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Evaluating The Impact of Micro-Interactions on User Engagement: Study the Effects of Micro-Interactions on User Experiences on University-Level Platforms

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ABSTRACT

In the field of human-computer interaction (HCI), the impact of micro-interactions on user experiences (UX) has taken an important step. Micro-interactions are small, subtle animations or visual signs integrated into user interfaces that can impact user engagement, satisfaction, and attention. This article presents a study that aims to measure the effects of micro-interactions on these key factors. Through experimental analysis, the article presents explanations of the importance of micro-interactions in user interface design and their impact on user skills. The study used several purposefully controlled designs and then collected data from

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the respondents. Participants interacted with an interface that combined several types of interfaces with and without micro-interactions simultaneously, while their usage experiences were recorded and their feedback was obtained through a well-designed questionnaire. Quantitative analysis techniques, including the Statistical Package, were used to compare survey responses and identify statistically significant differences. The results emphasize the value of incorporating well-designed micro-interactions into interface design to create more engaging and satisfying user experiences (UXs). Interface designers can use these insights to enhance user-centric design practices and optimize system performance. Finally, this study enhances our understanding of the role and effect of micro-interactions in human-computer interaction (HCI). The study focuses on the nuanced connection between users and micro-interactions, demonstrating how these indirect design elements can profoundly impact user experiences. We are continually refining our understanding of how these small design details shape the digital landscape, driving innovation and enhancing user interactions in effective ways.

1. Introduction

HCI, as a discipline, appeared in the 1980s with the primary focus of making computer interfaces more user-friendly. One of the important outcomes of using Human-Computer Interaction is the removal of physical buttons on current smartphones compared to the newest models from previous years, due to the use of touchscreens as the primary mode of interaction. Instead of the benefits of removing physical buttons, it has led to sleeker designs, larger screens, and more immersive visuals. In older phones, before using HCI, you had to press a button several times to perform an action. Furthermore, the absence of physical buttons has allowed for more flexible and customizable user interfaces. Figure (1) shows the difference between mobile phones with and without HCI [1].

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Micro-interaction is considered to be an essential part of HCI since users react positively to user engagement, satisfaction, attention, and early understanding of the platforms they work on. Additionally, it is important to confirm that the view advocated by designers is supported by users, indicating that micro-interactions improve UX. Ultimately, designers are also considered as part of the user base, similar

A B

Figure (1): A) Smart Phone without physical Buttons, B) Blackberry Mobile with Physical Buttons.

to any other field. .Further research is necessary to enhance the subject's objectives Micro-interactions refer to small, subtle animations or visual cues combined into UIs (user interfaces) to provide feedback, enhance interactions, create engaging experiences, and give users a sense of control. Figure (2) shows some visually animated micro-interactions for a different purpose. This research Figure (1): A) Smart Phone without physical buttons, B) Blackberry Mobile with Physical Buttons. This article aims to assess the impact of micro-interactions on these critical factors and provide empirical evidence and insights for interface designers [2, 21].

As perceived, most universities use several platforms, including learning management system platforms such as Moodle, grading platforms, quality assurance process platforms, university websites, and sub-domains such as journals, forums, etc. Most

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of them are designed in a way that needs improvement in interface design and use micro-interaction elements. Therefore, this study highlights the point to better understand whether micro-interactions are used accurately or not and whether their use causes users to improve their engagement, satisfaction, and attention to the mentioned platforms [3, 4].

