Impact Analysis of Microinteractions on User Experience in User Interfaces

Karol Łazaruk, Natalia Prażmo, Karolina Rybak, Mariusz Dzieńkowski, Piotr Tokarski,
and Małgorzata Plechawska-Wójcik
Department of Computer Science
Lublin University of Technology
Lublin, Poland
e-mail: k.lazaruk@pollub.pl, s95537@pollub.edu.pl, k.rybak@pollub.pl,
m.dzienkowski@pollub.pl, p.tokarski@pollub.pl, m.plechawska@pollub.pl

***Abstract*—Microinteractions constitute a crucial element in enhancing the usability and overall user experience of digital interfaces. The objective of this study is to empirically investigate the impact of incorporating microinteractions into an e-commerce interface by comparing two versions: one with microinteractions and one without them. The experimental procedure employed eye-tracking technology in conjunction with the Short version of the User Experience Questionnaire (UEQ-S), which was extended with additional author-developed items. The results revealed a substantial improvement in usability, a higher intention to reuse the system, and approximately double the levels of excitement and enjoyment when interacting with the interface enriched with microinteractions. Notably, participants using the version without microinteractions reported a perceived need for these features more frequently, potentially indicating heightened frustration due to their absence. Although not all observed differences reached statistical significance, the overall findings support the conclusion that microinteractions have a positive influence on the quality of the user experience.**

Keywords-microinteractions; user interface; user experience; usability; eye tracking; UEQ-S questionnaire.

I. INTRODUCTION

User eXperience (UX) and User Interface (UI) design are central to modern digital systems, with microinteractions, such as animations and feedback, playing an increasingly important role in shaping user perception. As defined by Saffer, microinteractions consist of triggers, rules, feedback, and loops [1], which together enhance usability and engagement.

Research on microinteractions focuses primarily on their impact on UX and design approaches within user interfaces. McDaniel [2] defines microinteractions as structured units composed of triggers, rules, feedback, and loops that enhance usability and system efficiency. Gonzales et al. [3] emphasize the role of observing user behavior in interface design, while Boyd and Bond [4] demonstrate that microinteractions positively affect perceived usability in studies using System Usability Scale (SUS) and UEQ metrics. Falkowska et al. [5] show that rapid feedback improves form completion efficiency and user satisfaction. In mobile health applications, microinteractions increase accessibility and satisfaction [6], and similar benefits have been observed on academic platforms [7]. Ahn et al. [8] link personalization and visual interactivity to user agency and intention to recommend, while Reyneke [9] demonstrates their role in emotional attachment and brand loyalty. Positive emotional responses have also been associated with long-term engagement [10].

In the context of UX animation, Burge [11] reports that animated microinteractions enhance credibility, particularly among older users, while Lomakina [12] applies Disney's animation principles to support intuitive interface design. On platforms such as TikTok, effective microinteraction design is associated with increased retention and loyalty [13], while positive effects on satisfaction and usability have also been reported in e-commerce contexts [14]. Sosa-Tzec and Stolterman [15] emphasize the semiotic role of animations in clarifying functionality, and Jergović et al. [16] underline the importance of feedback-rich microinteractions for engagement. Smooth transitions between interface states have been shown to reduce disorientation [17], while appropriate animation timing supports UX fluency [18][19].

Research on wearable devices indicates that microinteraction timing and complexity influence cognitive load and user comfort [20]. Betz and Hall [21] show that optimized microinteractions increase satisfaction and adoption in institutional repositories, while Avila-Munoz et al. [22] and Antal [23] highlight the importance of balancing aesthetic and functional aspects to improve feedback, accessibility, and interface coherence.

A/B testing is commonly used to evaluate usability through controlled comparisons of interface variants [24]. Eye tracking complements this approach by providing objective measures, such as fixation duration and gaze trajectories [25], with machine learning increasingly used to support adaptive interface design [26]. Among subjective methods, questionnaires remain essential, with the UEQ-S validated as a reliable tool for assessing pragmatic and hedonic UX dimensions [27].

In summary, microinteractions significantly influence usability, emotional engagement, and user satisfaction. Their effectiveness depends on intentional design supported by rigorous evaluation using complementary research methods.

The rest of the paper is structured as follows: Section II describes the research methods, Section III presents the research results, Section IV discusses the results, and Section

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V concludes the paper.

II. Materials and Methods

The study analyzed the impact of microinteractions on the interface and UX, using eye-tracking technology and an evaluation questionnaire. Data were collected using an eye-tracking device, which enabled the recording and analysis of eye movements to evaluate how users interacted with the interface. Key eye-tracking metrics included Fixation Count, Fixation Duration (Dwell Time), Peak Saccade Velocity, Time to First Fixation (TTFF), as well as visualizations, such as heatmaps and scanpaths.

