondents reported that cluttered layouts, poor spacing, and weak visual hierarchy made content difficult to follow and created visually overwhelming experiences. Disorganized presentation of information was perceived as discouraging and frustrating.

“Cluttered layout when websites have excessive elements—such as numerous images, videos, and text blocks” (Respondent 22, 35)

“Insufficient spacing between elements can cause content to appear cramped, leading to a visually overwhelming experience.” (Respondent 11, 25)

“Inconsistent visual hierarchy when headings, subheadings, and body text are not distinct or are used inconsistently. Struggle to understand the logical flow.” (Respondent 03, 28)

“Overwhelming amount of text used. Large blocks of uninterrupted text can deter readers.” (Respondent 27)

“Sometimes cannot easily find the content due to unclear menus or a lack of intuitive structure.” (Respondent 22, 29)

Lack of Responsive Design

Another major issue was poor responsiveness across devices. Students or respondents highlighted how websites that failed to adjust to mobile or tablet screens made learning more difficult and disrupted smooth engagement.

“Websites cannot adjust to mobile screens, so often require users to zoom in and scroll horizontally, making navigation cumbersome and frustrating.” (Respondent 13, 17, 19, 26)

Inconsistency

Design inconsistency was also a recurring complaint, with students noting irregular use of fonts, colors, buttons, or interaction patterns across different pages. Such inconsistencies diminished professionalism and trust while forcing users to adapt repeatedly.

“Feel disoriented when fonts, colors, buttons, or icon styles vary across pages.” (Respondent 10, 22)

“Inconsistent behaviors, such as different navigation menus or interaction patterns on various pages, can lead to user frustration.” (Respondent 09, 17, 29)

“Discrepancies in terminology, or information presentation across pages can erode trust. For example, using both “Sign Up” and “Register” for the same action can confuse users.” (Respondent 25).

Insufficient Accessibility Features

Accessibility issues were another critical theme, with students pointing out that many websites lacked essential design elements to support learners with disabilities. The absence of alt text, poor color contrast, vague link descriptions, and inaccessible interactive elements were commonly mentioned.

“Images without description can prevent screen readers from conveying their content to visually impaired users. For example, a banner image lacking alt text would be inaccessible to someone relying on a screen reader.” (Respondent 35)

“Insufficient contrast between text and background colors can make content unreadable for users with low vision or color blindness.” (Respondent 33)

“Inadequate Link Descriptions such as links with vague text like “click here” do not inform users of their destination or purpose, posing challenges for screen reader users.” (Respondent 22)

“Inaccessible interactive elements where elements like sliders, accordions, or modals that aren't properly coded can be unusable for keyboard and screen reader users.” (Respondent 28, 32)

Non-Intuitive Design

Finally, students emphasized that non-intuitive designs made websites difficult to use. Poorly placed navigation bars, inconsistent interactive elements, and lack of feedback during user actions all contributed to frustration. *“Unfamiliar navigation patterns. For instance, placing the navigation bar at the bottom of the screen instead of the top may confuse visitors accustomed to standard placements.”* (Respondent 14, 26, 31)

“Feel distracted while using varying styles for similar elements. If buttons, links, and icons look different across pages, users may not recognize them as interactive elements.” (Respondent 16, 18)

“Sometimes, I did not receive feedback while submitting a form, they should receive immediate feedback. Wonder if the form was successful submitted.” (Respondent 07, 23, 31)

Layout

Layout was another theme that significantly influenced how students interacted with educational websites. Respondents described how the arrangement of visual and interactive elements shaped their ability to focus,

navigate, and engage effectively with content. Two subthemes emerged from the data: cluttered layouts and disorganized hierarchies.

Cluttered Layout

Many students felt overwhelmed when webpages were overcrowded with text, images, or stylistic elements that lacked clear organization. Such designs created confusion, visual fatigue, and difficulty in concentrating on learning tasks.

“Overwhelming layouts when a page is filled with too much information or too many options can overwhelm users. Without clear visual hierarchy, users might not know where to focus their attention first.” (Respondent 2, 24, 34)

“Difficult to focus on content when a page is too crowded. Need to have more empty space between elements.” (Respondent 11, 17)

“Design elements not consistent because using too many fonts, different colors and styles create visual noise.” (Respondent 32)

Disorganized Hierarchy

Students also expressed frustration with layouts that failed to establish clear hierarchies between primary and secondary content. Overly complex menus, visual distractions, and intrusive advertisements made navigation less intuitive and disrupted learning.

