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Mapping Global Information Design Research in Digital Interfaces: A Bibliometric Perspective on SDGs 4 and 9

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ABSTRACT

Objective: *To map the global development of research on information design in digital interfaces through the perspective of user interface (UI), user experience (UX), and usability studies. This study also examines its relevance to Sustainable Development Goal 4 (Quality Education) and Sustainable Development Goal 9 (Industry, Innovation and Infrastructure).* ***Method:*** *Bibliometric analysis was conducted using Scopus-indexed journal articles published between 2000 and 2026. Data were retrieved using the query TITLE-ABS-KEY ("UI" AND "UX" AND ("user experience" OR usability)). Following PRISMA-guided screening, 51 articles were selected for analysis. Performance analysis and science mapping using VOSviewer were applied to identify publication trends, source contributions, and thematic structures.* ***Results:*** *The findings indicate rapid growth of UI/UX research during the 2020s, with major contributions from computer science, engineering, and interdisciplinary fields. Thematic mapping shows that user experience, usability, and user interface represent the central research clusters, while design thinking and usability testing emerge as important supporting themes.* ***Novelty:*** *The study highlights information design as a strategic component in sustainable digital development. Effective interface structures support SDG 4 by improving accessibility and comprehension in digital learning environments, while supporting SDG 9 through the development of inclusive and human-centered digital infrastructure. The findings provide directions for future research on accessibility, usability evaluation, and sustainable interface design.*

INTRODUCTION

The 2030 Agenda for Sustainable Development identifies digital technology and accessible information infrastructure as cross-cutting enablers of multiple Sustainable Development Goals (SDGs). In particular, SDG 4 (Quality Education) calls for inclusive and equitable digital learning and SDG 9 (Industry, Innovation and Infrastructure) highlights the need for inclusive and resilient digital infrastructure. At the heart of each of these goals lies a common challenge: users must be able to comprehend, navigate, and act upon digital information effectively. This is precisely the domain of information design in digital interfaces. Digital interfaces have become the dominant channel for accessing information, completing transactions, and making decisions across education, healthcare, public services, and industry (Arief et al., 2023). As interfaces grow more content dense and interaction rich, the way information is structured, labeled, visualized, and sequenced increasingly determines whether users can understand what is presented and act with confidence (Joshi & Deole, 2025; Kemangi et al., 2025; Nik Ahmad et al., 2025; Nirapai & Leelasantitham, 2024; Nuñez et al., 2024; Pietroni et al., 2018; Rinawiyanti et al., 2025; Ro et al., 2024; S et al., 2025; Samsudin et al., 2025). This makes information design a core concern in UI/UX research, not only as an aesthetic layer but as a cognitive and behavioral scaffold that shapes comprehension, efficiency, trust, and error rates in real usage contexts (Alao et al., 2022; Alghamdi et al., 2022; Alomari et al., 2020; AlSalem & Alshamari, 2023).

Recent UI/UX scholarship reflects this shift toward complex, multimodal, and AI mediated interaction. Studies addressing digital twins, for example, highlight that adoption barriers are often usability barriers, where interface representations and conversational interaction patterns become decisive for operational acceptance (Luo et al., 2026). Work on multimodal interfaces combining augmented reality and internet of things enabled environments similarly emphasizes design principles that govern how information is coordinated across modalities and devices, linking interface structure to experience quality (J. C. Kim et al., 2026). In education, the UI/UX continuum in e-learning platforms indicates that interface and experience are interdependent rather than separable constructs, suggesting that information organization and interaction flow should be examined together (Masveta & Manyangara, 2025). Evidence from eye tracking based usability evaluation of higher education websites also shows that navigation cues and information placement directly influence attention allocation and perceived usability (Albaghli et al., 2025).

Parallel to these developments, domain specific contexts increasingly demand rigorous information design decisions. In digital health, user centered redesign of an mHealth application for burn recovery demonstrates that the usability of information presentation and task flow can shape engagement with recovery content (Stewart et al., 2025). Clinical and therapeutic contexts provide even clearer signals: a randomized controlled trial on a self guided digital intervention reports that user interface characteristics relate to treatment engagement, implying that interface level information design has measurable consequences beyond satisfaction metrics (Hentati et al., 2021). In specialized information services and decision environments, cognitive load optimization studies argue that interface information structure should be treated as a design variable that can be tuned to reduce mental effort and improve performance (Balasm et al., 2025). In geospatial applications, research on user experience in graphical user interfaces of web maps illustrates how representational choices and interaction controls shape task success and perceived usability in information intensive environments (Cybulski & Horbiński, 2020).

At the same time, generative AI is accelerating the diversification of interface forms and the ambiguity of information outputs. Research discussing responsibilities and challenges in the UX design of text to image AI models indicates that interface heuristics must now address transparency, controllability, and user interpretation of generated content (Liu & Martens, 2024). A taxonomy and trend analysis focused on UI/UX for generative AI further suggests that emerging interface paradigms require new organizing concepts, since the information being interacted with is probabilistic and often non deterministic (Drungilas et al., 2024; Fuada et al., 2024; B. Gao et al., 2024; J. Gao et al., 2024; Gibbs et al., 2015; Gu & Sung, 2023; J. Kim et al., 2015; T.-S. Kim et al., 2024).

The relationship between information design in digital interfaces and sustainable development has become increasingly important within the framework of the Sustainable Development Goals (SDGs). SDG 4 (Quality Education) emphasizes inclusive and equitable learning opportunities, where effective digital interfaces support accessibility, comprehension, engagement, and learning effectiveness in online education environments. Previous studies indicate that UI/UX quality influences the usability and effectiveness of digital learning platforms by shaping user interaction, information accessibility, and learning experiences (Alomari et al., 2020; Masveta & Manyangara, 2025). Meanwhile, SDG 9 (Industry, Innovation and Infrastructure)

highlights the importance of inclusive and resilient digital infrastructure, where human-centered interface design influences technology adoption and the ability of diverse users to benefit from digital services (Kim et al., 2026; Luo et al., 2026). Therefore, information design should be viewed not only as a usability component but also as an essential factor supporting sustainable digital transformation through accessible, understandable, and user-centered technologies (Ro et al., 2024; Donthu et al., 2021).

A bibliometric approach addresses this need by offering a structured and reproducible large scale mapping of the literature. Instead of depending on selective narrative sampling, bibliometric techniques quantify publication growth trends, identify leading journal venues, and uncover conceptual relationships through keyword co occurrence networks and citation based structures. Drawing on the compiled dataset provided as the study corpus, this study investigates the global development of research linking information design with user experience and usability in digital interfaces within the 2000–2026 publication period and the context of Scopus indexed journal articles. The analysis is framed around the following research questions.

1. How has the scientific production on information design in digital interfaces evolved between 2000 and 2026 in terms of publication dynamics and source level concentration within the dataset?
2. What thematic clusters and emerging topics characterize the intersection of information design with user experience and usability, as reflected by recurring terms and conceptual groupings in the dataset?

By answering these questions, the study aims to clarify the knowledge structure of the field, support more consistent positioning of future UI/UX studies that explicitly foreground information design, and highlight underexplored intersections. In addition, this study contributes to the growing body of SDG-oriented research by demonstrating that advances in information design and UI/UX evaluation carry tangible implications for SDG 4 (Quality Education) and SDG 9 (Industry, Innovation and Infrastructure)—goals that depend critically on the quality of digital interfaces through which people access education, health services, and innovation-driven infrastructure.

