Usability and User Experience Evaluation for Website Design of Higher Education Institutions (2015-2024): Evolutionary Trends and Clusters of Research

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Abstract

Websites have become essential platforms in the Higher Education Institution (HEI) system, enabling flexible access to education and academic information. Therefore, HEI websites' Usability and User Experience (UX) have gained significant scholarly attention. This study aims to identify research trends evaluating usability and UX in HEI website design (2015- 2024) through bibliometric analysis of publications (n = 124) from Scopus, IEEE Xplore, and ScienceDirect. The scope of the analysis includes publication frequency, keyword networks, citation performance, journals, authors, institutional affiliations, and research clusters. The results showed that usability and UX evaluations are studied across multiple disciplines and are concentrated in five clusters: (1) E-learning website interfaces during the COVID-19 pandemic, (2) Library information systems, (3) Students' continuance intention on learning websites, (4) Marketing communication websites, and (5) Learning management systems. These results underscore that usability and UX evaluation on HEI website platforms leans towards student-centric studies encompassing some sites and service units. This paper also emphasizes the importance of user-centred evaluation throughout HEI websites' design, development, and post-implementation phases. Given that HEIs must provide optimal services to stakeholders with diverse backgrounds, needs, and information access capabilities.

Keywords: Usability, User Experience, Higher Education Institution Websites, Bibliometric Analysis, Thematic Analysis

1. Introduction

Higher education is vital in enhancing individuals' quality of life by providing knowledge and skills. In practice, higher education institutions prioritize the needs of stakeholders (Skolnik, 1998), which are addressed through a range of services (Pan et al., 2022). Consequently, stakeholder satisfaction with these services is a key indicator in assessing the performance of Higher Education Institutions (HEI) (Pan et al., 2022).

One commonly used platform for delivering services is the website—a collection of electronic pages containing various types of content, such as text, images, audio, and video, accessible through browser applications (Shipley & Bowker, 2014). Within HEI, websites serve a wide range of service functions, including virtual collaboration platforms for campus communities (Yesmin & Atikuzzaman, 2023), health information services (Macakoğlu & Peker, 2023), academic administration (Pratiwi et al., 2023), learning management (Apriana Ramadhan et al., 2022), library services (Nuriman & Mayesti, 2020),

counseling (Wiyono et al., 2020), and career support (Venable, 2010). To effectively meet users' needs through websites, it is essential to consider aspects of Usability and User Experience (UX) (Salas et al., 2019). Usability ensures that users can successfully navigate and interact with a website (Chang et al., 2019), directly influencing their overall experience. Consequently, ongoing evaluation is necessary as a benchmark for improving service quality in higher education (Apriana Ramadhan et al., 2022).

The study of usability and UX evaluation in higher education websites has been one of the focal points of research topics. Şengel's study (2013) evaluated Sakarya University's website using usability testing methods. Research by Manzoor et al. (2019) examined the usability aspects of college websites using a wider geographical area coverage on a sample of three countries' websites including the United States, Canada, and Europe. Mombarg (2021) analysed two university course websites in the Netherlands targeting international students. Usability research was also conducted on learning management system (Qurrata A'yun et al., 2023; Priyadi et al., 2021; Wijanarko et al., 2024), and a usability evaluation study on the library service website (Nuriman &

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Mayesti, 2020). Valerian et al. (2018) provided website design recommendations based on the results of a usability study to redesign the staff website at Universitas Indonesia. Nandhi et al. (2022) measured UX on an admission website for prospective students. A study by Galko et al. (2018) examined the level of usability and UX on the chatbot feature of the admission website. Qasrawi et al. (2021) explored the performance and user experience of several university websites in Palestine. The number of studies on this topic highlights the growing global concern regarding usability and UX in university websites, as higher education institutions exist in every country. The number of studies creates opportunities for further reviews of the research conducted.

A literature review by Yerlikaya & Durdu (2017) only investigated the usability aspect of university websites from 2006 to 2016, based on 53 papers, and concluded that most usability evaluations were conducted using survey-based data. The study found that common issues on university websites include navigation problems, suboptimal interface design, and inadequate information quality. The literature review conducted by Salas et al. (2019) focused on the characteristics required by learning support platforms to produce a usable product. Li et al. (2022) reviewed bibliometric-based literature on user experience in terms of methodology from 1999-2019. A subsequent bibliometric study by Zuo et al. (2023) on UX research trends in 2011–2021 identified that many UX studies are related to virtual reality, augmented reality, human-computer interaction, m-Health, and molecular biology. The literature review by Gunesekera et al. (2019) focused on usability in e-learning, concluding that usability issues in e-learning systems affect student satisfaction, potentially hindering the continuation of the learning process. However, there remains a lack of bibliometric-based literature reviews addressing usability and UX evaluations on HEI websites. A bibliometric-based literature review is crucial given the quantity of publications concerning usability and UX on higher education institutions' (HEI) websites. This approach effectively describes the current research landscape, identifies current research hotspots, and predicts future agendas in both UX (Zuo et al., 2023; Pateman & Pramudia, 2024) and usability (Yerlikaya & Durdu, 2017), ensuring relevance, validity, and alignment with the research topic's context (Li et al., 2022).

Based on these rationales, this study examines the literature on usability and UX evaluation of HEI websites through bibliometric analysis. Therefore, the study aims to:

1) Identify the evolutionary trend of research publications related to usability and UX on HEI websites (2015-2024).

2) Identify keyword networks, citations, authorship information (author identity and affiliation), journal contributions, and research clusters regarding usability and UX on HEI websites.