“Confused with a cluttered navigation menu that has too many options. Simplifying and organizing navigation improves user experience.” (Respondent 14,24)

“Feel interrupted with too many ads or pop-ups.” (Respondent 09,18)

Respondents emphasized that poor layout design was more than an aesthetic problem. Cluttered arrangements and disorganized hierarchies imposed unnecessary cognitive demands, diverted attention away from course materials, and discouraged persistence in online learning.

Compatibility

The final theme concerned compatibility, which relates to a website’s ability to function consistently across different browsers and devices. Respondents emphasized that inconsistencies in how educational websites displayed on various platforms undermined usability, professionalism, and equitable access. Two codes were identified under this theme: cross-browser compatibility and device compatibility.

Cross-Browser Compatibility

Students reported that websites often failed to display consistently when accessed through different browsers. These discrepancies included alignment problems, margin issues, and variations in font rendering, all of which detracted from both the visual appeal and the functionality of the platforms. This is crucial because different browsers interpret HTML, CSS, and JavaScript in slightly different ways, which can result in inconsistencies in how a website appears or behaves.

“I found web margins, paddings, or flexbox do not align perfectly across browsers.” (Respondent 17, 27)

“When I changed to different browsers, fonts not consistent.” (Respondent 11, 23)

Such feedback highlights how even minor inconsistencies can disrupt the user experience and reduce confidence in the reliability of educational websites.

Device Compatibility

Device-related issues were also frequently cited, especially since many students relied heavily on mobile devices for accessing learning resources. Problems such as text overflow, slower performance, and inconsistent rendering were reported as barriers to smooth engagement.

“Text overflows when using Android.” (Respondent 02, 26, 31)

“While using a handphone, slower performance compared using desktop devices.” (Respondent 04, 18, 32)

Students stressed that mobile optimization was critical, since poor performance on handheld devices forced them to shift to desktop computers, thereby limiting flexibility and accessibility. Therefore, these findings demonstrate that compatibility issues remain a major obstacle for effective online learning. Inconsistent performance across browsers and devices not only frustrates learners but also undermines the broader goal of equitable and accessible web-based education.

After identifying four main themes and thirteen codes, this study constructed a thematic map to organize and visually represent the relationships within the data. The thematic map was used to sort the different codes into their respective themes and to clarify the connections between them. Fig 2 presents the thematic map of the difficulties encountered while using educational websites, illustrating how themes (depicted as circles) and codes (depicted as rectangles) were derived through the reflexive thematic analysis process.