LITERATURE REVIEW

Information design in digital interfaces

Information design in digital interfaces concerns how content is structured, prioritized, labeled, and visually encoded so users can interpret meaning efficiently and accurately. In practice, this includes hierarchy, grouping, typography, iconography, navigation cues, and feedback that guide attention and reduce ambiguity. Empirical work in interface heavy domains shows that representational choices matter because users rely on spatial placement and signaling to allocate attention and form judgments of clarity and quality, as evidenced in web usability studies using eye tracking and standardized UX metrics (Alomari et al., 2020; AlSalem & Alshamari, 2023; Alti & Lakehal, 2025; Čejka et al., 2023). In information intensive environments such as web mapping, interface controls and visual representation shape task performance and perceived ease of use, indicating that information design is inseparable from interaction demands and context (Lopata et al., 2024; Malik & Frimadani, 2022; Mohr & Winkler, 2025; Tanasyah et al., 2025; Tombeng & Mambu, 2024).

User experience and usability as evaluative perspective

The UI/UX literature commonly frames usability as task oriented effectiveness, efficiency, and satisfaction, while user experience broadens the scope to emotions, expectations, and meaning during interaction. Contemporary studies increasingly treat these dimensions as interdependent, especially in digital learning where UI and UX are discussed as a continuum rather than separate layers (Vacanti et al., 2024; Wang, 2026). Interface characteristics can be associated with behavioral outcomes such as engagement, which elevates interface level design decisions from convenience to clinical relevance (Tanasyah et al., 2025; Whaiduzzaman et al., 2023; Yang & Wang, 2025). User centered design highlights the need for information flow clarity and frictionless task sequences to support adherence and sustained use (S et al., 2025; Sebald et al., 2024). Taken together, usability and user experience operate as complementary lenses: usability detects friction in completing tasks, while user experience explains why users stay, trust, or disengage (Ro et al., 2024).

Cognitive load and attention oriented interface structuring

Cognitive perspectives emphasize that interface information structure must match human perceptual and memory constraints. When interfaces present dense content, weak hierarchy and unclear grouping can increase mental effort and degrade comprehension. Work on cognitive load optimization in interface design explicitly treats the arrangement of information as a controllable design variable, supporting the argument that information design can be optimized to improve performance and reduce overload (Balasm et al., 2025). Complementary evidence from eye tracking based usability evaluation reinforces that attention is not distributed uniformly; instead, users follow cues embedded in layout and labeling, and small design changes can shift scanning behavior and perceived quality (Alao et al., 2022; Albaghli et al., 2025). This strand of literature suggests that stronger operationalization is needed: information design should be measured not only through subjective ratings, but also through behavioral indicators such as attention allocation, error patterns, and completion paths.

Emerging interface paradigms: Multimodal, conversational, and generative AI

Interface paradigms are expanding beyond traditional graphical interaction. In multimodal contexts, design principles must coordinate information across channels such as AR overlays, mobile screens, and ambient displays, increasing the importance of consistency and cross modality coherence (J. C. Kim et al., 2026). In conversational or natural language interfaces supporting complex systems like digital twins, usability gaps can hinder adoption, implying that interaction design and information presentation strongly condition organizational acceptance (Luo et al., 2026). The rise of generative AI introduces new information design challenges because outputs can be probabilistic, variable, and difficult to verify. Taxonomies and discussions of UX for generative AI argue that interfaces must support transparency, controllability, and user interpretation, making information framing and feedback critical to trust calibration (T.-S. Kim et al., 2024; Liu & Martens, 2024).

Research gaps

Although the literature increasingly addresses usability and user experience across diverse digital contexts, several gaps remain evident for research that explicitly centers information design in digital interfaces. A conceptual gap persists because many

studies evaluate interface quality through usability or UX outcomes without positioning information design as the core analytical construct, which fragments insights from visual communication and HCI into loosely connected findings. A measurement gap also remains, as operational indicators of information design quality are not consistently standardized; behavioral measures such as attention patterns from eye-tracking and downstream engagement outcomes appear in selected studies but are rarely integrated into unified models linking hierarchy, labeling, comprehension, error rates, and decision confidence. A synthesis gap is visible across domains, since evidence is distributed among education, healthcare, mapping, and intelligent systems, yet comparative cross-domain consolidation of design principles and their effects remains limited, reducing generalizability. Finally, an emerging paradigm gap is increasingly important as multimodal, conversational, and generative AI interfaces introduce uncertainty, variable outputs, and cross-channel coherence demands; current frameworks are still evolving to translate transparency, controllability, trust calibration, and cognitive load considerations into concrete, reusable information design patterns for next-generation interfaces.

RESEARCH METHOD

This study applies bibliometric analysis to examine the global evolution of research on information design in digital interfaces through the lens of UI/UX studies. Bibliometric techniques are used to organize and evaluate scientific production by tracing publication growth, identifying influential sources, and revealing intellectual and thematic structures through citation- and network-based indicators (Yang & Wang, 2025). By quantifying relationships among documents, sources, and keywords, bibliometrics supports systematic synthesis of large-scale literature and reduces the subjectivity that can occur in purely narrative reviews (Donthu et al., 2021). Aligned with the study title, the approach is intended to clarify how UI/UX scholarship develops over time and how it connects to information design concerns within digital interface contexts.

The dataset was retrieved from the Scopus database due to its multidisciplinary coverage, standardized metadata, and frequent adoption in bibliometric mapping, which improves comparability with prior studies (Passas, 2024). While other databases may provide complementary coverage, relying on Scopus supports consistent indexing for longitudinal trend analysis and citation-based indicators, although it may underrepresent non-English or region-specific outlets.

A keyword-based search was applied to the TITLE-ABS-KEY fields to capture UI/UX studies explicitly using core evaluative constructs. The query used was TITLE-ABS-KEY ("UI") AND TITLE-ABS-KEY ("UX") AND TITLE-ABS-KEY ("user experience" OR usability). The search was restricted to English journal articles published between 2000 and 2026. Records were exported in a standardized bibliographic format and treated as the master corpus for analysis. Data screening followed PRISMA-guided procedures. After database-level filtering (document type, source type, and language), remaining records were screened by title and abstract to retain studies relevant to digital interfaces and UI/UX evaluation. Records were excluded when they focused primarily on technology adoption, system optimization, or domain workflows without substantive attention to interface design, information presentation, usability, or user experience constructs.

The analysis combined performance indicators and science mapping. Performance analysis summarized annual publication output and leading sources by number of publications. Citation-based influence was assessed using total citations, citations per article, and source-level h-index and g-index computed within the dataset. Science mapping used keyword co-occurrence networks to identify thematic clusters and emerging topics, with network visualization and clustering generated in VOSviewer. Citation metrics were taken from Scopus metadata to ensure consistent calculation.