2. Theory
2.1. Usability Evaluation

Referring to the definition of usability from the International Standardisation Organisation (ISO) 9241-11 in Soares et al. (2022), usability is defined as the extent to which a system, product, or service can be used by a particular user to achieve a specific goal, influenced by effectiveness, efficiency, and satisfaction in a specific context of use. This has implications for user experience (Chang et al., 2019). The easier a product or service is to use, the more positive the user experience will be. Conversely, if the product or service has poor usability, it can lead to a negative experience of the entire interaction process (Soares et al., 2022). Therefore, usability is an important aspect to consider, including service systems that have a large audience, such as higher education institutions.

Based on the development stages of an information service system, usability evaluation is divided into two types: formative usability and summative usability (Tullis & Albert, 2013). Formative usability is conducted before and during the development process of a product, system, or service design, while summative usability is carried out after the design has been finalized. The evaluation aims to identify problems, make recommendations, implement them, and evaluate the results iteratively. According to Tullis & Albert (2013), one widely used method to measure usability is task analysis and survey-based usability testing.

2.2. User Experience Evaluation

In contrast to usability, user experience arises from the aftereffects of a user's use of a system or service. User experience (UX) refers to an individual's perception when interacting with a particular product or service (Tan et al., 2021). It encompasses all aspects of the interaction between the user and the company, including its services and products (Norman & Nielsen, 1998). User experience arises from interaction with interactive digital products (Soares et al., 2022), which is influenced by usability, product usefulness, and user emotions (Hartson & Pyla, 2012). When the user experience evaluation results are negative, it indicates problems in the service system, including usability.

A commonly used method to evaluate the UX of a system or service is questionnaires, such as single-item questionnaires, After Scenario Questionnaire (ASQ), Usability Metric for User Experience (UMUX), System Usability Scale (SUS), Purdue Usability Testing Questionnaire, User Experience

Questionnaire (UEQ), and Visual Aesthetics of Website Inventory (Schrepp, 2025). Respondents generally complete these evaluations after using the product or service.

2.3. Higher Education Institution Website, Structure, and Functions

A website is a collection of electronic pages containing documents (text, images, audio, and video) that can be accessed through browser applications (Shipley & Bowker, 2014). In higher education, a website platform is designed to convey information about educational objectives to its stakeholders (Saichaie & Morphew, 2014), both internal and external (Manzoor et al., 2019). Internal audiences include students, faculty, campus staff, and parents, while external audiences encompass prospective students, institution partners, industry representatives, and the general public. Audience and structure of the HEI website are shown in Figure 1. The structure of the university's information service website aimed at external parties consists of several main sections that anyone can access, such as the homepage, which is equipped with menus providing information on institutional profiles, admissions, facilities, scholarships, student organizations, and academics (Indrianti & Rizqullah, 2020). Academic information may include knowledge, research results, and information related to academic activities, including academic calendars and course syllabi (Indrianti & Rizqullah, 2020). In contrast, the structure of a website dedicated to internal audiences features a specific information architecture based on user needs, service flows, organizational frameworks, databases, policies, and specific authorities within the university (Nusa & Faisal, 2020). Typically, such websites are known as portals or information systems requiring access to a specific account.
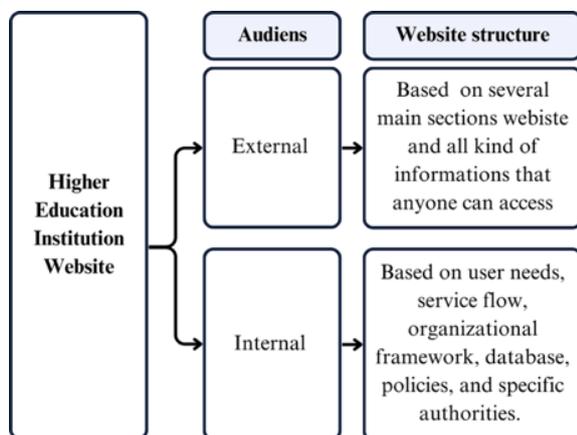

Figure 1. Audience and Structure of HEI Website.

Each information service system in higher education has different information structures, such as learning management systems, student administration services, financial information systems, personnel information systems, academic information systems, or other web-based services used to support higher education operations.

3. Research Methodology

This research employs bibliometric analysis, a quantitative method to explore and analyse large volumes of publication data (Donthu et al., 2021). Donthu et al. (2021) explained that bibliometric-based research is conducted using two analysis techniques:

1) Publication performance analysis using publication and citation metrics data.
2) Science mapping using citation analysis, co-word analysis, author performance analysis, and affiliation analysis.

According to Tan et al. (2021), the two analysis techniques are complementary and can be combined to produce a thorough and accurate analysis. Donthu et al. (2021) stated that bibliometric analysis is carried out in four stages: (1) determining the purpose and scope of the bibliometric study; (2) selecting the type of bibliometric analysis technique; (3) conducting data collection; and (4) reporting the results of bibliometric analysis.

4. Results and Discussion

4.1. Scope of the Bibliometric Study

The aims of this bibliometric study is to identify publication evolutionary trends, keyword networks, authorship information (authors identity and affiliation), journal contributions, and research clusters related to usability and UX on university websites in 2015-2024. The study is based on search results from the Scopus-indexed scientific journal database, as these database contains innovative content, high-quality data, and publication track record (Hu et al., 2024) and is relatively easy to use in bibliometric applications (Donthu et al., 2021). Database scope includes Scopus, IEEE Xplore, and ScienceDirect.

