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A Systematic Literature Review of Understand the Human-Computer-Interaction Collaboration with User Experience Design

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Abstract
In the realm of human-computer interaction (HCI), while the integration of computerized systems with humans (e.g., robots) is crucial, the focus often remains on the technology itself rather than on user acceptance and interaction. This creates a significant research gap, as future advancements in digital systems will rely heavily on effective HCI. This article reviews literature through a framework emphasizing User Experience (UX), which focuses on enhancing interactions between people and technology. UX is described as a method for creating desirable, accessible, and useful technology experiences. The paper concludes with recommendations for future UX research, particularly in wireless and emerging technologies, highlighting the role of User Experience Strategy (UXS) in addressing consumer needs and developing practical, engaging solutions. This systematic literature review's general target is to investigate studies published in the past 15 years related to using AI strategies in conventional technology. The fundamental goal is partitioned into the next RQ research question to accomplish a more point-by-point and far-reaching perspective on this subject.
Keywords: Human-Computer-Interaction, UX Design, HCI, UXIP, UXS

1. Introduction

In HCI, interaction design involves thoughtful planning, targeting usability, resources, cost, and feasibility. Key activities include identifying needs, making design choices, prototyping, and evaluating systems (Mohammed & Karagozlu, 2021; Chao, 2009). This article presents an HCI overview, highlighting its advantages, disadvantages, and challenges. The goal is to create a natural communication flow between systems and users, drawing from multidisciplinary fields and integrating advanced user feedback (Chao, 2009).

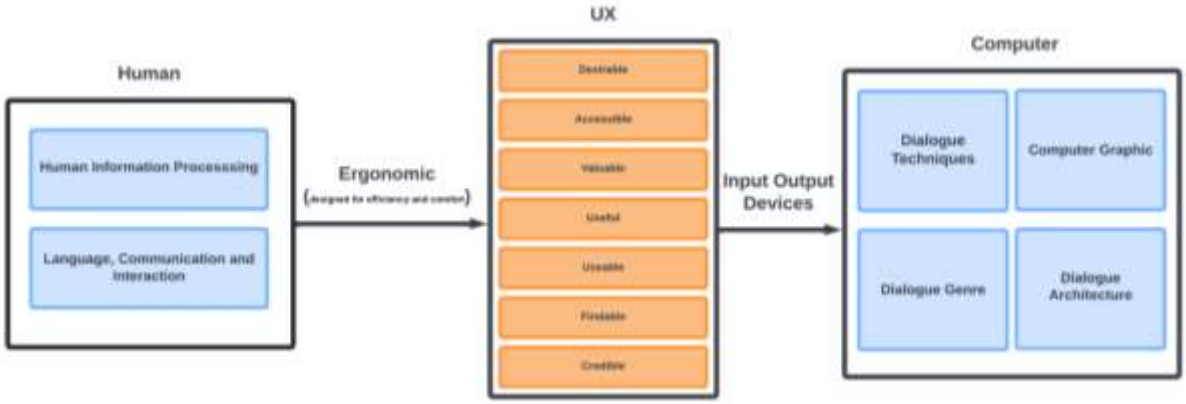

Figure 1: HCI and UX Design diagram

Clients must understand the significance of interaction design and use it effectively. Designers should streamline features, focusing on user goals (Stephanidis et al., 2019). Users need clear, concise instructions and appropriate feedback channels (Stephanidis et al., 2019; Salah et al., 2014). Interaction should be easy to learn and intuitive. Designers must ensure clear communication, aligning user expectations with the interface (Stephanidis et al., 2019). The design should provide essential, effective functions, address user concerns, and minimize potential errors (Stephanidis et al., 2019; Salah et al., 2014).

In this review, we continue research on development time and visual search tasks in human-computer interaction (Michalski et al., 2006; Park & McKilligan, 2018). Our findings suggest that the Fitts' equation is insufficient for search tasks, leading us to propose an alternative model. We also provide guidelines for designing graphical interfaces based on empirical evidence (Michalski et al., 2006). As technology evolves, new opportunities for fostering personal growth and creativity will emerge, allowing people with diverse backgrounds to collaboratively solve complex problems and create knowledge (Michalski et al., 2006; Park & McKilligan, 2018). Technology will support new learning styles, multimodal affordances, and lifelong learning (Michalski et al., 2006).