2. Literature review

(Samuelsson, A. and Lagerquist, A., 2021) explained the effect of micro-interactions on users' ability to complete web-based forms according to the data requirements. Through this, they also provide an understanding of how the user experience is positively affected and, as such, improves the perceived experience [5]. (Luo, Y. and Cai, J., 2022) mentioned in their study on Social Networking Service (SNS) that they found using micro-interaction elements in UIs of social networking service pages makes products well displayed to crowds of customers [6]. Several recent studies have been conducted in this field. According to (Herna, L., December 2020), which analyzed the effect of micro-interaction in the Instagram application on the users, it can make the product more fun, interesting, and deeply and smartly bond with the user [7]. In addition, (Vikalp Kaushik, 2022) announced that micro-interaction is small, and sometimes few, but it plays a very important role. As researchers, we have seen that the subject needs more research, especially in interface design, which aims to improve interaction and satisfaction on various university platforms after using the principles of micro-interaction (Figure 3). It also has a positive perception of the organization behind it [4]. By studying the effects of micro-interactions on user engagement, micro-interactions aim to uncover their potential in fostering a more engaging UX (Unger, R. and Chandler, C., 2023). In Interaction Design – Beyond Human Computer Interaction (Sharp, Helen., Rogers, Yvonne., and Preece, Jennifer., 5th Edition, 2019), interaction design is related to designing interactive products to support communication and interaction in everyday life and work [2, 9]. For this purpose, a survey was organized and distributed to the participants, and feedback was received. Then, the data obtained were analyzed through well-known platforms

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in the field, and the results were presented to the designers [10, 11, 12]. (Chromik, M. and Butz, A., 2021) User-friendly digital interfaces with micro-interactions led to an improved overall user experience.

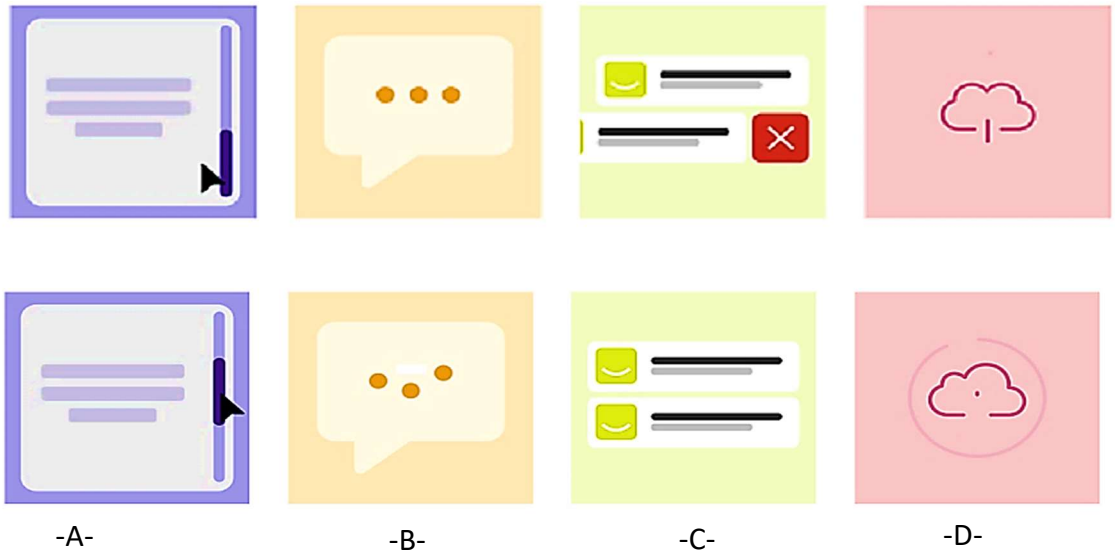

Figure (2): Visually animated micro-interaction for a different purpose.

In Figure 2, some icons are presented with and without micro interactions as follows: a) a scrollbar that appears when you move the mouse cursor, b) the ability to see that another person is typing, c) the ability to see that another person is typing, d) the ability to see that another person is typing.

2. Micro-interactions

Micro-interactions have gained critical attention in the HCI field due to their importance in enhancing user engagement experiences. This chapter presents a review of the related literature to understand the current status of the issue and identify research gaps in the impact of micro-interactions on users [13, 14].

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2.1 Definition and Characteristics of Micro-interactions

Micro-interactions refer to small, subtle animations inserted into user interfaces to add a sense of enjoyment during interactions. Micro-interactions are purposeful, single-task interactions that occur within larger user experiences [15,17]. Several studies have investigated the relationship between micro-interactions and user engagement. Subtle animations in micro-interactions increased user attention and engagement during task completion. Higher user satisfaction levels were observed when micro-interactions were employed to provide real-time feedback [16, 9].