RESULTS AND DISCUSSION

Result

PRISMA screening and final dataset

The study corpus was built from the *Scopus* database using the query TITLE-ABS-KEY ("UI") AND TITLE-ABS-KEY ("UX") AND TITLE-ABS-KEY ("user experience" OR usability) for the 2000–2026 period, restricted to English journal articles. Bibliometric workflows typically separate database retrieval from conceptual eligibility to preserve transparency and reproducibility when refining broad searches into analytically coherent datasets (Donthu et al., 2021). The identification stage produced 864 records. After applying database filters for document type, source type, and language, 149 records remained and 715 were excluded. The eligibility stage then screened titles and abstracts to retain studies that meaningfully addressed interface design, usability evaluation, or user experience as a central analytical construct in digital interface contexts. This step removed 98 records, leaving 51 articles for the final bibliometric analysis. The complete selection sequence is reported in Figure 1 and reflects PRISMA-guided reporting practice for systematic screening and documentation of exclusions.

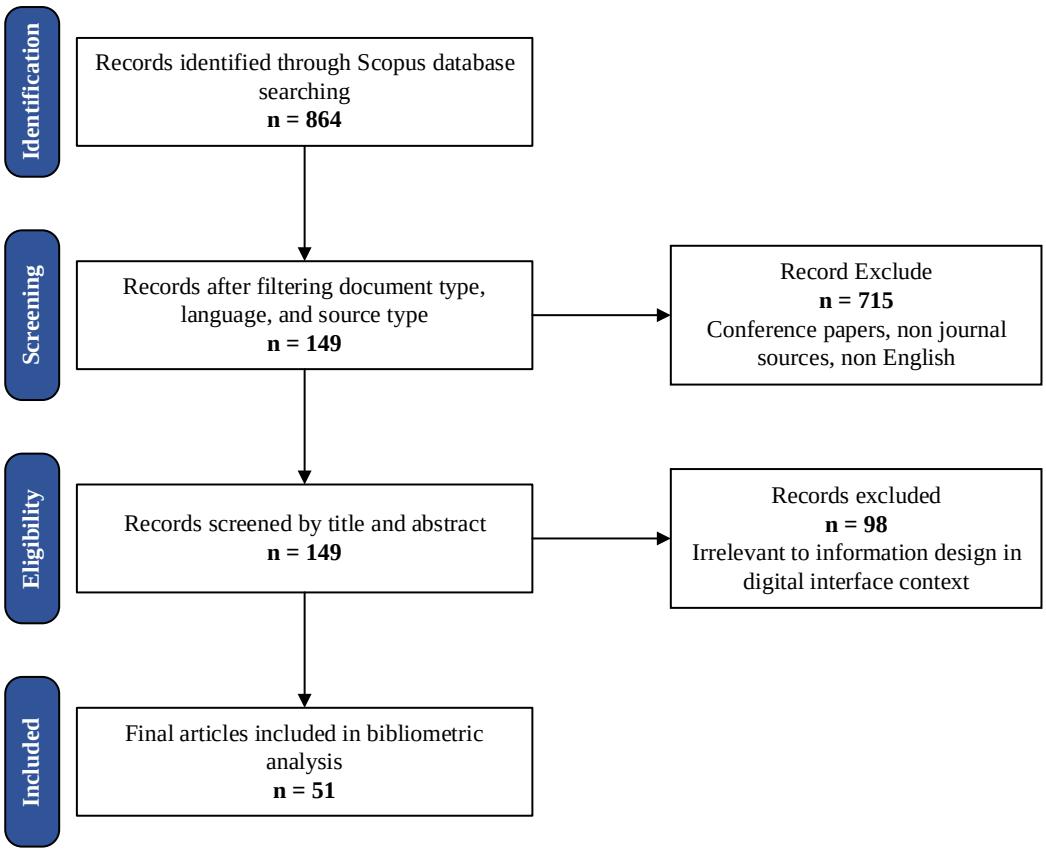

Figure 1. PRISMA flow diagram of dataset identification, screening, eligibility, and inclusion

Publication dynamics over time

The annual trajectory indicates a long early period of minimal production followed by rapid expansion in the 2020s. The time series shows near-zero output across much of 2000–2010, reflecting limited indexed journal coverage for the queried intersection during that period. A gradual rise becomes visible after 2011, moving toward a stable but still modest level in the mid-2010s. Growth strengthens after 2018 and becomes sustained from 2019 onward, indicating consolidation of UI/UX research that explicitly frames outcomes through user experience or usability concepts. The strongest acceleration occurs in 2023–2025, with peak production in 2024 (164 documents), followed by 2025 (153) and 2023 (136). The observed decline in 2026 (17) should be interpreted as a partial-year artifact at the time of data export, rather than evidence of a structural downturn.

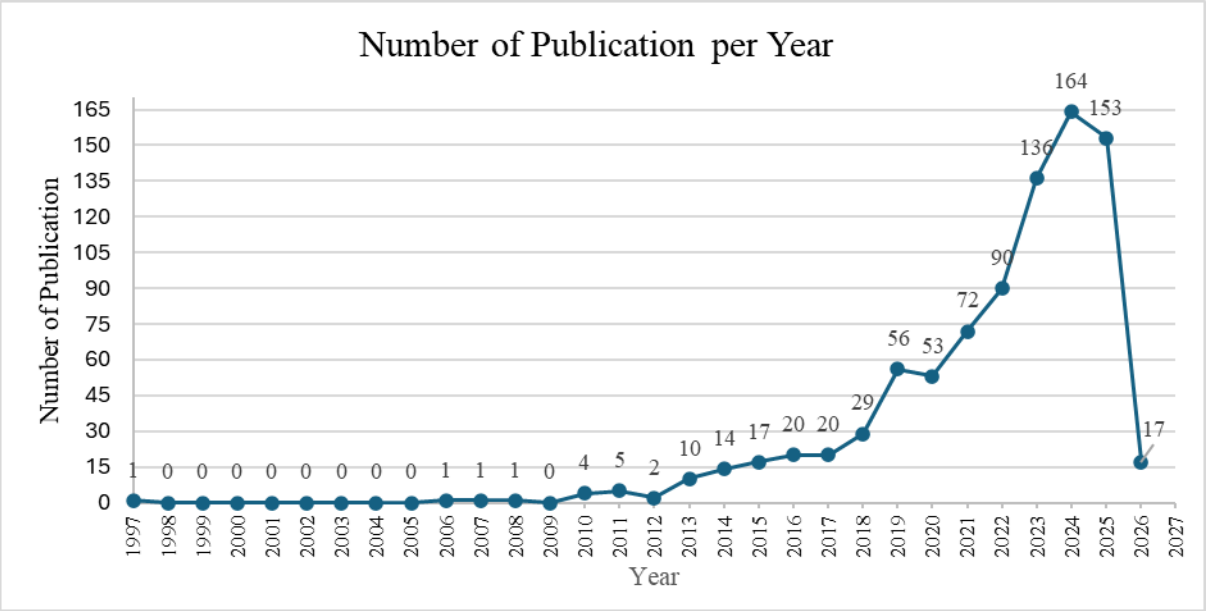

Figure 2. Annual publication trend for UI/UX and usability-related journal articles (2000–2026)

This temporal evolution is visualized in Figure 2. The pattern is consistent with a field that intensifies as digital services become more pervasive and as usability and user experience increasingly serve as decision-relevant quality measures in interface-driven systems, a dynamic commonly highlighted in bibliometric studies that track maturation and growth phases of interdisciplinary research areas (Yang & Wang, 2025).