This adaptability enhances human skills in arts, science, and design. The discussion of technology in student learning now includes privacy, ethics, learning theories, and educational perspectives (Michalski et al., 2006).

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Technology-assisted learning is not new and uses various tools like PCs, projectors, smartboards, and software like office applications, learning management systems, social networks, and online games (Park & McKilligan; Mohammed & Karagozlu, 2021). Digital technologies support learning by boosting motivation, improving subject understanding, and adapting to individual student needs (Park & McKilligan, 2018; Mohammed & Karagozlu, 2021).

2. Literature Review

The role of Human-Computer Interaction (HCI) has become increasingly prominent, yet it lacks a clear philosophical foundation with coherent goals (Chao, 2009; Ren et al., 2019; Shu et al., 2016). The ability of computers to recognize hand signals is crucial for advancing HCI (Chakraborty et al., 2018; Huang, 2009; Ziad et al., 2016). This paper reviews current HCI interface design approaches in modern information systems to determine their effectiveness (Nguyen & Le, 2020; Mohammed & Karagozlu, 2021). It highlights that advancements in cloud and IoT are essential. Usability is a key term in HCI, ensuring the acceptance and effectiveness of interactions (Martinez-Toro et al., 2019; Chao, 2009; Karpov & Yusupov, 2018). It evaluates whether products are user-friendly, safe, efficient, and easy to learn and remember (Chao, 2009; Karpov & Yusupov, 2018). The paper summarizes the origins and analysis of human-machine systems and human-computer interfaces, emphasizing improvements in human-machine relationships (Costa et al., 2021; Chao, 2009). It discusses advancements in network, multimedia, and interface technologies, highlighting the use of interactive media for human-computer interactions. The paper advocates for increased design efforts and extensive research on multi-user interaction settings (Klumpp et al., 2019; Clark et al., 2019). It describes the integration of technology into everyday interactions (Sutcliffe et al., 2019; Stephanidis et al., 2019), and explores how people adapt to new ICT eras, including Human-Computer Confluence and Integration (De Guzman et al., 2019; Stephanidis et al., 2019). The article also details multimodal UIs that process heterogeneous user input simultaneously (Dodd et al., 2017; Karpov & Yusupov, 2018). It highlights the efficiency of speech input over text typing and discusses vision-based gesture recognition in HCI, essential for advancements in human-computer interaction (Ortega, 2021; Chakraborty et al., 2018). The study outlines challenges in gesture recognition due to varied contexts, interpretations, and hand movements, noting limitations in current classifiers (Punchoojit & Hongwarittorrn, 2018; Chakraborty et al., 2018). This article uses an interdisciplinary approach to explore arts, psychology, and cultures (Nguyen & Le, 2020). It highlights the importance of human-technology collaboration and acceptance, addressing a significant research gap (Klumpp et al., 2019). Human-Computer Interaction (HCI) research emphasizes understanding and improving human-computer systems (Ren et al., 2019). A model demonstrated the impact of graphical object design on task efficiency (Michalski et al., 2006). The paper focuses on Virtual Reality in HCI, exploring design challenges and guidelines (Sutcliffe et al., 2019). It stresses the need for HCI and psychological knowledge in VR design teams and suggests HCI principles apply across VR technologies, including Head-Mounted Displays and desktop VR (Ortega, 2021; Sutcliffe et al., 2019). The article also discusses HCI designs for mobile devices, aiming to create user-friendly interfaces (Huang, 2009). It examines challenges in designing hardware and software for mobile devices and suggests solutions for better user interaction (Huang, 2009). Scaling down equipment is a key trend in HCI for mobile phones. For instance, most cell phones are pocket-sized and require a touch screen and a small keyboard. This paper examines HCI, privacy, and security (Guzman & Thilakarathna, 2019). Mixed-Reality technology is advancing due to improvements in computing, sensor integration, and display technologies. However, there is limited focus on the privacy and security implications of Mixed-Reality (Guzman & Thilakarathna, 2019). Methodological approaches include computer-based, phone-based, mobile applications/IPAs, and vehicle-based technologies (Clark et al., 2019). The VGR method involves sign language recognition (Chakraborty et al., 2018), enhancing interaction between people and technology (Nguyen & Le, 2020). Different generations use distinct communication patterns: Baby Boomer, Gen-X, Millennial, and Gen Z (Nguyen & Le, 2020).