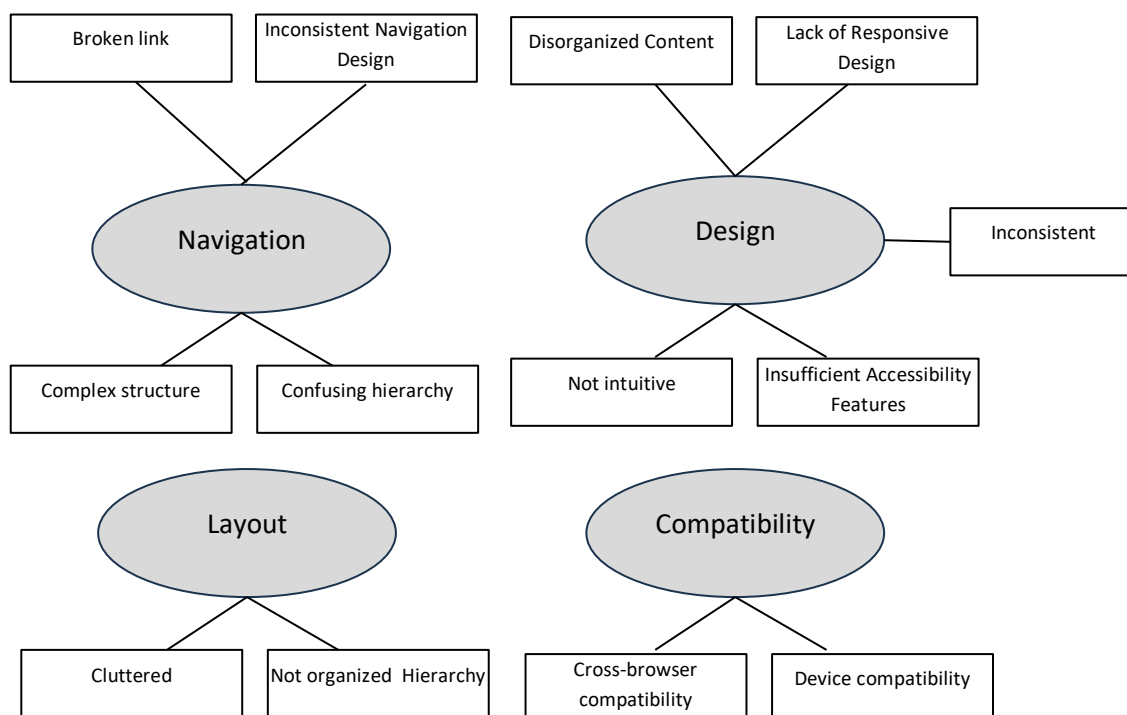


Fig 2. Thematic map of difficulties encountered while using educational websites

DISCUSSION

The present study explored the experiences of learners when interacting with educational websites, focusing on four key themes: navigation, design, layout, and compatibility. By employing reflexive thematic analysis (RTA) within the empathize phase of Design Thinking (DT), the study revealed not only the technical challenges that learners face but also the pedagogical and emotional meanings attached to those experiences. In doing so, the findings illustrate how seemingly functional design decisions shape trust, inclusivity, cognitive engagement, and equitable access. The following sections discuss each theme in light of existing scholarship, highlight methodological contributions, and draw implications for the development of more empathetic and learner-centered digital platforms.

Navigation and the Role of Predictability

Navigation emerged as the most pressing concern, as respondents consistently highlighted difficulties with broken links, inconsistent menu structures, and confusing hierarchies. These findings align with studies showing that clear navigation is a prerequisite for effective online learning environments, since it allows learners to focus on instructional content rather than negotiating the interface (Corrales-Estrada, Rodríguez-Hernández, Rodríguez-Montes, & Sánchez-Alonso, 2020). When effort is diverted toward overcoming navigational barriers, learners' motivation and satisfaction decline, leading to reduced persistence (Ibrahim et al., 2022). Importantly, participants in this study perceived navigation problems not only as functional obstacles but also as evidence of neglect, which eroded their trust in the platform. This highlights that usability failures carry symbolic meaning, shaping whether students view the platform as credible and professionally maintained.

These interpretations resonate with Hassenzahl's (2018) observation that user experience includes both functional and emotional dimensions. Respondents construed broken links and inconsistent menus as signs that their needs were not taken seriously, which undermined their confidence in the learning process. This concern is echoed in comparative contexts. In sub-Saharan Africa, weak navigation support in virtual learning systems has been linked to high dropout rates, as students disengage when platforms appear unreliable (Ssekakubo, Suleman, & Marsden, 2011). Similarly, in the Middle East, Albelbisi and Yusop (2019) found that unclear menu structures diminished learner autonomy, suggesting that navigation failures reduce the capacity for self-directed learning. Together, these findings show that navigation is not simply a technical matter but also a determinant of learners' sense of control and confidence across diverse educational settings.

Theoretically, the findings reinforce several pedagogical insights. Constructivist theory stresses the importance of providing learners with structured pathways that enable active exploration without overwhelming cognitive resources (Jonassen, 1999). Cognitive load theory adds that poorly organized navigation imposes extraneous load, diverting attention away from essential learning tasks (Sweller, Ayres, & Kalyuga, 2011). Furthermore, self-determination theory explains why inconsistent navigation undermines motivation: when learners cannot rely on predictable structures, their sense of competence and autonomy is weakened, leading to frustration and withdrawal (Ryan & Deci, 2020). By combining Design Thinking with reflexive thematic analysis, this study illustrates that navigation must be treated as both a pedagogical and ethical concern. Platforms that fail to provide predictable, reliable structures risk undermining trust, diminishing learner motivation, and ultimately reducing the effectiveness of web-based education.

Design and the Question of Inclusivity

Design was another decisive factor shaping learners' evaluations of educational websites. Respondents frequently highlighted content-heavy pages, inconsistent styling, and inadequate accessibility features as persistent sources of frustration. These findings echo prior work that emphasizes coherence, responsiveness, and accessibility as critical to usability (Bhandari, Zhang, & Chang, 2021). Yet the present study extends this scholarship by showing that learners interpreted poor design not only as inefficiency but also as structural exclusion, especially when accessibility features such as alternative text or sufficient color contrast were absent. For students with disabilities, these omissions reinforced feelings of marginalization, illustrating how design decisions carry social as well as functional consequences.