Subject areas and source-level concentration

The subject-area profile indicates that research captured by the dataset is anchored primarily in technical disciplines while also spanning applied and human-centered domains. Computer Science is the most prominent subject area, followed by Engineering and Mathematics, reflecting strong contributions from computational design, interface engineering, and quantitative evaluation methods. Notably, Social Sciences and Decision Sciences also contribute substantial volume, indicating that behavioral measurement, decision support, and organizational interpretation are active components of the UI/UX literature captured by this query. Additional representation in Business, Management and Accounting and Medicine suggests application-driven research in digital services and health-related interfaces. The distribution is

summarized in Figure 3. Because Scopus commonly assigns multiple subject categories to a single article, these totals reflect the interdisciplinary indexing structure rather than mutually exclusive group counts, which is typical for UI/UX research spanning both technical and socio-behavioral perspectives.

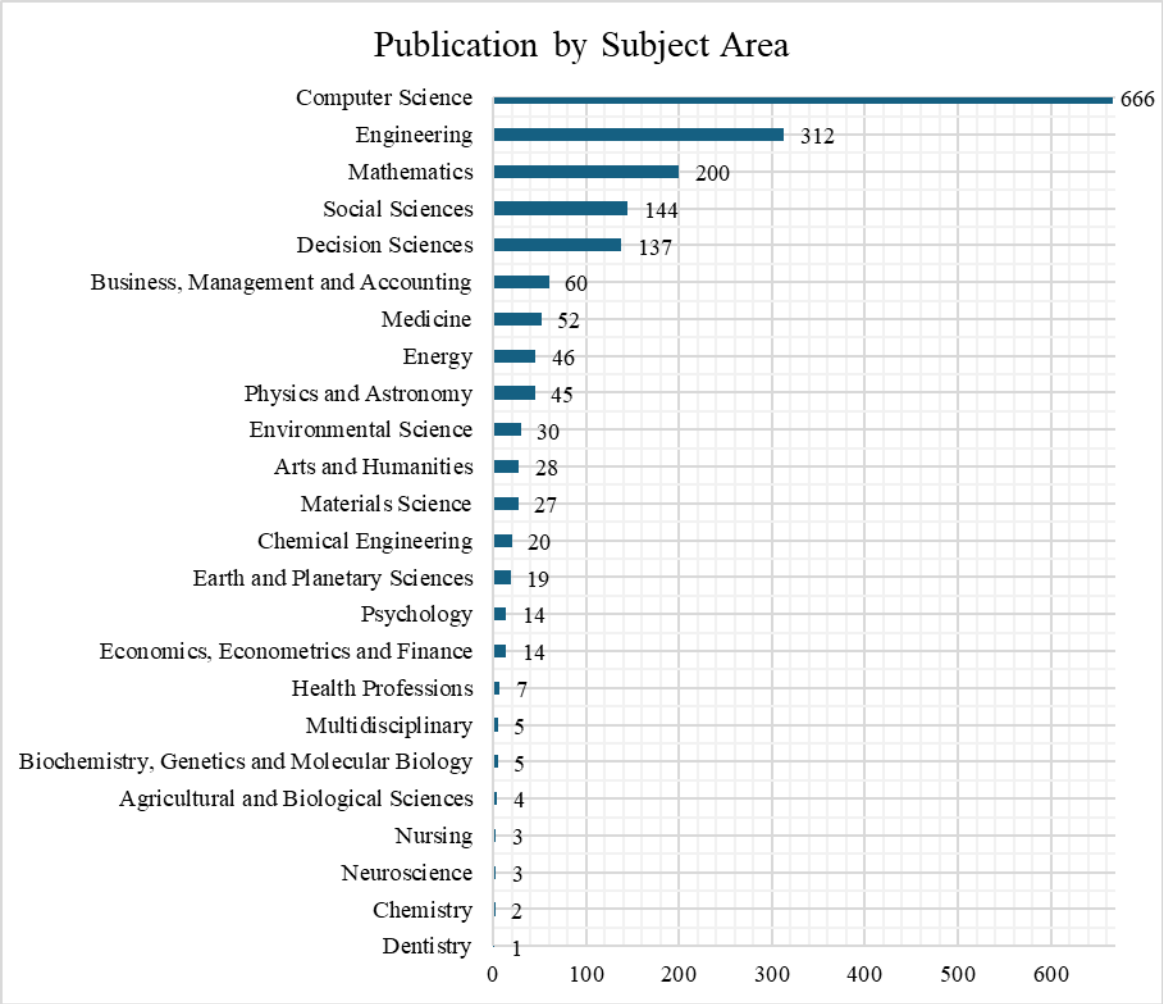

Figure 3. Publications by subject area

Source-level concentration was assessed using productivity and citation-based indicators within the final dataset. The top sources and their metrics are reported in Table 1 using NP (number of publications), NC (number of citations), AC (citations per article), as well as within-dataset h-index and g-index. In productivity terms, Applied Sciences (Switzerland) leads the source list (NP = 5), followed by IEEE Access (NP = 4). Several other outlets contribute repeated publications (NP = 2), showing that the corpus is distributed across multiple journals rather than dominated by a single venue. Impact, however, is more concentrated than productivity. Some sources with low NP show high NC and high AC because of highly cited single contributions, indicating that a small number of papers can substantially shape perceived influence within the dataset. In contrast, sources that combine repeated publication with sustained citation accumulation exhibit stronger within-dataset h and g values, indicating more consistent impact across multiple articles. This dual pattern supports a distinction between productivity concentration, which is moderate, and influence concentration, which is stronger and driven by a subset of highly visible articles, an effect frequently observed in bibliometric performance profiles.

Table 1. Top sources and source-level indicators

No	Sumber	NP	NC	AC	h	g
1	Applied Sciences (Switzerland)	5	29	5.80	4	5
2	IEEE Access	4	54	13.50	2	4
3	International Journal on Informatics Visualization	2	24	12.00	1	2
4	International Journal of Human Computer Studies	2	5	2.50	1	2
5	Future Internet	2	3	1.50	1	1
6	International Journal of Engineering, Science and Information Technology	2	3	1.50	1	1
7	Jurnal RESTI	2	3	1.50	1	1
8	Heliyon	1	88	88.00	1	1
9	ISPRS International Journal of Geo-Information	1	33	33.00	1	1
10	Internet Interventions	1	30	30.00	1	1

Note(s): NP = number of publications, NC = number of citations, AC = citations per article, h = h-index, g = g-index
Source(s): Created by authors

Thematic structure and emerging topics from VOSviewer

To address thematic clusters and emerging topics, keyword co-occurrence analysis was performed using VOSviewer, a widely used tool for science mapping and network visualization. The keyword network (Figure 4) shows that the conceptual center of the dataset is organized around three strongly connected hubs: user experience, usability, and user interface. These terms act as bridging constructs that connect evaluative outcomes to design- and method-oriented keywords. The map also indicates recurring methodological and practice-linked terms such as usability testing, design thinking, and web design, suggesting that the dataset links interface outcomes not only to conceptual framing but also to applied evaluation and design-process approaches.