3. Methodology and Techniques

We directed the SLR as indicated by the philosophy proposed by [M Klumpp]. This technique comprises arranging, coaching, and announcing stages, where each progression consists of a few phases. Figure 1 shows that this SLR is complete in three fundamental steps. Each passage portrays in the following segments.

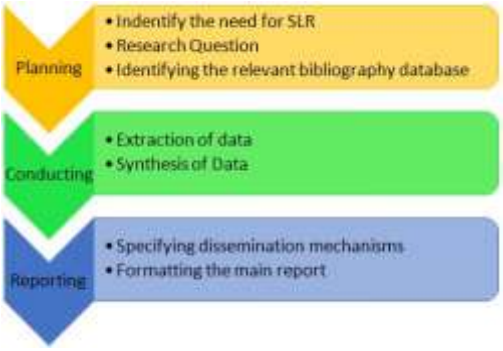

Figure 2: Phases and Activities

3.1. Planning Phase

All through this stage, we decided on the fundamental point of the review and completed the accompanying exercises that exhaustively made sense of each progression.

3.1.1. Identify the need for SLR

We need the SLR because it intends to distinguish, assess, and sum up the discoveries of all significant individual investigations over a well-being-related issue, making accessible proof more available to leaders. The SLR is an essential intelligent development that licenses specialists to focus on the "lay of the land" in a particular district. The SLR recognizes, evaluates, and coordinates research that intends to summate back and forth movement verification that can edit to affirm based practice.

The SLR convention portrays the review's reasoning, speculation, and arranged strategies.

The SLR is an amalgamation or outline of all accessible proof about a specific technical exploration question.

3.1.2. Research Question

After reading the 23 papers, we have not found any of these questions we have described in the phase 1 questionnaire section. This systematic literature review's general target is to investigate studies published in the past 15 years related to using AI strategies in conventional technology. The entire goal has been partitioned into the next RQ research question to accomplish a more point-by-point and far-reaching perspective on this subject.

Q1- Why do challenges occur when linking to the user interface?

Q2- How can the UX model do integration between user and device?

Q3- Can interface design corrupt in HCI, and how to avoid it?

Q4- If we focus on the design, how can we face them, and why should we focus on it?

3.1.3. Relevant databases bibliographic identifying

As indicated by the examination questions, the accompanying computerized libraries looked for the necessary articles; Springer, Google Scholar, and Elsevier. The fundamental justification behind choosing these automated book rooms was; that they gather it concentrates on connection with software engineering and clinical science. They record articles from distribution stations like diaries, meetings, books, and studios. In this article, the inquiry restricts diary and structural articles from the past 15 years.

3.2. Conducting Phase

3.2.1. Extraction of Data

Close by the new HCI capacities, another quality perspective for data or applications arose: the User Experience (UX). That is why we used (UX) User-Experience methodology in the light of M Klump's article: Today, users expect applications not exclusively to work well but to be fun & agreeable. While no generally acknowledged meaning of U-X exists, most recognize it to be an exceptionally emotional matter. That collaboration with data or the application and setting of purpose assume a predominant part [Klumpp] portray three UX perspectives got from analytical writing: innovation is above a simple instrument; the user's specific circumstance and interior state are significant; & every user has an individual, abstract feeling of good U-X.

3.2.2. Synthesis of Data

While the writer focuses on making humanoid robotics, so their methodology can mean for any application, including independent frameworks. They broaden exemplary UX plans with two extra advances: character and communication plans. Character configuration includes giving robots a disposition relying upon the ideal UX. In straight forward terms, originators should characterize how independent machines respond to people. Is it true or not that they are accommodating to people or cutthroat (which can utilize for, e.g., genuine gaming in workspaces)? People will more often than not allocate characters to HR humanoid robots. Along these lines, explicitly incorporating a character plan into the user experience, the UX configuration process upholds a suitable UX. Regardless, the planned morality should match the ideal undertaking, the setting, and the workspace.