Searches were conducted on the Scopus, IEEE Xplore, and ScienceDirect databases from November 26-27, 2024. The search strategy used a combination of the keywords "*University Website*", "*Usability Evaluation,*" and "*User Experience*". Synonyms of the keywords were also included to ensure the search results matched the context of the research topic. Therefore, the Boolean operator code for searches on Scopus and IEEE Xplore used the following: *("usability evaluation" OR "usability testing" OR "usability analysis") AND ("user experience" OR "UX" OR "user satisfaction") AND ("website" OR "web platform" OR "online platform") AND ("university" OR "higher education institution" OR*

"college"). For searches on ScienceDirect, the following Boolean code was used: *("usability evaluation" OR "usability testing") AND ("user experience" OR "UX") AND ("university" OR "higher education" AND "Website").*

4.2. Bibliometric Analysis Technique

The publication performance analysis technique employs the Publish or Perish application, while the science mapping analysis technique uses the VOSViewer application. These applications are open-source and can be downloaded for free, with relatively easy-to-navigate (Donthu et al., 2021). The Publish or Perish and VOSViewer applications also allow authors to analyse publication trends, citations, collaborations, and research topics in interactive visual-based networks (Muhammad & Triansyah, 2023).

4.3. Data Collection

The initial search results from each database showed that Scopus found 56 publications, IEEE Xplore 85 publications, and ScienceDirect 735 publications. Publication search results are listed in Table 1.

Table 1. Publication Search Results.

| Database	Results	Document type
Scopus	56 publications	29 conference papers 26 articles 1 book chapter
IEEE Xplore	85 publications	82 conference papers 3 articles
ScienceDirect	735 publications	37 review articles 592 research articles 7 encyclopedia 55 book chapters 6 conference abstracts 4 editorials 4 mini reviews 2 short communications 30 others
Total	876 publications	
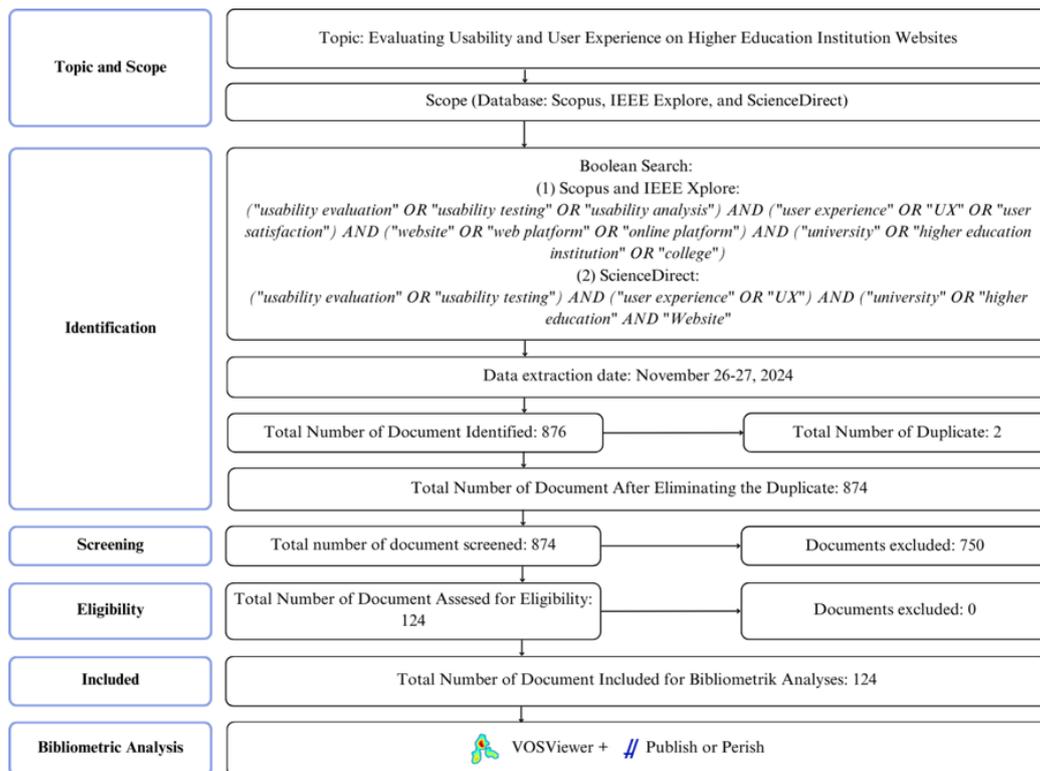
Figure 2. Stages of Data Selection for Bibliometric Analysis.

The process of filtering the search result data is adopted from the PRISMA framework (Page et al., 2021), as shown in Figure 2. After obtaining the publication 876 data, the authors identify duplicate data. If duplicate data is found, one instance is excluded. The screening stage ensures that the publication has topical relevance. In this stage, authors read each publication title. The publications are excluded from the selection criteria if the title does not match the research topic. The inclusion and exclusion criteria are listed in Table 2.

Table 2. Inclusion and Exclusion Criteria for Publication Data for Analysis.

No.	Inclusion	Exclusion
1	English-language publications.	Publications not in English.
2	Focus on usability and/or user experience (UX) topics.	Publications not addressing usability and/or user experience (UX) topics.
3	Studies related to Higher Education Institution (HEI) websites.	Studies not pertaining to Higher Education Institution (HEI) websites.
4	Publication period: 2015-2024.	Publications falling outside the 2015-2024 timeframe.

In the eligibility stage, the authors review each abstract to ensure that the research content is relevant to the topic of this study. Finally, The filter proccess included 124 eligible publications for bibliometric analysis, comprising 80 articles, 38 conference papers, and six book chapters. The eligible publications were then converted into the '.ris' file format to facilitate bibliometric analysis using Publish or Perish and VOSViewer. The Publish or Perish application is used to identify publication trends, keyword networks, authorship information, and journal contributions through its citation metric feature and publications data, as shown in Figure 3. Additionally, the VOSViewer application is used to identify research clusters related to usability and UX on HEI websites (2015-2024), resulting in the result as shown in Figure 6.