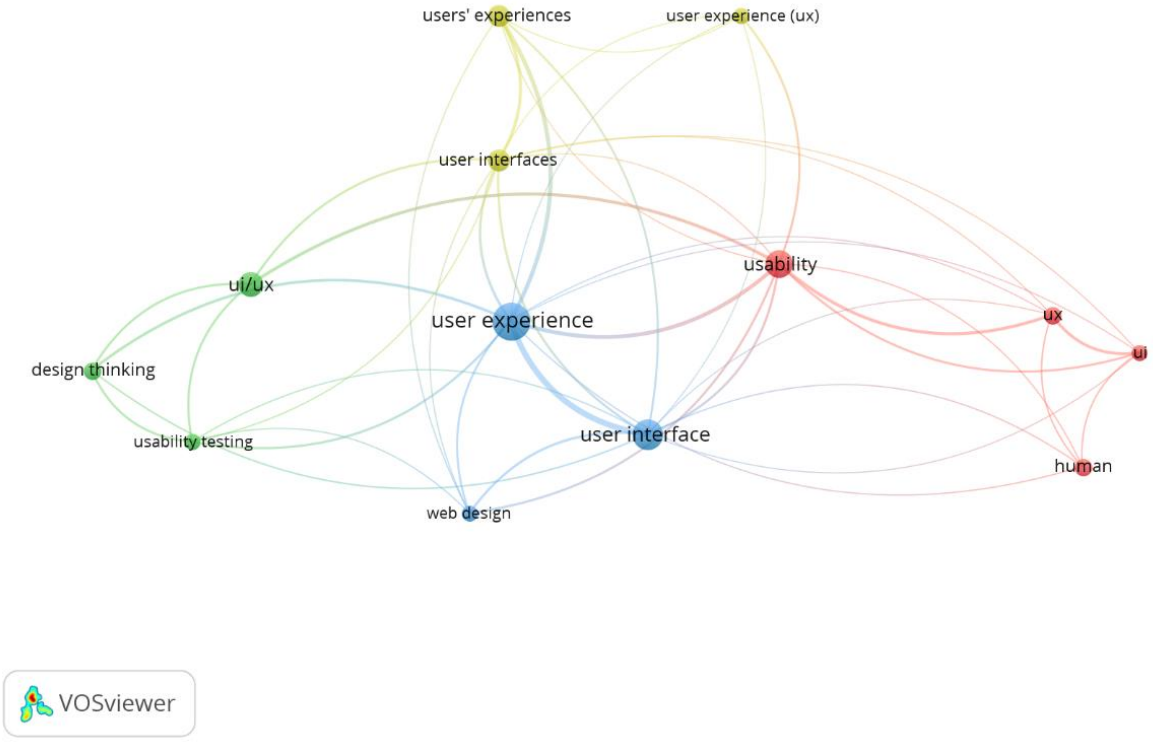

Figure 4. Keyword co-occurrence network (VOSviewer)

The density visualization (Figure 5) reinforces this structure by showing the most concentrated areas around user experience, usability, and user interface, confirming that these are the most frequently used descriptors and the most central connectors in the co-occurrence space. Secondary density zones appear around ui/ux and usability testing, indicating that integrated UI/UX framing and evaluation routines represent recurring extensions of the core. The overlay visualization (Figure 6), using average publication year, provides an indication of topical recency: terms associated with design processes and evaluation practices display relatively more recent coloring, implying that the field has increasingly emphasized structured design approaches and testing-based assessment alongside broader UI/UX framing.

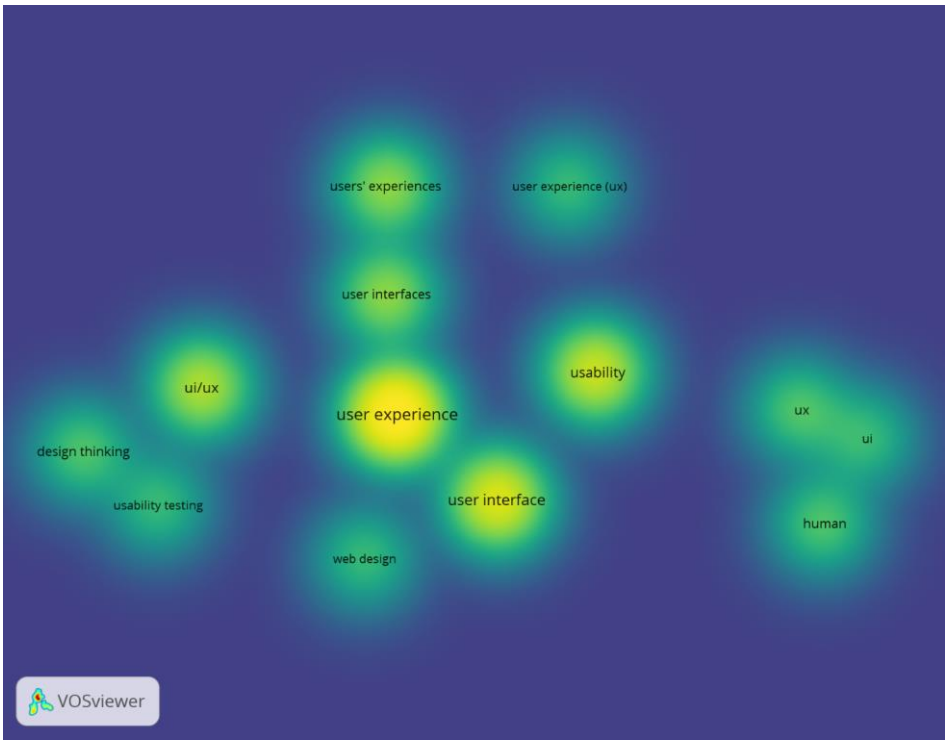

Figure 5. Keyword density visualization (VOSviewer)

The maps reveal keyword fragmentation, with near-duplicates such as user interface and user interfaces, or ui/ux versus separate ui and ux nodes. This variation reflects differences in author keyword choices and indexing practices and suggests that thesaurus-based normalization could further sharpen thematic boundaries. Importantly, the thematic outputs indicate that information-structuring concerns are frequently expressed implicitly through interface and evaluation terminology rather than consistently labeled as explicit "information design" keywords, which has direct implications for how future studies might standardize construct naming to better capture information hierarchy, labeling, navigation cues, and meaning-making in digital interfaces (Donthu et al., 2021; Sharma et al., 2022).