Figure 3: Seven Factors of UX Design

3.3. How is this useful?

The (UX) user experience design is one of the interaction design groups used to make data that give significant & applicable encounters to people or clients. This UX includes creating the whole course of obtaining and incorporating the thing, including parts of marking, design, ease of use, and capacity. Sites, web applications, & work area applications are frameworks appearing as the idea of (HCI). We call the (UX) user experience human collaboration with frameworks. UX is significant because it intends to give positive encounters that keep clients faithful to the item or brand.

3.4. Justifying

UX is a complementary aspect of the interaction between the user and computer. There are seven UX design factors: desirable, accessible, valuable, useful, useable, finable, and credible. Breaking down UX innovation open doors in smart home, wireless, & other arising technologies, UXS frames some portion of (UXIP) at the stage of strategy diagnostic. Zeroing in on user ways of behaving, inspirations & interests across various buyer verticals, UXIP assists clients with addressing shopper needs, fostering usable arrangements, and conveying convincing UX through partnered and restrictive exploration abilities. With our broad skill in the enormous scope of study work, inside and out interviews, center gatherings, and observational meetings, UXIPs' examination

philosophies permit vital user-driven investigation of the probable for advancement and new technologies. Given noteworthy understanding, go-to-showcase systems, and business proposals, UX-IP is a significant provider of purchaser information to the innovation business.

3.5. Reporting Phase

3.5.1. Specifying dissemination mechanisms and formatting the main report

We describe the SLR with a few steps, including an abstract introduction, literature view methodology results from discussion conclusion, future work, and the last reference. We used the abstract as a brief introduction for our whole article.

After reading the 23 articles of different researchers, we collected the required data from those papers and described it in the literature view with references. We used the figure to refine our SLR. We discussed UX methodology in figure 3 for implementing the designs and interfaces in HCI. We read the different papers, abstract, introduction, and conclusion; We chose those written in English between the records and used the two criteria that helped select Articles for our SLR.

3.5.2. Inclusion Criteria

- Studies introducing UX design in HCI either assessed or not.
- Papers validating an existing user experience design in HCI
- Except for proposing any recently evolved technique, articles providing a correlation between user experience design in HCI

3.5.3. Exclusion Criteria

- studies published on distributed in other languages than English, Studies published after 2005:

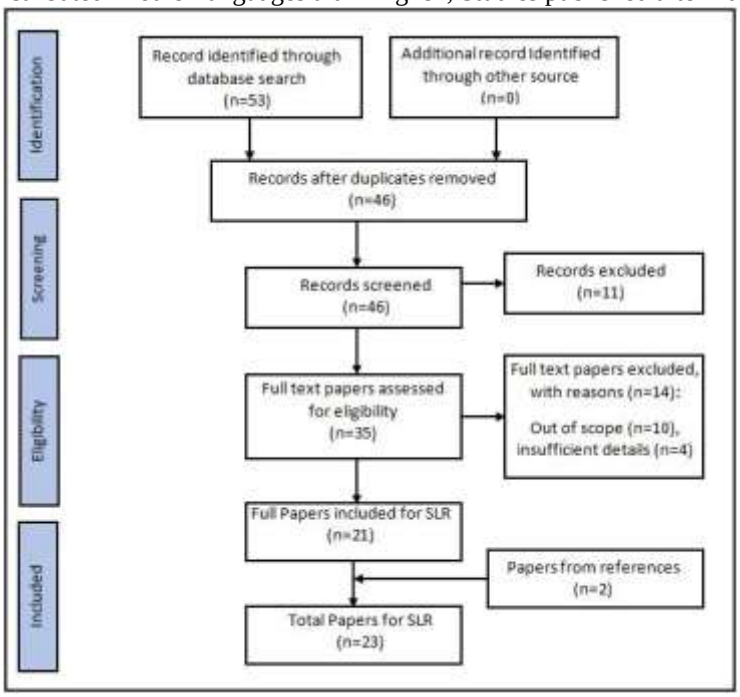

Figure 4: SLR Flow Diagram

4. Result and Discussion

Q1- Why do challenges occur when linking to the user interface?