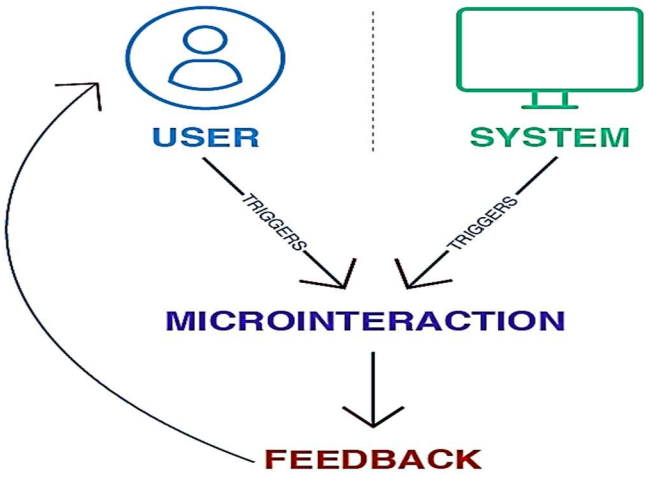

Figure (3): A process flow indicating how micro-interactions are either user- or system- triggered, and result in feedback communicated to the user by a small change in the user interface.

From Figure 3, the process flow indicates how micro-interactions work. Micro-interactions are small and simple, often only doing one thing. This can positively influence users' perception of system responsiveness, reducing perceived waiting time, and enhancing the overall user experience.

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2.2 Design Guidelines

Designers and researchers have proposed various guidelines for effectively integrating micro-interactions into user interfaces. Design principles are quite extensive; here are a few points that are mentioned when it comes to using these principles to design human-computer interactions [18].

1. Keep things consistent. Users prefer and perform better when an interface feels similar to something they have used in the past.
2. Help constrain bad outcomes. Removing possible bad outcomes even before users interact with an interface helps to provide a sort of "guide rail" for the user and reduces the amount of effort and cognitive load needed to complete a task.
3. Keep things simple. Try to highlight key actions and information needed by the user without overcrowding the interface.

To optimize the user experience, it is crucial to keep micro-interactions simple and inconspicuous, allowing them to enhance audience engagement effortlessly [19, 20]. Balancing knowledge and creativity, incorporating familiar interactions while exploring innovative connections ensures user satisfaction. Prioritizing functionality over aesthetics, micro-interactions must serve a purpose in facilitating ease of use. Placing user satisfaction at the forefront, micro-interactions should be constructed with the same focus on comfort and shareability as the overall design. Avoiding any distractions, minimal interactions should seamlessly integrate with the user's experience without detracting from the content. While small interactions may seem insignificant, they have a significant impact on digital interactions, making it essential to test and evaluate their effectiveness before implementation [23, 24].

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To sum up, the reviewed literature demonstrates the potential of micro-interactions to positively affect user engagement, satisfaction, and attention. However, additional research is needed to further investigate the mechanisms and identify specific design guidelines for the optimal integration of micro-interactions into UI [25].

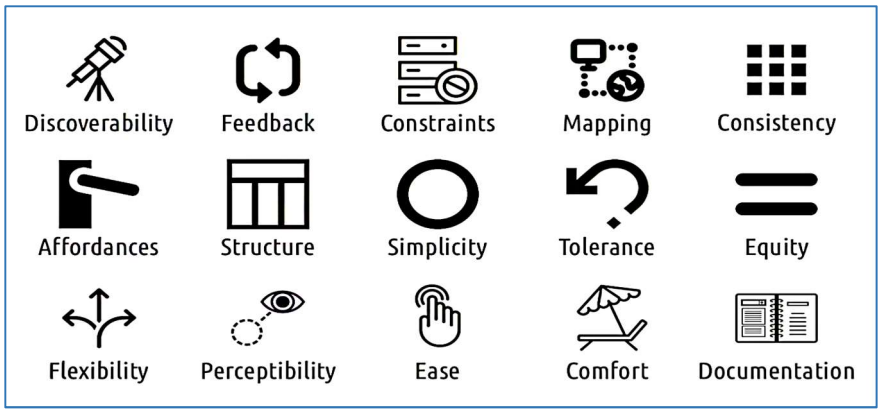

Figure (4): HCI Design and Principles Diagram

These general principles, which appear in Figure 4, are part of the Universal Design process used to enhance human-computer interaction by improving how an interface is utilized and understood by humans.