4.4. Bibliometric Analysis Results
4.4.1 Evolutionary Trends in Publication by Year

Table 3 shows number of publications related to usability and UX research topics on university websites from 2015-2024, which classifies publications based on the year of publication.

Table 3. Total in Number of Publications by Year of Publication.

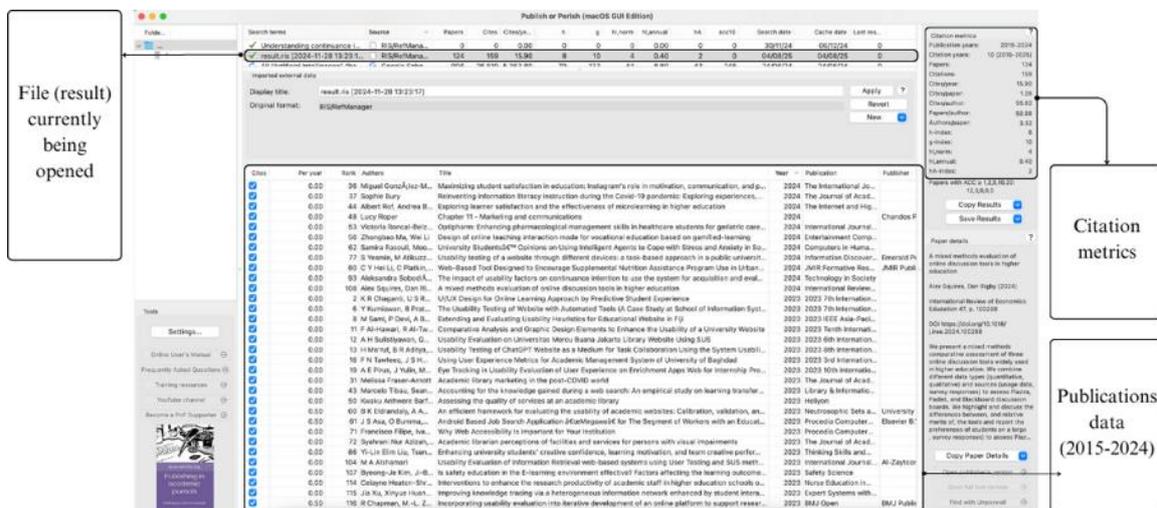| No.	Year	Number of Publications
1	2024	11
2	2023	22
3	2022	11
4	2021	14
5	2020	15
6	2019	14
7	2018	12
8	2017	6
9	2016	9
10	2015	10
Total		(N=124)

Figure 3. Screenshot of Publish or Perish Software Utilisation.

Although the number of publications per year has fluctuated over the past ten years. Statistically, the peak of most publications is in 2023. According to Hu et al. (2024), that year marked the full swing of digital innovation, driven by implementing technologies such as artificial intelligence (AI), cloud computing, and affective computing. The frequency of article publications between 2019 and 2023 was notably high compared to the years before and after. This trend can also be attributed to the COVID-19 pandemic and the post-pandemic period, which enabled researchers to conduct various activities online, such as research (Qazi et al., 2024). Additionally, the digital nature of the research objects—such as agency websites, electronic services, e-learning media, and mobile-based applications—facilitated online accessibility.

Over the past decade, there has been a transition and broadening of research focus. From 2015 to 2018, usability research was predominant, concentrating on the quality of ease of use and functional aspects of university website systems or services, such as learning platforms (Prantner, 2015; Pangestu & Karsen, 2016; Rodríguez et al., 2017; Greer & Harris, 2018), digital libraries (Alharbi & Mayhew, 2015; Swanson et al., 2017; Eaton & Argüelles, 2017;), and institutional websites (Štefko et al., 2015; Peker et al., 2016; Ismail & Kuppusamy, 2018).

In 2019, however, several studies combined usability and user experience aspects. Research moved beyond just ease of use or functional aspects, delving into the psychological impact, perceptions, emotions, and motivations of users (Demirkol & Seneler, 2019; Demirkol et al., 2020; Maslov & Nikou, 2020; Kurniawan et al., 2021; Chaganti et al., 2023; Rof et al., 2024), that arise from their interactions with university website services. This transition reflects a more holistic understanding that when designing and developing a web-based service system in an academic setting, the focus has shifted from merely functional aspects to a user-centred approach.

In line with technological advancements, the objects of study have also adapted to developments in each period. For instance 2015, research began integrating social media platforms, which were rapidly developing globally. Xu et al. (2015) demonstrated this by applying WeChat to campus library services. A study by González-Mohíno et al. (2024) reinforces that social media is important in enhancing student communication, participation, and motivation. This, in turn, ultimately leads to increased student satisfaction in higher education.

The impact of the COVID-19 pandemic significantly influenced the focus of research over the last four years. From 2021 to 2024, several publications focused on how learning platforms, information services, and technology utilisation were employed during the lockdown and post-pandemic periods (Bury, 2024; Fraser-Arnott, 2023; Hjiej et al., 2022; Su et al., 2021). This change was driven by the urgent need to maintain the quality and continuity of learning services amid global efforts to prevent the spread of the virus.

From the total research literature that met the bibliometric analysis criteria, contributions came from various disciplines are listed in Table 4, including Computer Science (51 publications), Information and Library Science (26 publications), Health Science (11 publications), Educational Technology (10 publications), Communication Science (5 publications), Civil Engineering (1 publication), Economics and Business (5 publications), Data Science (1 publication), Design (5 publications), Linguistics (2 publications), Social Science (4 publications), Law (1 publication), and Industrial Engineering (2 publications).

Table 4. Disciplines Related to Usability and UX Research in Higher Education Website.