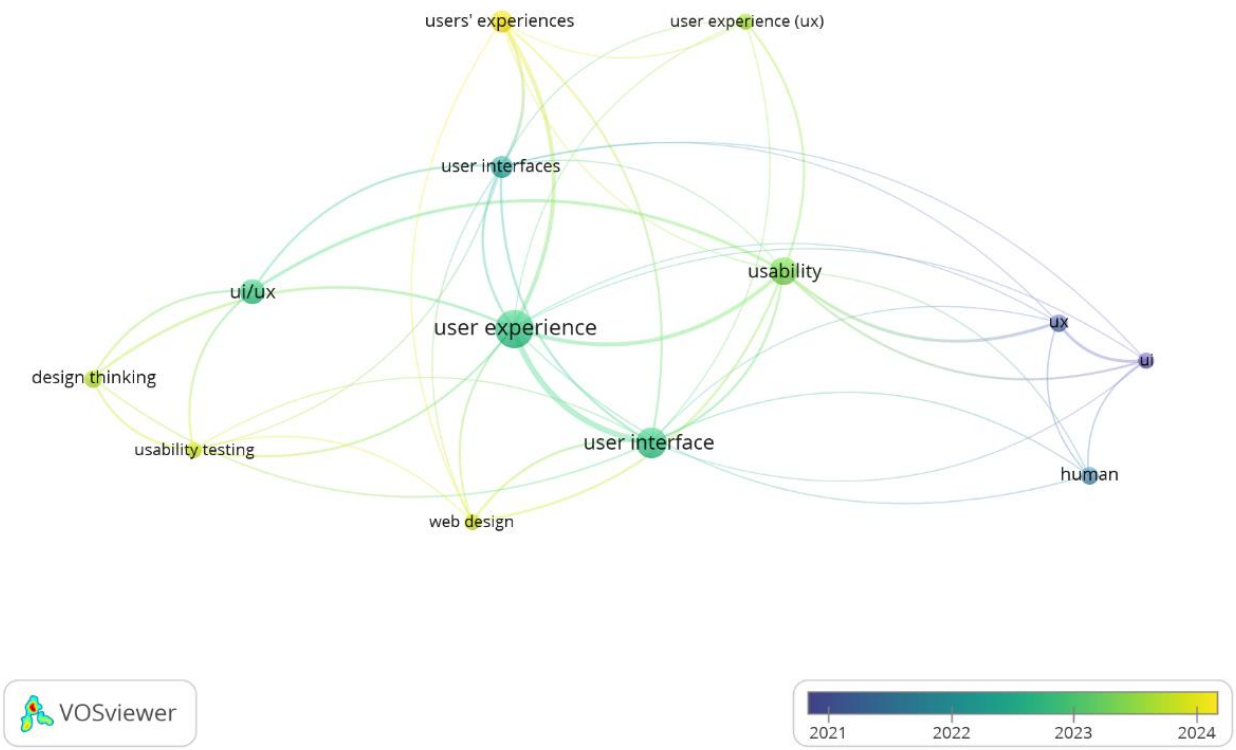

Figure 6. Keyword overlay visualization by average publication year (VOSviewer)

Discussion

The findings portray a rapidly expanding body of UI/UX scholarship in which interface quality is increasingly evaluated through user experience and usability constructs, while information design often remains embedded as an implicit driver rather than an explicitly labeled concept. The sharp growth observed after 2019 and the peak in 2023–2025 indicate that interface evaluation has become a mainstream research priority, likely reflecting the proliferation of digital services and the increased reliance on interface-mediated decision making. Within this growth, the subject-area profile suggests that the field is technically grounded yet interdisciplinary, combining computational and engineering approaches with behavioral and decision-oriented perspectives. This positioning is consistent with the premise that information design in digital interfaces is both a technical problem of representation and interaction and a human problem of comprehension, attention, and trust.

Source-level concentration patterns further support the view that knowledge development is distributed across multiple outlets, but influence is shaped by a smaller set of highly visible contributions. This dual structure has practical implications for researchers: productive journals provide stable publication pathways for incremental advances in UI/UX evaluation, while highly cited papers can define reference points for methods, metrics, and conceptual framing. For the study focus, this indicates that progress in information design is likely being advanced through two channels, sustained applied research in recurring venues and occasional high-impact works that consolidate or redirect evaluation practices.

The VOSviewer keyword maps clarify the conceptual structure. The dominance of user experience, usability, and user interface as central nodes suggests that the literature is primarily organized around outcome-based evaluation rather than around design variables. In other words, research tends to ask whether an interface is usable or delivers a good experience, while design mechanisms, such as hierarchy, labeling,

navigation cues, and visual encoding, are frequently discussed under broader interface terms rather than as standardized information design constructs. This helps explain why explicit "information design" terminology is not prominent in the mapped keywords even though information presentation is central to UI/UX outcomes. The overlay results indicate growing attention to structured processes and evaluation routines, such as design thinking and usability testing, suggesting a methodological shift toward more systematic and test-driven interface refinement.

These patterns imply that future research could strengthen explanatory power by making information design more measurable and more explicitly theorized. Linking information-structuring choices to observable outcomes, such as attention allocation, task efficiency, error reduction, and engagement, would allow UI/UX evaluation to move beyond descriptive assessments toward causal design guidance. Practically, the results support interface designers in prioritizing evaluative frameworks that capture both performance and experience, while emphasizing that information architecture decisions should be treated as primary determinants of usability and perceived quality.

Positioning these findings within the framework of the Sustainable Development Goals illuminates broader implications. The accelerating growth of UI/UX research since 2019, particularly in education and health domains, parallels increased global investment in digital public services as instruments for achieving the SDGs. Research on e-learning interfaces directly informs SDG 4 (Quality Education) by establishing evidence-based design principles that can make digital learning more inclusive and effective for learners across socioeconomic and geographic contexts. At the infrastructure level, the interdisciplinary coverage of the field spanning computer science, engineering, and social sciences reflects the complexity of SDG 9 (Industry, Innovation and Infrastructure), where inclusive and accessible digital infrastructure depends not only on technical deployment but on interfaces that allow diverse populations to benefit meaningfully from digital services. Explicitly framing UI/UX and information design research within the SDG agenda can help direct future funding, policy, and research collaboration toward the highest-impact intersections.

Several limitations should be acknowledged. The dataset is derived solely from Scopus and restricted to English journal articles, which may underrepresent region-specific outlets or non-English research. The 2026 counts are likely incomplete due to partial-year indexing. Keyword-based mapping is sensitive to inconsistent author keyword choices, as seen in duplicated terms (e.g., ui/ux, ui, ux), indicating that thesaurus-based normalization could yield sharper thematic clustering. Finally, because the search query emphasizes UI/UX and usability terms, relevant work that discusses information design without using these keywords may not be captured, suggesting that complementary queries could be considered in future extensions of the analysis.

CONCLUSION

Fundamental findings: This study mapped the global evolution of research linking UI/UX evaluation with the broader concern of information design in digital interfaces through a bibliometric synthesis of Scopus-indexed journal articles from 2000–2026. **Implications**: The results show a strong acceleration of publications in the 2020s, an interdisciplinary subject-area footprint anchored in computer science and engineering while extending into behavioral and applied domains, and a source-level structure where productivity is moderately distributed but influence is shaped by a smaller set of highly visible contributions. Keyword-based science mapping further indicates that the

field is conceptually organized around evaluative hubs such as user experience, usability, and user interface, with design-process and testing terms forming important extensions. Collectively, these findings contribute an evidence-based overview of the field's growth patterns, publication venues, and thematic structure, supporting clearer positioning of future UI/UX studies that aim to foreground information structuring as a driver of measurable outcomes. Practically, the findings reinforce that interface evaluation should treat information design decisions such as hierarchy, labeling, navigation cues, visual encoding, and feedback as primary determinants of usability and perceived experience, especially in content-dense or high-stakes digital systems. Future research can strengthen cumulative knowledge by standardizing vocabulary and operational measures for information design so that design mechanisms can be linked more directly to behavioral indicators such as attention allocation, cognitive load, error rates, completion efficiency, and sustained engagement. Extending science mapping with refined keyword normalization and complementary queries that explicitly target information design terminology may also yield sharper thematic boundaries and reduce construct fragmentation. **Limitations**: emerging interface paradigms, including multimodal, conversational, and generative AI systems, warrant focused investigation to translate transparency, controllability, and trust calibration challenges into reusable information design patterns that remain evaluable through robust UI/UX metrics. From an SDG perspective, this study underscores that research on information design in digital interfaces is not merely a technical discipline but a direct contributor to sustainable development. Usable and well-designed digital education interfaces support SDG 4 (Quality Education) by reducing access barriers and improving learning outcomes for diverse populations, including those in low-resource settings. At the infrastructure level, the continuous innovation of inclusive and accessible digital interfaces supports SDG 9 (Industry, Innovation and Infrastructure) by ensuring that digital systems are built to serve broad populations rather than narrow technical elites. **Future research** : Future bibliometric and empirical research in UI/UX should make these SDG connections explicit, enabling policymakers and developers to leverage interface design research as an evidence base for sustainable digital transformation.