3. Methodology

3.1 Participants

The study will involve participants from the university community. A diverse group of participants will be recruited, including students, academic staff, and employees who have experience using university-level platforms such as learning management systems (LMS), grading systems, university journals, quality assurance databases, Enterprise Resource Planning (ERP) systems, and so on.

3.2 Pre-Experiment Training and Data Collection

Before commencing the experiment, participants are provided with a brief training session on the interface and any specific tasks they will perform. This includes many elements with and without micro-interactions shown through a video. This ensures

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that participants have a basic understanding of the interface's functionality and can focus on their interactions during the experiment. A survey will be designed to capture quantitative data related to micro-interactions. The questionnaire will be administered to participants to gather individual responses. The questions will be derived from the attributes identified in the earlier stages of research and measured on a Likert scale or through multiple-choice options. The questionnaire will be administered to participants to gather individual responses and distributed electronically through social media groups for college staff, students, and friends of the participants. Following the completion of the survey, finally, the answers will be collected and stored securely.

The survey questionnaire used in this study was designed to evaluate the influence of micro-interactions on user experiences. The questionnaire consisted of twelve questions distributed across two sections, covering various aspects related to micro-interaction evaluation. The response to most questions was based on psychometric measurements, consisting of a series of statements or items that participants were asked to respond to on the Likert scale, ranging from six to eleven. The questionnaire also included open-ended questions to gather feedback from participants.

3.3 Analysis and Integration of Findings

Collected data will be analyzed using statistical packages such as SPSS or R to identify statistical differences, correlations, and descriptive statistics. Inferential statistical tests, such as t-tests, will be conducted to examine the differences between participant groups (students, academic staff, and employees) and to assess the relationships between variables of interest. In this study, a quantitative approach was employed to investigate survey responses, and the quantitative analysis provides a deeper understanding of participants' perspectives. The results will provide insights into the impact of micro-interactions on user experiences on university-level platforms, supporting the validity and reliability of the research findings.

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3.4 Data Reliability Considerations

Assuming that a reliability assessment was conducted using SPSS to evaluate the stability and consistency of our measurement tool, the main objective of this evaluation was to determine the dependability of the items or scales employed in our study. Through this test, valuable data concerning the reliability and consistency of our collected data were obtained by scrutinizing inter-item correlations and applying statistical measures like Cronbach's alpha. This facilitated informed judgments regarding the quality and credibility of our data.

4. Results and Discussion

A survey was conducted to gather data from users, including their gender, age, role in the university, overall technology experience, duration of platform usage, and their perceptions of micro-interactions in six questions in section two of the questionnaire. Table 1 shows the participants' demographics and their roles in the university, and Table 2 shows the participants' prior experience and duration of using university platforms.

Table (1): Participants Demographic and their Roles on University

Title	Type	N %
Age	18 to 24	65.6%
	25 to 34	8.0%
	35 to 44	21.5%
	45 to 54	4.3%
	55+	0.6%
Gender	Male	58.3%
	Female	41.7%
Role in University	Academic Staff	19.0%
	Employee	8.6%
	Student	72.4%

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Table (2): Prior Experience and Duration on Using University Platforms

Title	Type	N %
Prior Experience	Beginner	9.8%
	Intermediate	62.6%
	Expert	27.6%
Duration on University Platforms	Less than 1 year	29.4%
	1 to 3 years	44.2%
	3 to 5 years	16.0%
	More than 5 years	10.4%