No.	Disciplines	Number of Publications
1	Computer Science	51
2	Information and Library Science	26
3	Health Sciences	11
4	Education Technology	10
5	Communication Science	5
6	Civil Engineering	1
7	Economics and Business Science	5
8	Data Science	1
9	Design	5
10	Linguistics	2
11	Social Sciences	4
12	Law	1
13	Industrial Engineering	2
		Total (N=124)

Figure 4. Usability and UX Keyword Wordcloud on HEI Website.

The Computer Science discipline accounts for the largest share of the literature compared to other disciplines, as the concepts and methods of usability evaluation and user experience are predominantly applied within the Human-Computer Interaction (HCI) domain (Soares et al., 2022; Li et al., 2022). The interaction between humans and computers, in the context of information technology advancements, is not limited to the use of computers but also extends to other interactive devices such as smartphones, tablets, and laptops. In this regard, university website studies are evaluated in terms of usability and user experience based on the type of device used.

4.4.2 Publication Citation Trends

Table 5 presents the citation trends of usability and user experience research publications on university websites from 2015 to 2024, based on the total number of publications (TP), the number of cited papers (NCP), total citations (TC), and h-index (H). The highest number of citations occurred in 2019, with 37 citations, followed by 2021 with 29 and 2016 with 28. Based on the h-index data for each year, 2021 ranks first with an h-index value of 4, followed by 2019 and 2016 in second place with an h-index of 3. Although 2023 had the highest number of publications and 2019 recorded the highest number of citations, the data show that the 2021 publication had the most significant influence on usability and UX research on

university websites during the 10 year (2015-2024) due to the 2021 publication achieved the highest h-index value 4. Conversely, the publication with the lowest h-index is from 2024, with an h-index of 0. The number of citations may be because the 2024 publication is relatively new and has not been widely read or cited.

Table 5. Publication Citation Analysis.

No.	Year	TP	NCP	TC	H
1	2024	11	0	0	0
2	2023	22	3	3	1
3	2022	11	1	2	1
4	2021	14	4	29	4
5	2020	15	3	8	2
6	2019	14	3	37	3
7	2018	12	1	9	1
8	2017	6	2	20	2
9	2016	9	5	28	3
10	2015	10	2	23	2

TP: Total number of Publication; NCP: Number Citation Paper: TC; Total Citation; H: h-index.

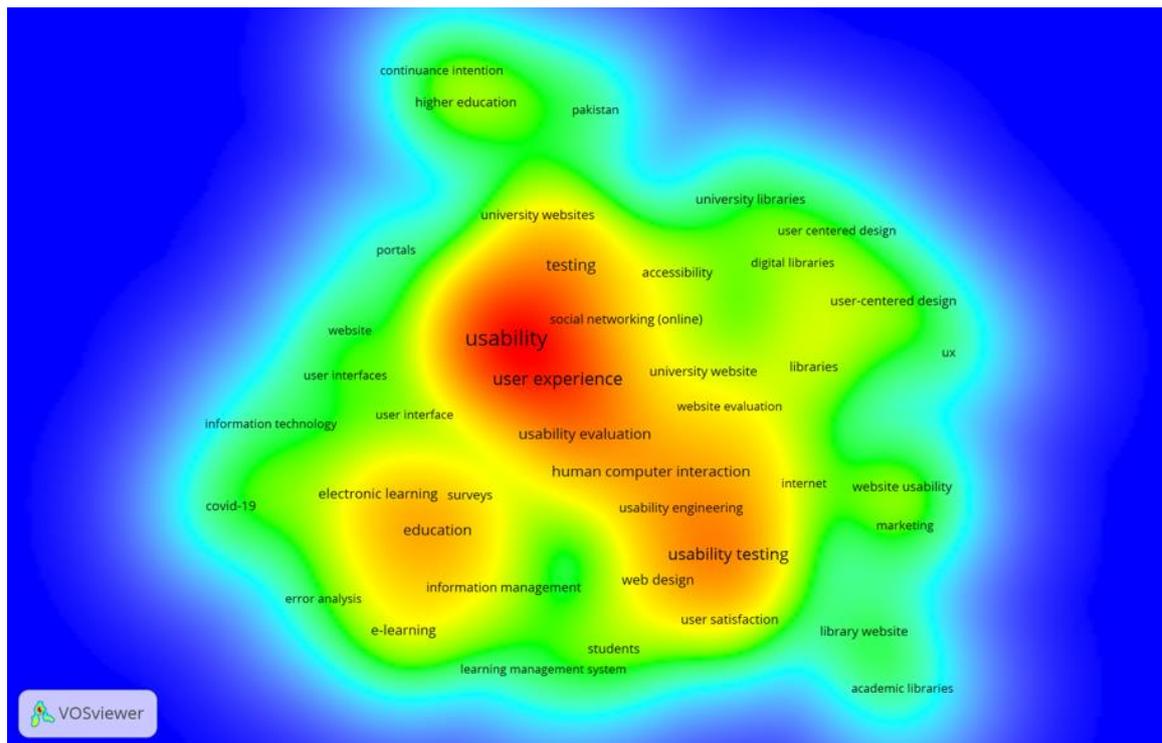Figure 5. Keyword Heatmap Visualization Using VOSViewer.

4.4.3 Keyword Analysis

The frequency of keywords reflects the terms most commonly used in the research literature as depicted in Figure 4. Keywords also represent the main content of the research topic related to the research object and can be specifically analysed and compared based on their frequency in the literature (Tan et al., 2021).