(UX) user experience plan is the interaction configuration groups use to make Challenges when linking the user interface with Humans also arise at the aggregate level. Aggregate commitment divides into human commitment, for example, collaboration or worldwide participation. The work process is generally productive because of gathering correspondence and attributes like arrangement, trust, typical reason, instinct, unconstrained reaction, and want towards the goal of contention. The impact of human commitment on synergized collaboration is triple. First and foremost, human limits do not fully initiate without human commitment. 2nd, without human commitment, substantial advancements won't be created, understood, and their maximum capacity. And 3rd, without the earlier two limits ultimately evolved, it is challenging to deliver an exceptionally synergized condition where people and advancements are firmly "incorporated," synchronized, and efficient. Without human commitment, notwithstanding substantial improvements and capable people, these two variables will miss the mark concerning their possibilities and won't arrive at their total limit.

Q2- How can the UX model do integration between user and device?

(UX) user experience plan is the interaction configuration groups use to make items that give significant and applicable encounters to clients. It includes the method of the whole course of obtaining and incorporating the thing, including parts of marking, plan, ease of use, and capacity.

Q3- Can interface design corrupt in HCI, and how to avoid it?

The design interface can corrupt when it deteriorates. So, we face the other client assistance challenges incorporating the decrease of the actual weight from enduring the gadget, eye inconvenience from impediment issues, inaccurate concentration, & the mental disengage from the deficiency of material criticism while "communicating" with the different articles. However, a significant number need unwavering quality or legitimacy testing & are not reliably involved across the exploration investigated, creating problems for the legitimacy of estimation. Most examinations will often consider parts of a plan or explore hypothesis-motivated research questions. Formal observational investigations can't evaluate the tasteful point of view of the plan because of its subjectivity. These lines, the ends are challenging to characterize & appear to be fluffy to apply to the down-to-earth plan. Computational style is relied upon to complete this hole from two or more stages. From the different levels, apparatuses will create to assist the originators in the point of the interaction plan in a like manner. We can avoid the issues mentioned above by connecting with the group, and specialists should target getting the elegant impression of clients & help them structure or foster stylish capacities.

Q4- If we focus on the design, how can we face them, and why should we focus on it?

If we focus on the design so, we have to follow some of the steps to face them, just like:

Leverage technology to meet diverse needs through comprehensive solutions. Develop frameworks and tools for effective accessibility and integrate them into educational systems seamlessly. Focus on enhancing learning, creativity, and well-being. Create educational technologies and games that balance engagement and practicality, addressing privacy concerns and involving educators in the design process. Support personalized creativity and skill development, blending digital and physical environments. Use systems thinking to ensure sustainable, reliable solutions, and engage all stakeholders to promote inclusivity, social interaction, and justice through technology.

Any item's capacity accomplishes through human-PC collaboration. The trade aims to convince clients to use items rapidly complete, correspondences and discoursed among people, and PCs more agreeable. In particular, the post among clients and PCs contains a few cycles: shared acknowledgment, the joint arrangement, standard transmission, and criticism of data. An intelligent plan is the substance and center of the human-PC interface plan. As indicated by the attributes of clients, undertakings, and conditions of the frameworks, the most appropriate communication ought to be figured out, including distinguishing the assignment model of human-PC collaboration, assessing the helping level provided to exchange, and anticipating an intricacy of association, so that are the reasons we should focus on design.

Table 1: Articles According to the Journal Names

List of Journals	Frequency	Percentage	Cumulative frequency
ACM Computing Surveys	1	4.35	1
BRAIN. Broad Research in Artificial Intelligence and Neuroscience	1	4.35	2
International Conference on Computer and Automation Engineering	2	8.70	4
Herald of the Russian Academy of Sciences	1	4.35	5
IET Computer Version	2	8.70	7
International Journal of the Industrial	1	4.35	8
International Journal of Human-Computer	2	8.70	10
Proceedings of the World Congress on Engineering and Computer Science	1	4.35	11
The International Journal of Advanced Manufacturing Technology	1	4.35	12
Interacting with Computers Published by Oxford University Press	1	4.35	13
CCF Transactions on Pervasive Computing and Interaction	1	4.35	14
International Conference on Information and Computer and Computer Technologies (ICICT.)	1	4.35	15
Applied Ontology	1	4.35	16
International Conference on Software Engineering ICSE.	1	4.35	17
arXiv Preprint arXiv	1	4.35	18
IEEE Conference	1	4.35	19
Journal of Physics: Conference Series	1	4.35	20
Australasian Conference on Information Systems	1	4.35	21
Advances in the Human-Computer Interaction	1	4.35	22
Conference of Design	1	4.35	23
Total	23	100	