Responsiveness across devices was repeatedly identified as essential. Several learners noted that non-responsive websites forced them to zoom and scroll awkwardly on mobile devices, which diminished both engagement and motivation. Similar results have been reported globally. In East Asia, Huang, Jong, and Hwang (2020) found that non-responsive designs significantly reduced learner satisfaction, while in African contexts, Mpungose (2020) reported that students with limited access to desktops were disproportionately disadvantaged when platforms were not optimized for mobile use. These findings underscore that responsiveness is no longer optional but a prerequisite for equitable access. From a pedagogical perspective, self-determination theory helps explain these responses: when learners encounter accessible, responsive design, they experience greater autonomy and competence, which in turn supports motivation and persistence (Ryan & Deci, 2020).

Finally, inconsistency in visual elements such as fonts, colors, and icons was also described as disorienting. Prior research shows that inconsistency not only undermines trust but also increases extraneous cognitive load, as learners must continuously adjust to shifting patterns (Sweller, Ayres, & Kalyuga, 2011). Respondents in this study interpreted such inconsistencies as signs of neglect, questioning whether their needs were prioritized. Comparative studies reinforce this concern. In Europe, Fernández-Batanero et al. (2021) demonstrated that inconsistent visual presentation disproportionately affected learners with disabilities, while in North America, Henriksen, Richardson, and Mehta (2017) found that coherent design fostered greater inclusivity and learner confidence. Collectively, these findings affirm that effective design is not merely aesthetic but pedagogical, shaping whether learners feel supported, respected, and included. Educational websites must therefore integrate universal design principles from the outset to create coherent, accessible, and inclusive environments.

Layout and its Relationship with Cognitive Load

The layout of educational websites was another recurrent concern, with respondents describing cluttered pages and poorly organized hierarchies. These findings confirm that excessive visual density contributes to cognitive overload, which reduces concentration and engagement (Sweller, Ayres, & Kalyuga, 2011). While previous studies have highlighted the efficiency costs of disorganized structures (Rupere & Jakovljevic, 2021), this study shows that learners interpreted cluttered layouts as signals that their educational needs were undervalued. Layout, therefore, was not only a technical barrier but also a relational one, affecting how students felt about their learning environments.

Respondents reported that intrusive advertisements and inconsistent structuring scattered their attention and diminished learning satisfaction. These findings resonate with Hassenzahl (2018) work on user experience, which emphasizes that aesthetic coherence and clarity are integral to positive engagement. Cross-cultural evidence provides further support. In Central Asia, Dichev, Dicheva, and Ismailova (2022) demonstrated that streamlined layouts improved persistence by reducing distraction, while in Latin America, Guaman-Quintanilla et al. (2023) found that cluttered interfaces contributed to student withdrawal from online platforms. These parallels highlight the global importance of layout clarity as a determinant of learner retention.

Grounded in the principle of DT, the empathize phase is essential for recognizing that layout preferences are not uniform across learners but mediated by their expectations of professionalism and order. RTA further demonstrates that respondents' complaints were interpretive, often framed as judgments about whether the platform respected their time and cognitive resources. These insights align with recent studies on educational technology, which stress that well-structured, minimalist layouts reduce extraneous cognitive load and enhance learner persistence (Dichev, Dicheva & Ismailova, 2022). Theoretically, layout connects closely to both constructivist and cognitive load perspectives. Constructivist theory emphasizes that learners require environments that support exploration without overwhelming them with unnecessary complexity (Jonassen, 1999). Cognitive load theory reinforces this by showing that poorly organized layouts impose unnecessary burdens on working memory, thereby reducing efficiency and learning outcomes (Sweller et al., 2011).

Therefore, in the standpoint of self-determination theory, cluttered and chaotic structures also undermine the sense of competence, discouraging learners from sustained engagement (Ryan & Deci, 2020). By demonstrating how layout directly shapes both cognitive and motivational dimensions of learning, this study underscores that minimalism and coherence are not aesthetic luxuries but pedagogical imperatives. Developers should therefore treat effective layout design as both a strategic and ethical responsibility in digital education.

Compatibility and Equity of Access

Compatibility emerged as the final theme, reflecting the importance of ensuring cross-platform functionality for equitable digital participation. Learners described frustration when websites performed poorly on mobile devices or across different browsers, with issues such as overlapping content or slow loading times. These findings are consistent with studies showing that poor compatibility undermines accessibility and widens the digital divide (Yu, Tsoi, Rhim, Chiu & Lung, 2022; Zheng, Han, Huang, Wu & Wu, 2025).