Complementarily, the UEQ-S was used to evaluate the usability and attractiveness of the interface [27], extended with additional items developed by the authors to allow for a more nuanced assessment.

A. Research plan

The research design comprised several stages (Figure 1) and was preceded by the development of two interface versions: one with microinteractions and one without. Participants were randomly assigned to one of two groups, each interacting with a different version of the system. Additional questionnaire items were included to enable a more detailed assessment of usability and user perception.

The experimental procedure consisted of two identical stages for both groups: eye-tracking analysis of responses to visual stimuli and an evaluation of the overall interface experience. After data validation, quantitative and qualitative analyses were performed.

B. Research object

For the purposes of the experiment, a simple website in the form of a store for technology items, such as electronics and accessories was implemented. The site was designed as a browser-based application in two versions: one included microinteractions, the other did not. The store consisted of five main views: home page, product list, product details, shopping cart, and registration page. Users could perform basic actions, such as registering, browsing, searching for products, and adding and removing them from the shopping cart.

The main difference between the interface versions was the use of microinteractions, such as button animations, user guidance, and feedback on actions performed. The application was designed for intuitive use and its interface provided

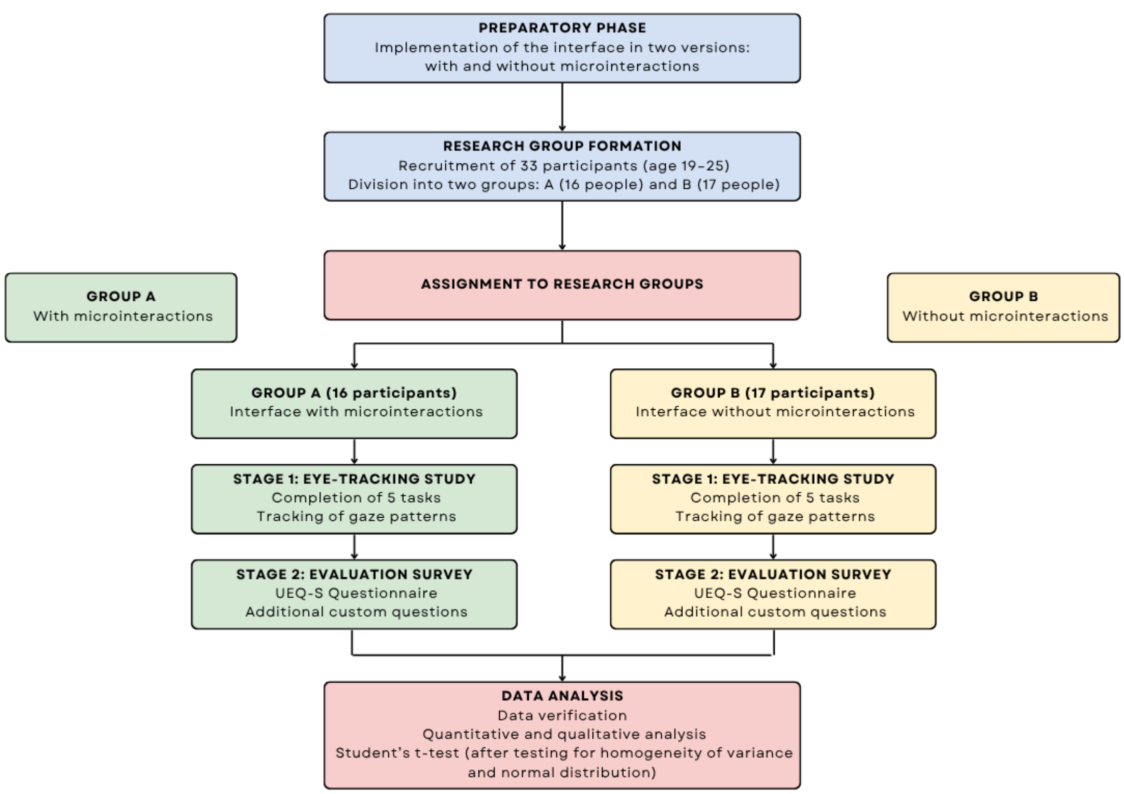

Figure 1. Study design.

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readability and user-friendliness, allowing participants to focus on the tasks at hand.

C. Research group

The study included 33 participants aged 19 to 25. Their mean age was 21.9 with a standard deviation of 1.06. The study group mainly consisted of men (30 males, 3 females). Most participants had normal or corrected vision. Minor uncorrected visual impairments were present in three cases but did not affect the results due to the task nature and short viewing distance. All the respondents were computer science students with advanced digital literacy and prior experience using online stores. In accordance with the A/B testing [24], participants were randomly assigned to two equivalent experimental groups, which tested two alternative versions of the interface that differed in the presence (A, $n = 16$) or absence (B, $n = 17$) of microinteractions, allowing for a reliable assessment of their impact on the UX under experimental conditions.