Table (3): Data Analyzing

Level	Direction	Percent	S. Div	Mean	S. D.	Disagree	Neutral	Agree	S. A.	Q. No.
1	Agree	79	0.844	3.939	0%	6%	20%	47%	26%	5
2	Agree	70	0.789	3.509	2%	9%	25%	61%	2%	4
3	Agree	69	0.591	3.460	1%	0%	52%	46%	1%	1
4	Neutral	67	0.658	3.331	0%	9%	50%	40%	1%	3
5	Neutral	66	0.675	3.294	1%	9%	52%	37%	1%	6
6	Neutral	63	0.788	3.166	1%	20%	41%	37%	1%	2

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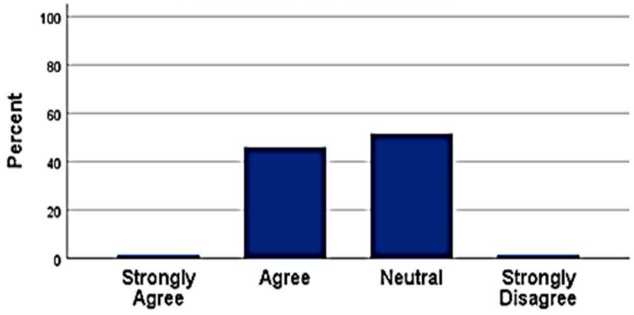
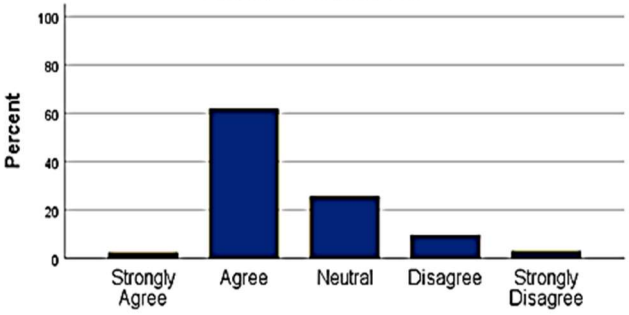
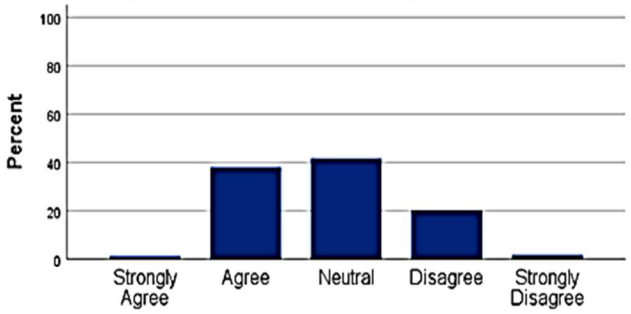
Question No. 1: How engaging do you find the micro-interactions to enhance your user experience?



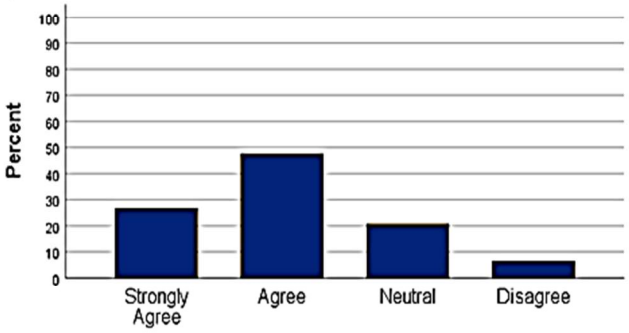
Question No. 4: Do the micro-interactions enhance the clarity and Usability of the platform's



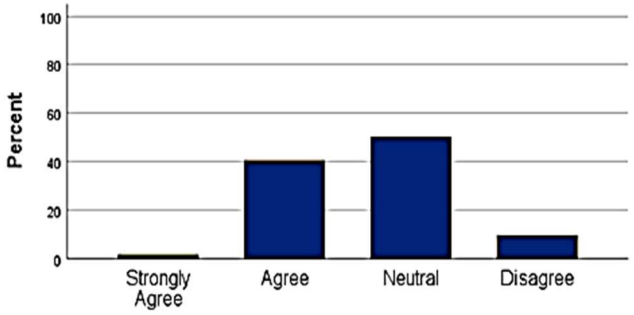
Question No. 2: To what extent do the micro-interactions contribute to your overall satisfaction with the platform?