The analysis of the publication search data, which included 124 publications, revealed 663 keywords. However, 20 keywords were found to be most dominant in the research literature, namely: "*usability*", "*user experience*", "*usability testing*", "*human computer interaction*", "*education*", "*usability evaluation*", "*websites*", "*e-learning*", "*electronic learning*", "*web design*", "*accessibility*", "*libraries*", "*higher education*", "*students*", "*task analysis*", "*university website*", and "*usability engineering*". Some of these keywords share similar meanings. For instance, "*e-learning*" is synonymous with "*electronic learning.*" The frequency of keyword usage can also be visualized by the font size of each keyword. The larger the text size of a keyword, the more frequently it has been researched and cited in other studies.

The keyword visualization in the VOSViewer application uses different colour densities to show trends in research topics being explored as shown in Figure 5. The red color represents high density and many items, while the bluish color represents fewer items on a topic (Li et al., 2022). Figure 5 presents the color density highlights keywords with high citation counts, including "*Usability*", "*User Experience (UX)*", "*Usability Testing*", "*Usability Evaluation*", "*Human-Computer Interaction*", "*Education*", "*Social networking*", "*Web design*", "*Usability engineering*", and "*Electronic learning*". Usability is a topic that has received significant attention from researchers. "*UX*" and "*Usability Testing*" are also widely discussed research topics because, during the website development process involving humans as users, usability and UX evaluation aspects are frequently carried out to identify problems, make and implement recommendations, and evaluate them iteratively on the product or service (Tullis & Albert, 2013). For instance, in higher education, evaluation is used to develop academic service information systems, library service websites, university websites, and learning management systems.

4.4.4 Keyword Network Analysis

The data from 124 documents, comprising 663 keywords entered into the VOSViewer application, reveal 51 related keyword nodes and 376 connections linking one keyword to another. The co-occurrence

Figure 6. Visualisation of Co-occurance Clustering Keywords Using VOSViewer.

network of keywords that appear together forms five thematic clusters as shown in Figure 6. Cluster #1 (red) focuses on usability studies (survey) related to the interface design of e-learning websites during the COVID-19 pandemic. Cluster #2 (green) explores usability research on library information systems. Cluster #3 (blue) examines usability and continuance intention research on university learning websites. Cluster #4 (purple) investigates UX and usability research on websites for marketing communications. Finally, Cluster #5 (yellow) addresses usability and user experience testing studies on learning management system websites.

Cluster #1 (red)-A survey-based usability study on the interface design of electronic learning websites during the COVID-19 pandemic consists of 12 keywords: *website, user interfaces, user interface, information technology, COVID-19, pandemic, electronic learning, surveys, education, error analysis, information management,* and *e-learning.* Research on usability during the COVID-19 pandemic has caused academic activities to be carried out online, including learning and teaching activities through the electronic learning system website. The evaluation aims to determine the level of usability of the electronic learning platform by collecting user feedback (Azwar et al., 2021). Some methods used to evaluate the usability of a website include usability testing, task analysis (Haries et al., 2022), and the System Usability Scale (SUS) questionnaire (Benaida

et al., 2018; Valerian et al., 2018; Chapman et al., 2023).

Cluster #2 (green)-Usability research on library information systems consists of seven keywords: *university libraries, user centered design, digital libraries, accessibility, libraries, information systems,* and *usability evaluation.* The research area in this cluster is user-centered design related to academic information system websites in the library environment. Duncan & Durrant (2015) measure aspects of effectiveness, ease of system learning, usability, functionality, navigability, and user satisfaction through Focus Group Discussions (FGDs), which are used as a basis for consideration to redesign the library website. Retnani et al. (2017) utilized usability testing and a SUS survey of three categories of users (regular users, active users, and skilled users) to evaluate the Universitas Jember library website. Research conducted by Guay et al. (2019) identified problematic areas to improve the quality of the information architecture of the University of Toronto Scarborough library website using assignment-based usability testing and card sorting. However, the experiment was carried out only on desktop displays. Hence, future research recommendations must consider other device displays, such as mobile and tablet, so the library website can be easily accessed from various devices. The accessibility aspect needs to be considered in the library website because the library website is a public facility that should be accessible to anyone, including users with special needs (Filipe et al., 2023).

Cluster #3 (blue)-Usability and continuance intention research on learning websites containing seven keywords: *usability, portal, testing, university websites, higher education, Pakistan,* and *continuance intention*. The quality of usability and UX levels on a university website affects the intensity of user focus when interacting with a product, service, or system. Dai et al. (2020) emphasized the importance of continuance intention in a study on learning persistence on a Massive Open Online Course (MOOC) developed by a university. Tian and Liu (2020) applied the eye-tracking method to monitor user behavior, collect user feedback, and provide improvement recommendations for university websites.

Cluster #4 (purple)-UX research and website usability in marketing communication contain six keywords: *user-centered design, UX, website evaluation, internet, marketing,* and *website usability*. Much like a showcase for education, a university website can serve as a medium to promote the educational institution to its target audience— prospective students. In order to address issues related to the user experience of prospective students when accessing university websites, Manzoor et al. (2019) identified and evaluated websites using metrics related to navigation attributes, organization, ease of use, design (layout), communication, and content. The findings revealed that the evaluation facilitated the usability of information services and transformed the website into an appealing platform that encouraged prospective students to enroll.

Cluster #5 (yellow)-Usability testing and user experience studies on Learning Management System (LMS) websites, comprising eight keywords: *human-computer interaction, usability engineering, usability testing, user satisfaction, students, learning management system, library website,* and *academic libraries.* Using websites as systems and supporting services for learning sustainability should possess good usability (Sami et al., 2023), by ensuring the effectiveness of students' use of the LMS. Sami et al. (2023) evaluated the usability of LMS interfaces to identify issues that arise when students use the LMS. The considerations regarding the identified problems were used to improve the learning management system. Related to the research keyword User Experience (UX), some factors influence UX: usability, usefulness, and user emotions (Hartson & Pyla, 2012). Demirkol et al. (2020) measured emotional factors in the design of student information system interfaces. Specifically, their research involved students as the subjects. The results indicated that service providers and developers must consider user characteristics, particularly within learning environments.