D. Research stand

The experiment was conducted under controlled laboratory conditions at the Lublin University of Technology, with appropriate lighting and ergonomic workstations. Eye movements were recorded using a Gazepoint GP3 HD remote eye tracker (150 Hz, 0.5–1° accuracy). Data were recorded and analyzed using iMotions software (v. 9.1).

E. Experiment description

During the eye-tracking phase, participants located and interpreted information across key website views, including promotional content on the main page (Task 1), product pricesand specifications on product list (Task 2) and detail pages (Task 3), interface controls in the shopping cart (Task 4), and form errors during registration (Task 5).

After completing the tasks, participants filled in an evaluation survey comprising the UEQ-S questionnaire [27] and 14 additional statements grouped into three dimensions. The usability dimension (S1–S7) assessed ease of information retrieval (S1), visual clarity (S2), task orientation (S3), action awareness (S4), feedback quality (S5), sense of control (S6), and perceived functional value of microinteractions (S7). The acceptability dimension (S8–S11) measured willingness to reuse the website (S8), preference for microinteractions (S9), perceived negative impact (S10), and influence on visual appeal (S11). The user experience dimension (S12–S14) evaluated enjoyment (S12), perceived system responsiveness (S13), and navigation smoothness (S14).

Data were collected individually and compared between groups to assess the impact of microinteractions.

F. Research metrics

To assess visual attention and cognitive load during UI interaction, standard eye-tracking metrics were applied, providing quantitative insight into visual processing and navigation. The analyzed measures included Time to First Fixation, Fixation Count, Dwell Time, Peak Saccade Velocity, and gaze visualizations in the form of heatmaps and scanpaths. These metrics were compared across interface variants to evaluate the impact of microinteractions on attention, search efficiency, and cognitive workload.

III. Research results

This section presents the study's results, including the most used eye-tracking metrics for evaluating usability, as well as users' responses to the questionnaire.

A. Eye-tracking results

Table I presents average values for TTFF, Dwell Time, Fixation Count, and Peak Saccade Velocity for interfaces with and without microinteractions. The version with microinteractions showed shorter TTFF, higher Dwell Time, increased Fixation Count, and higher Peak Saccade Velocity.

TABLE I. Average values for chosen metrics with the standard deviation

Metric	Micro.	No Micro.
TTFF [s]	1.88 ± 1.06	2.34 ± 0.79
Dwell Time [%]	25.48 ± 8.00	18.28 ± 5.38
Fixation Count	5.36 ± 2.47	4.06 ± 1.82
Peak Sac. Vel. [deg/s]	80.68 ± 6.25	72.46 ± 4.34

Average TTFF values (Figure 2) were generally lower for the interface with microinteractions, except in Task 3. The largest differences occurred in Tasks 2 and 4.

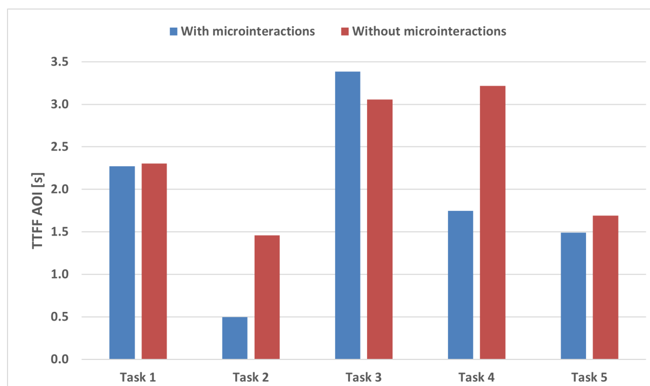

Figure 2. Average TTFF values for each task.

Average Dwell Time in the Area Of Interest (AOI) (Figure 3) was higher for the interface with microinteractions across all tasks except Task 4, where values were comparable.

The interface with microinteractions showed higher Fixation Count values and greater variance before entering the AOI compared to the non-interactive interface. Higher Peak Saccade Velocity values were also observed for the interactive version, with the distribution shifted toward higher velocities. In contrast, the non-interactive interface exhibited a more uniform distribution of viewing behavior and fewer high-velocity outliers.

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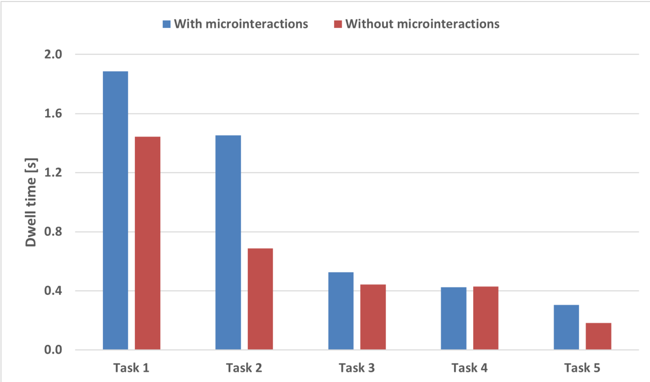

Figure 3. Average Dwell Time on AOI for each task.