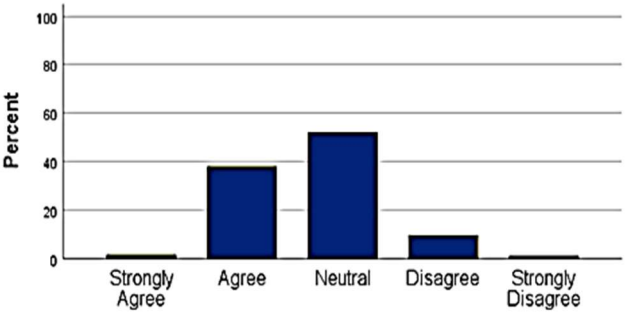
Question No. 5: Do Micro-interactions enhance a task's attention focus?



Question No. 3: Are the micro-interactions not distracting or overwhelming?



Question No. 6: To what extent do Micro-interactions improve task performance



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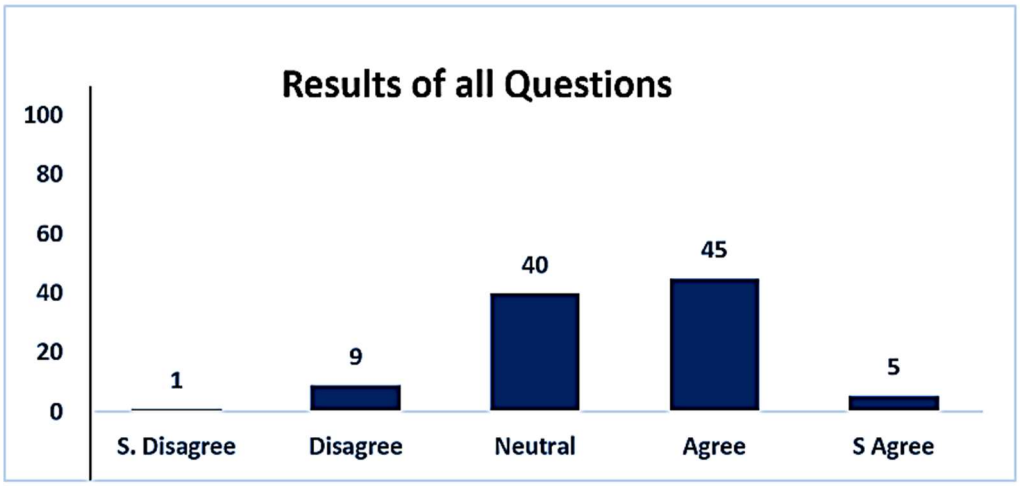

Figure (5) results of data analysis using the Statistical Package for the Social Sciences (SPSS).

Question No. 1 (How engaging do you find the micro-interactions to enhance your user experience?): 69% of respondents agreed that micro-interactions are engaging in enhancing their user experience.

Question No. 2 (To what extent do the micro-interactions contribute to your overall satisfaction with the platform?): 63% of respondents provided a neutral response regarding the contribution of micro-interactions to their overall satisfaction with the platform.

Question No. 3 (Are the micro-interactions not distracting or overwhelming?): 67% of respondents provided a neutral response, indicating that they neither found micro-interactions distracting nor overwhelming.

Question No. 4 (Do the micro-interactions enhance the clarity and usability of the platform?): 70% of respondents agreed that micro-interactions enhance the clarity and usability of the platform.

Question No. 5 (Do micro-interactions enhance a task's attention focus?): 79% of respondents agreed that micro-interactions enhance a task's attention focus.

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Question No. 6 (To what extent do micro-interactions improve task performance?): 66% of respondents provided a neutral response regarding the extent to which micro-interactions improve task performance.