4.4.5 Journal Performance

Table 6. The Journals with the Highest Contribution to the Publication Output.

No.	Journal	Number of Publications
1	The Journal of Academic Librarianship	51
2	Procedia Computer Science	26
3	Computers and Human Behaviour	11
4	Lecture Notes of Computer Science	10
5	Library and Information Science Research	5
6	She Ji: The Journal of Design, Economic, and Innovation	5
7	Computer and Composition	1

The number of publications in a journal reflects its level of productivity in disseminating research. Table 6 shows the seven journals with the highest contribution to publication output, namely *The Journal of Academic Librarianship* (51 publications), *Procedia Computer Science* (26 publications), *Computers and Human Behaviour* (11 publications), *Lecture Notes in Computer Science* (10 publications), *Library and Information Science Research* (5 publications), *She Ji: The Journal of Design, Economics, and Innovation* (5 publications), and *Computers and Composition* (1 publications). The types of publications—such as articles, books, and conference papers—featured in these journals indicate that usability and user experience assessments related to university websites can be examined from various perspectives, scopes, and disciplinary approaches.

The Journal of Academic Librarianship publishes research on library-related topics within educational settings, including both college and higher education institutions (The Journal of Academic Librarianship, n.d.). *Procedia Computer Science* and *Lecture Notes in Computer Science* focus on research in computer science, predominantly presented as conference papers. *The journal Computers and Human Behaviour* publishes the research results related to the impact of computer use on the psychological condition of users (The journal Computers and Human Behaviour, n.d.). *Library and Information Science Research* covers topics related to library and information science. Research on the use of computers in writing pedagogy is published in the journal *Computers and Composition*. Meanwhile, *She Ji: The Journal of Design, Economics, and Innovation* features interdisciplinary research topics concerning economics and innovation, processes of design, and

On-line: http://ejournal.undip.ac.id/index.php/jsinbis/article/view/73073

design thinking within organizational contexts, highlighting the interrelation between technical and social dimensions (She Ji, n.d.).

4.4.6 Publication Contribution by Institution

The number of publications produced by each institution reflects its level of productivity in contributing to research in the fields of usability and user experience. Out of 124 publications, each institution contributed between one to five publications. The ten institutions with the highest contributions are Bina Nusantara University (5 publications), Pondicherry University (3 publications), Universitas Indonesia (3 publications), Kent State University (2 publications), Rocky Vista University (2 publications), Soochow University (2 publications), Telkom University (2 publications), The City University of New York (2 publications), and the University of Hradec Králové (2 publications).

Bina Nusantara University is regarded as one of the most productive higher education institutions in generating usability and user experience (UX) research related to university websites. For instance, Kurniawan et al. (2021) evaluated the Bina Nusantara

University website by employing two online accessibility measurement tools to collect data concerning quality assurance of website elements and loading times when users navigated through web pages. Pangestu and Karsen (2016) utilized a questionnaire to assess perceptions of the university's internal e-learning platform. Pirus et al. (2023) applied the eye-tracking method to evaluate usability and user experience on the XYZ University website. Most of the articles produced by this institution were presented at international conferences and published as proceedings in IEEE Xplore due to the relatively short review and publication process compared to reputable academic journals. Other Indonesian higher education institutions that have made notable contributions to usability and UX research include Universitas Indonesia (2 publications) and Telkom University (2 publications).

4.4.5 Author Performance

Authors play a significant role in publishing research on usability and user experience in university websites as listed in Table 7. The authors are considered influential when they have published articles with the most citations. Data in Table 7

Table 7. Author(s) Contributions to Publications.

`1Author(s)	Institution	City	Number of citations
S Guay, L Rudin, S Reynolds (Guay et al., 2019)	University of Toronto Scarborough	Scarborough, Canada	18
S Peker, S Kucukozer-Cavdar, K Cagiltay (Peker et al., 2016)	Middle East Technical University	Ankara, Turkey	16
A Y M Payne, J Surikova, S Liu, H Ross, T Mechetiuc, R P Nolan (Payne et al., 2015)	University Health Network	Toronto, Canada	16
K H Ramanayaka, X Chen, B Shi (Ramanayaka et al., 2019)	Wuhan University of Technology	Wuhan, China	10
A Subiyakto, Y Rahmi, N Kumaladewi, M Q Huda, N Hasanati, T Haryanto (Subiyakto et al., 2021)	UIN Syarif Hidayatullah Jakarta	South Tangerang City, Indonesia	9
A M Valenti (Valenti, 2019)	Raritan Valley Community College	Branchburg, New Jersey, USA	9
M Benaida, A Namoun, A Taleb (Benaida et al., 2018)	Islamic University of Madinah	Madinah, Saudi Arabia	9
J D Calvano, E L Fundingsland, D Lai, S Silacci, A S Raja, S He (Calvano et al., 2021)	Rocky Vista University	Parker, Colorado, USA	8
J J Gale, K C Black, J D Calvano, E L Fundingsland, D Lai, S Silacci, S He (Gale et al., 2021)	Rocky Vista University	Parker, Colorado, USA	6
J.-M. Su, Y.-C. Yang, T.-N. Weng, M.-J. Li, C.-J. Wang (Su et al., 2021)	National University of Tainan	Taipei, Taiwan	6

indicates that Guay et al. (2019) are recognized as the most influential authors, with their publications receiving 18 citations. Guay and colleagues contributed to the scholarly impact of research published in 2019.