AUTHOR CONTRIBUTIONS

Hasabuddin Al-Habib contributed to conceptualization, investigation, methodology, data collection, formal analysis, and writing the original draft. **Dimas Avian Maulana** contributed to conceptualization, supervision, validation, interpretation of findings, and critical review and editing of the manuscript. **Shofian Fiangga** contributed to methodology development, supervision, validation, and manuscript review and editing. All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

CONFLICT OF INTEREST STATEMENT

The authors declere that there are no financial, prodessional, or personal conflicts of interest that could influence the research process, analysis, interpretation of finding, or publication of this manuscript.

STATEMENT ON THE USE OF AI OR DIGITAL TOOLS IN WRITING

The authors declare that no artificial intelligence (AI) tools or other digital writing assistants were used in the preparation, analysis, or writing of this manuscript. All stages of the research process, including data analysis, interpretation, and manuscript writing, were conducted solely by the authors. The authors take full responsibility for the originality, accuracy, and integrity of the content presented in this article.

REFERENCES

Alao, O. D., Priscilla, E. A., Amanze, R. C., Kuyoro, S. O., & Adebayo, A. O. (2022). User-Centered/user experience Uc/Ux design thinking approach for designing a university information management system. *Ingenierie Des Systemes d'Information*, *27*(4), 577–590. https://doi.org/10.18280/isi.270407

Albaghli, R., Beidas, A., & Attar, N. (2025). Eyes on higher education: Evaluating web usability in Kuwaiti private universities using eye-tracking and SUPR-Q metrics. *Journal of Engineering Research (Kuwait)*, *13*(4), 56–65. https://doi.org/10.1016/j.jer.2024.12.001

Alghamdi, A. M., Riasat, H., Iqbal, M. W., Ashraf, M. U., Alshahrani, A., & Alshamrani, A. (2022). Intelligence and usability empowerment of smartphone adaptive features. *Applied Sciences (Switzerland)*, *12*(23), 1-18. https://doi.org/10.3390/app122312245

Alomari, H. W., Ramasamy, V., Kiper, J. D., & Potvin, G. (2020). A User Interface (UI) and User eXperience (UX) evaluation framework for cyberlearning environments in computer science and software engineering education. *Heliyon*, *6*(5), 23-31. https://doi.org/10.1016/j.heliyon.2020.e03917

AlSalem, T. S., & Alshamari, M. A. (2023). Assessing interactive web-based systems using behavioral measurement techniques. *Future Internet*, *15*(11), 1-21. https://doi.org/10.3390/fi15110365

Alti, A., & Lakehal, A. (2025). AI-MDD-UX: Revolutionizing e-commerce user experience with generative AI and model-driven development. *Future Internet*, *17*(4), 43-60. https://doi.org/10.3390/fi17040180

Arief, I., Farhandika, M., Indrapriyatna, A. S., Yulianto, A. A., & Meuthia, Y. (2023). Enhancing user interface and experience of the Bukalapak application: A sentiment analysis approach for improved usability and user satisfaction in Indonesia's e-commerce sector. *Jurnal RESTI*, *7*(5), 192–204. https://doi.org/10.29207/resti.v7i5.5184

Balasm, Z., Rajan, S. S., Karpagham, C., Nuritdinovich, M. A., Yusupov, S., & Maurya, S. (2025). Cognitive load optimization in user interface design for info services. *Indian Journal of Information Sources and Services*, *15*(2), 69–74. https://doi.org/10.51983/ijiss-2025.IJISS.15.2.10

Čejka, M., Masner, J., Jarolímek, J., Benda, P., Prokop, M., Šimek, P., & Šimek, P. (2023). UX and machine learning – preprocessing of audiovisual data using computer vision to recognize UI elements. *Agris On-Line Papers in Economics and Informatics*, *15*(3), 35–44. https://doi.org/10.7160/aol.2023.150304

Cybulski, P., & Horbiński, T. (2020). User experience in using graphical user interfaces of web maps. *ISPRS International Journal of Geo-Information*, *9*(7), 178-185 https://doi.org/10.3390/ijgi9070412

Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business*

Research, *133*, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070

Drungilas, D., Ramašauskas, I., & Kurmis, M. (2024). Emotion recognition in usability testing: A framework for improving web application UI design. *Applied Sciences (Switzerland)*, *14*(11), 157-168. https://doi.org/10.3390/app14114773

Fuada, S., Setyowati, E., Restyasari, N., Heong, Y. M., & Hasugian, L. P. (2024). UI/UX Redesign of SH-UPI app using design thinking framework. *International Journal on Informatics Visualization*, *8*(3), 55–63. https://doi.org/10.62527/joiv.8.3.2094

Gao, B., Xie, H., Wang, Y., & Xie, Z. (2024). Principles of environmental and social psychology in UI/UX design for metaverse social games: A case study of horizon worlds. *Environment and Social Psychology*, *9*(1), 25-34. https://doi.org/10.54517/esp.v9i1.1871

Gao, J., Jia, W., & Yin, J. (2024). Exploring smartphone user interface experience-sharing behavior: Design perception and motivation-driven mechanisms through the SOR model. *Sustainability (Switzerland)*, *16*(15), 159-163. https://doi.org/10.3390/su16156670

Gibbs, I., Dascalu, S., & Harris, F. C. (2015). A separation-based UI architecture with a DSL for role specialization. *Journal of Systems and Software*, *101*, 69–85. https://doi.org/10.1016/j.jss.2014.11.039

Gu, B., & Sung, Y. (2023). UX framework including imbalanced UX dataset reduction method for analyzing interaction trends of agent systems. *Sensors*, *23*(3), 1-16, https://doi.org/10.3390/s23031651

Hentati, A., Forsell, E., Ljótsson, B., Kaldo, V., Lindefors, N., & Kraepelien, M. (2021). The effect of user interface on treatment engagement in a self-guided digital problem-solving intervention: A randomized controlled trial. *Internet Interventions*, *26*. https://doi.org/10.1016/j.invent.2021.100448

Joshi, M., & Deole, P. (2025). Enhancing UI/UX design for children's educational gaming platforms: An integrated multicriteria decision making framework. *Journal of Scientific and Industrial Research*, *84*(2), 196–206. https://doi.org/10.56042/jsir.v84i02.9675

Kemangi, A. K. A. J. A., Najaf, A. R. E., & Permatasari, R. (2025). UI/UX design of ruang kajian application using the design thinking method. *International Journal of Engineering, Science and Information Technology*, *5*(1), 145–156. https://doi.org/10.52088/ijesty.v5i1.665

Kim, J. C., Mitra, K., Saguna, S., Åhlund, C., & Laine, T. H. (2026). Designwise: Design principles for multimodal interfaces with augmented reality in internet of things-enabled smart regions. *International Journal of Human Computer Studies*, *2(7)*, 23-31. https://doi.org/10.1016/j.ijhcs.2025.103663