The results declare the positive impact of micro-interactions on user engagement, satisfaction, and attention. The presence of micro-interactions enhances UX by providing subtle feedback that improves interaction quality and perceived system performance. The results confirm the significance of incorporating well-designed micro-interactions in interface design to create engaging and satisfying UX.

5. Conclusion:

The survey results provide valuable insights into the impact of micro-interactions on user experiences within university-level platforms. Most of the participants, regardless of their roles, documented the effectiveness of micro-interactions in enhancing their ability to use the platforms. Micro-interactions were found to significantly improve user experiences. Additionally, micro-interactions were expected to enhance the clarity and usability of the platforms, assisting users with their interactions. While most users find micro-interactions supportive, designers need to strike a balance to prevent them from becoming distracting or overwhelming. It was also revealed that micro-interactions played a role in enhancing users' focus and task performance within university-level platforms. Designers must consider the preferences and experiences of users, taking into account factors such as gender, age, and prior technology experience, in order to create engaging and satisfying user experiences. Finally, this study demonstrates that micro-interactions have a positive impact on user experiences within university-level platforms. Developers and interface designers can create more engaging and user-friendly interfaces that cater to the needs of users in educational platforms.

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هەڵسەنگاندنی کاریگەری کارلێکە بچووکەکان لەسەر بەشداریکردنی بەکارهێنەر: پشکنینی کاریگەرییەکانی کارلێکە بچووکەکان لەسەر ئەزموونی بەکارهێنەر لەسەر پلاتفۆرمەکانی ئاستی زانکۆ

پوختە:

لە بواری کارلێکی مرۆڤ و کۆمپیوتەر (HCI)، کاریگەری کارلێکی بچووک لەسەر ئەزموونی بەکارهێنەر (UX) هەنگاوێکی گرنگی ناوە. کارلێکی بچووک بریتین لە ئەنیمەیشنی بچووک و ورد یان تاگی بینراو کە لە ڕووکارەکانی بەکارهێنەردا یەکخراون کە دەتوانن کاریگەرییان هەبێت لەسەر بەشداریکردنی بەکارهێنەر، ڕەزامەندی و سەرنجدان. ئەم بابەتە لێکۆڵینەوەیەک دەخاتە ڕوو کە ئامانجیەتی کاریگەرییەکانی کارلێکە بچووکەکان لەسەر ئەم هۆکارە سەرەکیانە بپێوێت. لە ڕێگەی شیکاری ئەزموونییەوە، بابەتەکە ڕوونکردنەوە دەدات لە گرنگی کارلێکە بچووکەکان لە دیزاینی ڕووکاری بەکارهێنەر و کاریگەرییەکانیان لەسەر کارامەیی بەکارهێنەر. توێژینەوەکە چەندین دیزاینی بە ئامانج کۆنترۆڵکراو بەکارهێناوە و دواتر زانیاری لە بەشداربووان کۆکراوەتەوە. بەشداربووان کارلێکیان لەگەڵ ڕووکارێکدا کرد کە چەندین جۆری ڕووکار لەگەڵ کارلێکی بچووک و هیچ کارلێکێک لە یەک کاتدا تێکەڵ کردبوو، لە کاتێکدا ئەزموونی بەکارهێنانیان تۆمارکرا و فیدباکەکانیان لە ڕێگەی پرسیارنامەیەکی باش داڕێژراوەوە وەرگیرا. تەکنیکەکانی شیکاری چەندایەتی، لەوانەش پاکێجێکی ئاماری، بەکارهێنران بۆ بەراوردکردنی وەڵامەکانی ڕاپرسییەکە و دیاریکردنی جیاوازییە ئامارییە