Our chosen articles are from different journals, and Table 1 portrays the point of the interaction and HCI plan in various ways. Most quantities, 73.9% of papers from other journals, and the rest of 26.1% of articles are from the International Conference on Computer (8.70%), IET Computer Version (8.70%), an International Journal of Human-Computer (8.70%).

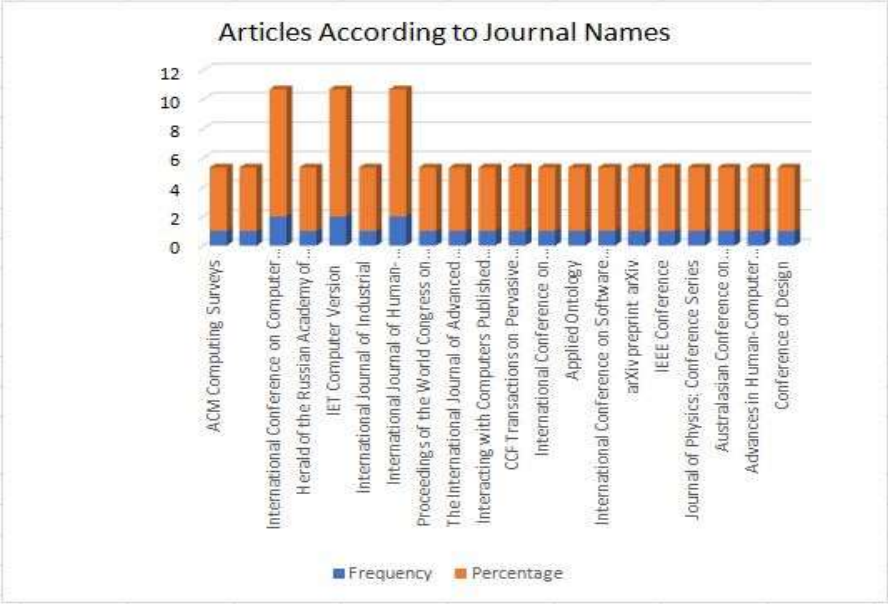

Figure 5: Articles According to the Journal Names

5. Conclusion and Future work

This article proposes the subject of synergized communication among people and advancements under the designation HCI. Which explicitly distinguishes, advances, improve, and synergizes intrinsic human limits and innovative capacities by augmenting collaboration. Among the advantages of a more noteworthy collaborative point would be consistent human-innovation communications, a more precise and significant objective for the plan, more down-to-earth and maintainable results, and more private and social fulfillment in a couple of communication courses, and the results in human existence. However, this paper does not point or profess to give nitty gritty responses to unfolded reports on these problems. That paper convention shows the review's reasoning, speculation, and arranged strategies. The design interface can corrupt because when it deteriorates, we face the other client assistance challenges incorporating the decrease of the actual weight from enduring the gadget; inaccurate concentration, or the result. However, a significant number of unwavering quality or legitimacy testing & are not reliably involved across the exploration investigated, creating problems for the legitimacy of estimation. We will consider parts of a plan or explore hypothesis-motivated research questions because the formal observational investigations cannot evaluate the tasteful point of view of the plan because of its subjectivity. These lines, the ends are challenging to characterize & appear to be obvious to apply to the reasonable plan. We used the UX methodology because it is crucial or binding web applications, sites, & work area applications are frameworks appearing as the idea of (HCI). We call the (UX) user experience human collaboration with frameworks. The worth of our report is to incite and suggest subtleties with the goal that an assortment of individuals might look from their particular conditions on what should and ought to be possible exhaustively. The very prerequisite for research & tried arrangements has moved us to the motive of the foundation of the Human-computer interface as a significant exploration outline. We need a theoretical structure that is delicate to the period, versatile to particular conditions and values worldwide, and different signs and in contact with the advancement of human & gadget possibilities.

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