Kim, J., Ryu, J. H., & Han, T. M. (2015). Multimodal interface based on novel HMI UI/UX for in-vehicle infotainment system. *ETRI Journal*, *37*(4), 793–803. https://doi.org/10.4218/etrij.15.0114.0076

Kim, T.-S., John Ignacio, M., Yu, S., Jin, H., & Kim, Y.-G. (2024). UI/UX for generative AI: Taxonomy, trend, and challenge. *IEEE Access*, *12*, 891–911. https://doi.org/10.1109/ACCESS.2024.3502628

Liu, Y., & Martens, J.-B. (2024). Conversation-based hybrid UI for the repertory grid technique: A lab experiment into automation of qualitative surveys. *International Journal of Human Computer Studies*, *184*. https://doi.org/10.1016/j.ijhcs.2024.103227

Lopata, A., Gudonienė, D., Butleris, R., Veitaite, I., Rudžionis, V., & Gudas, S. (2024). A multidimensional financial data model for user interface with process mining

systems. *Electronics (Switzerland)*, *13*(21). https://doi.org/10.3390/electronics13214304

Luo, P., Wen, X., Jiang, Y., Pärn, E., & Brilakis, I. (2026). ChatTwin: Bridging the usability gap to digital twin adoption in infrastructure operations and maintenance with a Natural Language Interface. *Automation in Construction*, *181*. https://doi.org/10.1016/j.autcon.2025.106655

Malik, R. A., & Frimadani, M. R. (2022). UI/UX analysis and design development of less-on digital startup prototype by using lean UX. *Jurnal RESTI*, *6*(6), 958–965. https://doi.org/10.29207/resti.v6i6.4454

Masveta, D., & Manyangara, M. E. (2025). The UX-UI continuum: Exploring the interplay between user experience and user interface in e-learning platforms. *Cogent Education*, *12*(1). https://doi.org/10.1080/2331186X.2025.2536531

Mohr, T., & Winkler, C. (2025). User-centered challenges and strategic opportunities in automotive UX: A mixed-methods analysis of user-generated content. *Applied Sciences (Switzerland)*, *15*(24). https://doi.org/10.3390/app152412967

Nik Ahmad, N. A. N., Lokman, A. M., Abd Majid, E. S. A., & Suhaimi, A. I. H. (2025). The Kansei engineering method for determining the emotional design concept of the metaverse library interface: Technical university students perspectives. *Journal of Technical Education and Training*, *17*(2), 53–67. https://doi.org/10.30880/jtet.2025.17.02.004

Nirapai, A., & Leelasantitham, A. (2024). A new adoption model for quality of experience assessed by radiologists using AI medical imaging technology. *Journal of Open Innovation: Technology, Market, and Complexity*, *10*(3). https://doi.org/10.1016/j.joitmc.2024.100369

Nuñez, I., Cano, E. E., Cruz, E., Concepcion-Patino, D., Navarro, N., & Rovetto, C. (2024). Improving usability in mobile apps for residential energy management: A hybrid approach using fuzzy logic. *Applied Sciences (Switzerland)*, *14*(5). https://doi.org/10.3390/app14051751

Passas, I. (2024). Bibliometric analysis: The main steps. In *Encyclopedia* (Vol. 4, Issue 2, pp. 1014–1025). https://doi.org/10.3390/encyclopedia4020065

Pietroni, E., Pagano, A., & Fanini, B. (2018). UX designer and software developer at the mirror: Assessing sensory immersion and emotional involvement in virtual museums. *Studies in Digital Heritage*, *2*(1), 13–41. https://doi.org/10.14434/sdh.v2i1.24634

Rinawiyanti, E. D., Surjani, R. M., Hartono, M., Permatasari, E. P., & Chrisma, A. C. V. (2025). Mixed method usability testing for user experience and user interface of AI-Based supermarket applications. *Journal of Applied Data Sciences*, *6*(1), 483–495. https://doi.org/10.47738/jads.v6i1.453

Ro, E. R., An, K. O., Kim, A. J., Jang, S. U., Kim, E. J., & Eun, S. D. (2024). Usability study to promote co-creation among people with disabilities, developers, and makers with a focus on the assistive technology open platform in Korea. *IEEE Access*, *12*, 16–27. https://doi.org/10.1109/ACCESS.2023.3345036

S, S., Shrivastava, A., & Karmakar, S. (2025). Identifying interface design factors impacting user experience in digital learning platforms- A pilot study. *Social Sciences and Humanities Open*, 1(1). https://doi.org/10.1016/j.ssaho.2025.101662

Samsudin, M. V. P., Muslih, M., Arianti, N. D., Zainuri Saringat, M. Z., & Ellahuuta, A. (2025). Designing UI/UX for a mobile TPA application using design thinking method †. *Engineering Proceedings*, *107*(1). https://doi.org/10.3390/engproc2025107112

Sebald, C., Treiber, M., Eryilmaz, E., & Bernhardt, H. (2024). Usability testing of novel IoT-infused digital services on farm equipment reveals farmer's requirements towards future human–machine interface design guidelines. *AgriEngineering*, *6*(2), 1660–1673. https://doi.org/10.3390/agriengineering6020095

Stewart, B. T., Menge, K., Kurien, T. V, Orton, C., Estrada, R., Carrougher, G., Thompson, C., Hsieh, G., & Pham, T. N. (2025). Optimizing the user-experience (UX) and −interface (UI) of a mHealth application to aid recovery from burn injury (BurnCORE) through a user-centered design approach. *Burns Open*, *11*. https://doi.org/10.1016/j.burnso.2025.100409

Tanasyah, J., Pan, E., Morimoto, Y., & Sun, N. (2025). UI/UX design for mental health: Surveying college students to shape the future of wearable devices. *Issues in Information Systems*, *26*(2), 387–401. https://doi.org/10.48009/2_iis_130

Tombeng, M., & Mambu, J. Y. (2024). Designing the UI/UX for a shoe repair application using the design thinking method. *International Journal of Engineering, Science and Information Technology*, *4*(3), 106–117. https://doi.org/10.52088/ijesty.v4i3.538

Vacanti, A., Burlando, F., Paz Ortiz, A. I., & Menichinelli, M. (2024). Challenges and responsibilities in the UX design of text-to-image AI models: A discussion through a comparative heuristics evaluation. *Temes de Disseny*, *2024*(40), 156–175. https://doi.org/10.46467/TdD40.2024.156-175

Wang, C. (2026). Mobile AIGC image generation interactive training model for design education. *International Journal of Interactive Mobile Technologies*, *20*(2), 63–77. https://doi.org/10.3991/ijim.v20i02.60137

Whaiduzzaman, M., Sakib, A., Khan, N. J., Chaki, S., Shahrier, L., Ghosh, S., Rahman, M. S., Mahi, M. J. N., Barros, A., Fidge, C., Thompson-Whiteside, S., & Jan, T. (2023). Concept to reality: An integrated approach to testing software user interfaces. *Applied Sciences (Switzerland)*, *13*(21). https://doi.org/10.3390/app132111997

Yang, Z., & Wang, P. (2025). Current status and research trend of English Language assessment: A bibliometric analysis. *Language Testing in Asia*, *15*(1), 1-11. https://doi.org/10.1186/s40468-024-00317-w

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