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گرنگەکان. ئەنجامەکان جەخت لەسەر بەهای یەکخستنی کارلێکە بچووکە باش دیزاینکراوەکان دەکەنەوە لە دیزاینی ڕووکارەکاندا بۆ دروستکردنی ئەزموونی بەکارهێنەری سەرنجڕاکێشتر و دڵخۆشکەرتر (UXs). دیزاینەرانی ڕووکار دەتوانن ئەم بیرۆکانە بەکاربهێنن بۆ بەرزکردنەوەی پراکتیکەکانی دیزاینی بەکارهێنەر سەنتەری و باشترکردنی کارایی سیستەم. لە کۆتاییدا، ئەم توێژینەوەیە تێگەیشتنمان لە ڕۆڵ و کاریگەری کارلێکە بچووکەکان لە کارلێکی مرۆڤ-کۆمپیوتەر (HCI)دا بەرەوپێش دەبات. توێژینەوەکە سەرنجی لەسەر پەیوەندییە نوانسییەکانی نێوان بەکارهێنەران و کارلێکە بچووکەکانە، کە نیشان دەدات کە چۆن ئەم توخمە ناڕاستەوخۆیانەی دیزاین دەتوانن کاریگەری قوولّیان لەسەر ئەزموونی بەکارهێنەر هەبێت. ئێمە بەردەوام تێگەیشتنمان باشتر دەکەین کە چۆن ئەم وردەکارییە بچووکانەی دیزاین دیمەنی دیجیتاڵی لە قاڵب دەدەن، داهێنان دەباتە پێشەوە و کارلێکەکانی بەکارهێنەر بە شێوازی بەهێز بەرز دەکەنەوە.

تقييم تأثير التفاعلات الصغيرة على مشاركة المستخدم: دراسة آثار التفاعلات الصغيرة على تجارب المستخدم على المنصات على مستوى الجامعة

الملخص:
في مجال التفاعل بين الإنسان والحاسوب(HCI) ، اتخذ تأثير التفاعلات الدقيقة على تجارب المستخدم (UX) خطوة مهمة. التفاعلات الدقيقة عبارة عن رسوم متحركة صغيرة ودقيقة أو علامات مرئية مدمجة في واجهات المستخدم والتي يمكن أن تؤثر على تفاعل المستخدم ورضاه وانتباهه. تقدم هذه المقالة دراسة تهدف إلى قياس آثار التفاعلات الدقيقة على هذه العوامل الرئيسية. ومن خلال التحليل التجريبي يقدم المقال توضيحات لأهمية التفاعلات الدقيقة في تصميم واجهة المستخدم وتأثيرها على مهارات المستخدم. استخدمت الدراسة العديد من التصميمات التي تم التحكم فيها بشكل هادف ثم جمعت البيانات من المشاركين. وتفاعل المشاركون مع واجهة تجمع بين عدة أنواع من الواجهات مع تفاعلات صغيرة وبدون تفاعلات في وقت واحد، بينما تم تسجيل تجارب الاستخدام الخاصة بهم وتم الحصول على ملاحظاتهم من خلال استبيان مصمم جيدًا. واستخدمت تقنيات التحليل الكمي، بما في ذلك الحزمة الإحصائية، لمقارنة استجابات المسح وتحديد الاختلافات ذات دلالة إحصائية. تؤكد النتائج على قيمة دمج التفاعلات الصغيرة المصممة جيدًا في تصميم الواجهة لإنشاء تجارب مستخدم أكثر جاذبية وإرضاءً .(UXs) يمكن لمصممي الواجهات استخدام هذه الأفكار لتعزيز ممارسات التصميم التي تركز على المستخدم وتحسين أداء النظام. أخيرًا، تعزز هذه الدراسة فهمنا لدور وتأثير التفاعلات الدقيقة في التفاعل بين الإنسان والحاسوب .(HCI) تركز الدراسة على العلاقة الدقيقة بين المستخدمين والتفاعلات الصغيرة، مما يوضح كيف يمكن لعناصر التصميم غير المباشرة هذه أن تؤثر بشكل عميق على تجارب المستخدم. نحن نعمل باستمرار على تحسين فهمنا لكيفية تشكيل تفاصيل التصميم الصغيرة هذه للمشهد الرقمي، وتحفيز الابتكار وتعزيز تفاعلات المستخدم بطرق فعالة.