4.5 Discussion

The results of the trend identification based on citation trends, co-occurrence clusters, journals, countries, institutions, and author identities related to usability and user experience (UX) evaluation on university websites over the past ten years (2015–2024) reveal the following:

1) A significant increase in the number of publications was observed in 2023. Although usability and UX studies were initially conducted predominantly within the field of Human–Computer Interaction (Soares et al., 2022), which is academically situated in computer science, usability and user experience (UX) research on university websites has since been applied across a range of disciplines: Library and Information Science (Duncan & Durrant, 2015; Halim et al., 2019; Guay et al., 2019; Retnani et al., 2017); Design (Valerian et al., 2018); Linguistics (Černá, 2016); Psychology (Farrer et al., 2019; Rasouli et al., 2024); Education (Azwar et al., 2021); Communication Studies (Das, 2022; Bjork, 2018; Liu et al., 2023); Business (Kyrö & Artto, 2015); Information Management (Alshamari, 2023; Demirkol et al., 2020); Health Sciences (Hei Li et al., 2024); Data Science (Kim & Chung, 2023); Social Sciences (Weidlich & Bastiaens, 2019); Law (MAC, 2024); Civil Engineering (Yudenkova & Savina, 2015); and Industrial Engineering (Azwar et al., 2021; Agustina et al., 2022).

2) The evolution of research publications on usability and UX evaluations on HEI websites has changed over the past ten years. The research focuses, topics, and objects have also changed with technological developments and global issues, including the COVID-19 pandemic.

3) The five countries contributing the most to publications in the field of usability and user experience in HEI websites are the United States (21 publications), Indonesia (17 publications), the United Kingdom (10 publications), China (8 publications), and Canada (7 publications). The United States is the leading contributor to usability and UX studies, not only within the context of higher education institutions but also in other areas such as wearable healthcare device development (Hu et al., 2024), driving systems (Tan et al., 2021), and medical equipment (Bitkina et al., 2020).

4) Publications from 2021 are considered the most influential, as they hold an h-index of 4, indicating that these works have been widely cited in subsequent research. Although the total number of publications in 2021 was lower than in 2023 and 2020.

5) The research clusters on usability and UX evaluation in university websites include (1) the design of e-learning website interfaces during the COVID-19 pandemic, (2) library information systems, (3) users' continuance intention on learning websites, (4) websites for marketing communication, and (5) learning management systems. However, most of the literature predominantly focuses on student participants. These clusters align with the literature review conducted by Li et al. (2022), which found that usability and UX research are almost always associated with technology-based services. Future research trends are expected to evolve in line with the growing presence of technology in society. For instance, usability and UX studies in HEI websites may increasingly incorporate artificial intelligence, machine learning, and cloud computing technologies to enhance user experience in higher education services.

6) The institutions with the highest number of publications are Bina Nusantara University (5 publications), Pondicherry University (3 publications), Universitas Indonesia (3 publications), Kent State University (2 publications), Rocky Vista University (2 publications), Soochow University (2 publications), Telkom University (2 publications), The City University of New York (2 publications), and The University of Hradec Králové (2 publications). Variation of the contributing institution indicates an opportunity for researchers to engage in collaborative studies with a broader user scope.

7) Usability and UX research on university websites focuses primarily on students, staff, and prospective students as research subjects. However, the audience of higher education institutions is highly diverse, and future studies should consider a broader range of user types and characteristics.

8) The Journal of Academic Librarianship published the most articles, totaling 12. This journal focuses on library research within school and higher education environments. Library services are frequently discussed as a topic because their accessibility and usage can support students, academic staff, and external stakeholders in both learning and research activities.

9) Guay et al. (2019) are the most cited authors. Their article reflects the quality of the publication and made a significant contribution to the h-index in 2019.

5. Conclusion

This bibliometric study provides an overview of research trends concerning evaluating Usability and User Experience (UX) on higher education institution (HEI) websites during 2015–2024. Trend analysis indicates fluctuating publication growth over the last decade, suggesting that the researcher's interest in this topic varies with context and specific study areas. It is further substantiated by the visualization of keyword co-occurrence clustering, which highlights dominant research clusters. Furthermore, while publications are dispersed across various journals, a few emerged as primary contributors. Author(s) and affiliation data also reveal that usability and UX research hold global relevance and impact, fostering significant international collaboration opportunities. Such collaborations are crucial for enriching methodologies, insights, ideas, perspectives, and the generalizability of findings. Investigating the research domains demonstrates that this topic is interdisciplinary, extending beyond human-computer interaction (HCI). It is due to the applicability of usability and UX principles in evaluating diverse websites within university environments, encompassing design, development, and/or post-implementation evaluation phases, which are user-centred. Given that HEIs must serve diverse users with varying backgrounds, needs, and information access capabilities through highly functional and user-friendly websites.

6. Authors's Opinion

This paper efficiently and systematically analyses HEI website usability and UX evaluations. Although extensive research, including longitudinal studies, has proven effective in improving service quality, existing literature predominantly focuses on library websites, marketing communications, learning management system, and e-learning. It highlights opportunities for future research, such as examining other crucial HEI services (e.g., health services, sexual harassment reporting, disability support, or broader campus community welfare initiatives). Furthermore, consider the user types (e.g., staff, international prospective students, special needs students, parents, or other external parties) and consider a broader range of databases (e.g., Web of Science, Dimensions, SpringerLink, PubMed, or Google Scholar) are essentials for more comprehensive results. In addition, qualitative methods should be integrated to yield more holistic insights. Ultimately, this bibliometric review offers a strong foundation for determining research objects and subjects to address usability and UX study gaps on HEI websites studies.

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