In this study, respondents interpreted compatibility problems as more than technical glitches. For many, poor mobile functionality was experienced as exclusion, particularly in contexts where smartphones are the primary access point for education. This perspective reinforces the ethical dimension of compatibility: failure to ensure cross-device reliability effectively restricts participation for students who cannot afford alternative technologies. Recent scholarship supports this interpretation, emphasizing that mobile-first design is central to promoting equity in digital education (Al-Emran, Malik, & Al-Kabi, 2020).

Through the lens of DT, compatibility issues highlight the need for iterative prototyping and rigorous testing across devices. RTA adds depth by demonstrating how learners interpret compatibility failures as disregard for their needs, reinforcing the importance of reflexivity in understanding digital exclusion. Addressing compatibility, therefore, is not simply about technical optimization but about promoting fairness and ensuring that all learners have reliable opportunities to participate in online education.

Methodological and Theoretical Reflections

This study contributes methodologically by integrating DT with RTA in the evaluation of educational websites. DT provided a structured framework for empathizing with users, while RTA offered a lens for interpreting the deeper meanings learners attached to their experiences. This combination demonstrates that qualitative inquiry can do more than describe usability problems; it can uncover how learners construct meaning around design, navigation, and accessibility. In doing so, the study extends previous calls for more human-centered approaches to educational technology (Guaman-Quintanilla et al., 2023) by showing how interpretive analysis enriches user-centered design.

Theoretically, the findings emphasize that usability is inseparable from pedagogy and equity. Each theme functioned not only as a technical aspect but also as a pedagogical signal that shaped trust, motivation, and inclusion. Navigation influenced predictability and credibility, design affected inclusivity and accessibility, layout determined cognitive load, and compatibility mediated equitable access. These interpretations are well aligned with constructivism, which stresses the role of structured yet flexible environments in supporting knowledge construction (Jonassen, 1999). They also resonate with self-determination theory, which explains how autonomy, competence, and relatedness are affected by design decisions (Ryan & Deci, 2020), and with cognitive load theory, which clarifies how poor structuring or functionality imposes extraneous burdens on learners (Sweller et al., 2011).

By situating these findings within the empathize phase of DT and the interpretive stance of RTA, the study contributes to ongoing debates about how to meaningfully integrate user experience into educational technology design. Importantly, the study demonstrates that learners' voices are not ancillary but essential to creating platforms that are pedagogically sound and socially inclusive. This methodological and theoretical contribution positions the research as part of a broader movement that bridges human-centered design with educational theory and practice, reinforcing the call for iterative, empathetic, and equity-driven approaches to digital learning development (Panke, 2019; Guaman-Quintanilla et al., 2023).

CONCLUSION

This study investigated learners' experiences with educational websites by applying reflexive thematic analysis within the empathize phase of Design Thinking. Four interrelated themes were identified: navigation, design, layout, and compatibility. This collectively shape how students perceive and engage with online learning platforms. Navigation difficulties undermined predictability and trust, poor design compromised inclusivity, cluttered layouts increased cognitive load, and compatibility issues restricted equitable access. These findings demonstrate that technical shortcomings in educational websites are not merely functional problems but also carry broader pedagogical, emotional, and ethical implications.

Methodologically, the integration of Design Thinking and reflexive thematic analysis provided a robust approach to uncovering these issues. While DT structured the process of engaging with learners' perspectives, RTA ensured that their narratives were interpreted reflexively, acknowledging how students attached meaning to frustrations and expectations. This methodological synergy advances research in educational technology by

showing that qualitative inquiry can move beyond description to produce interpretive and actionable insights that inform design and policy.

In practical terms, the findings underscore the need for clear and actionable strategies. First, institutions and developers should embed universal design for learning (UDL) standards into educational websites to ensure inclusivity for learners with diverse abilities. Second, iterative usability testing cycles should be institutionalized, involving learners at each stage of prototyping and refinement, so that platforms remain aligned with evolving needs. Third, adopting mobile-first design policies is essential, given that smartphones serve as the primary access point for many learners worldwide. These measures would not only enhance usability but also strengthen equity and learner confidence across contexts.

Finally, this study positions itself as a bridge between human-centered design and educational policy. By showing that learners interpret design failures as signals of care, reliability, and fairness, the study reframes educational website development as both a technological and a pedagogical responsibility. Policymakers, institutional leaders, and developers must therefore recognize that investments in empathy-driven design are central to building trustworthy, inclusive, and effective digital learning environments. In doing so, educational technology can move beyond technical efficiency to embody the values of equity, motivation, and learner empowerment that are fundamental to meaningful education in the digital age.

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