Heatmaps for Task 3 are presented in Figure 4. For the interface with microinteractions (accordion – collapsible content), gaze concentrations were more localized around the expanded content section containing the searched information. In contrast, the non-interactive interface showed a more dispersed gaze distribution across the interface.

Similar behaviour can be noted for Task 5 (Figure 5). In the case of the interface with microinteractions (highlighting, error icon, and clear feedback), the strongest user attention is focused on the form field containing the error and the accompanying message. As for the version without microinteractions, users' gaze is primarily focused on the field above the actual error, which may indicate difficulty in locating it or a possible shift caused by measurement limitations. There is also a clear dispersion of attention, represented by green-yellow cold areas.

The scanpaths for Task 3 are shown in Figure 6. For the interface with microinteractions, scanpaths consisted of fewer fixations and shorter saccades. The non-interactive interface exhibited scanpaths with a higher number of fixations and longer saccades.

Similar observations can be made in the case of Task 5. Selected scanpaths, which are presented in Figure 7, show that in the interface with micro-interactions, the scanning pattern is significantly less chaotic. The number of fixations has decreased by more than half, and the number of long saccades has also been clearly reduced.

B. Questionnaire results

The UEQ-S questionnaire comprises eight bipolar items rated on a 7-point scale, assessing pragmatic quality (usability and functionality) and hedonic quality (aesthetics, stimulation, and attractiveness).

UEQ-S results (–3 to 3; Figure 8) show higher ratings for the interface with microinteractions across most dimensions, particularly usability, efficiency, perspicuity, supportiveness, and stimulation. The largest differences were observed in usability-related dimensions, indicating improved navigation and information processing. Higher stimulation and attractiveness scores suggest increased user engagement, while novelty showed minimal differences, implying a limited effect of microinteractions on perceived innovation.

Average ratings (1–7; Figure 9) show consistently higher scores for the interface with microinteractions across overall, pragmatic, and hedonic scales. The largest difference was observed for pragmatic quality, indicating a positive effect on perceived functionality, while the smallest difference occurred for hedonic quality, which nonetheless favored the microinteractions version.

Statistical significance between the two interface versions was assessed using UEQ-S results from an A/B test with two independent groups (n = 16 and n = 17).

As shown in Table II, independent samples t-tests revealed a statistically significant difference in pragmatic quality between the two interface versions ($p = 0.004$), whereas no significant difference was observed for hedonic quality ($p = 0.328$). The interface with microinteractions received higher ratings for supportiveness, efficiency, and perspicuity. The difference in the overall UEQ-S score did not reach statistical significance ($p = 0.063$).

a) b)

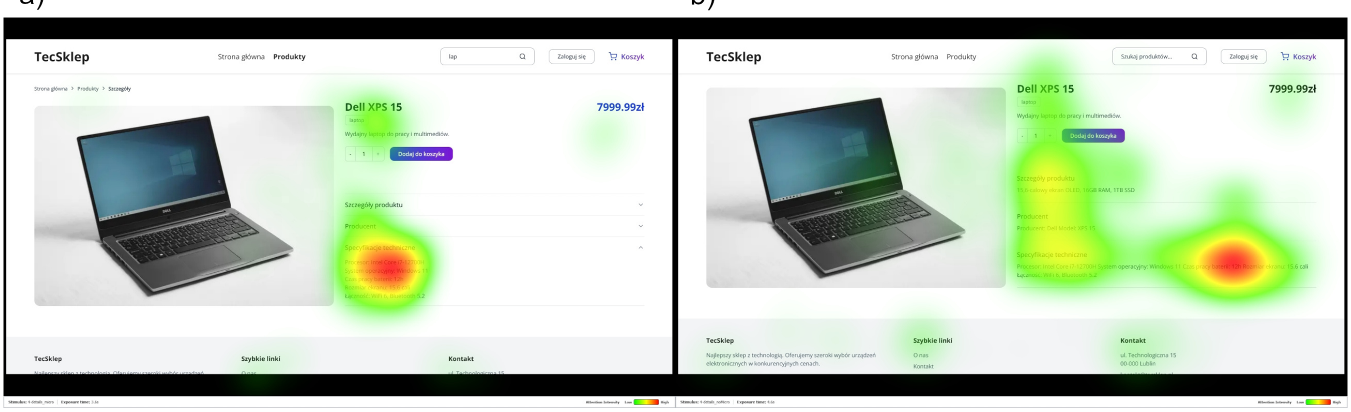

Figure 4. Heat map for Task 3: a) with microinteractions, b) without microinteractions.

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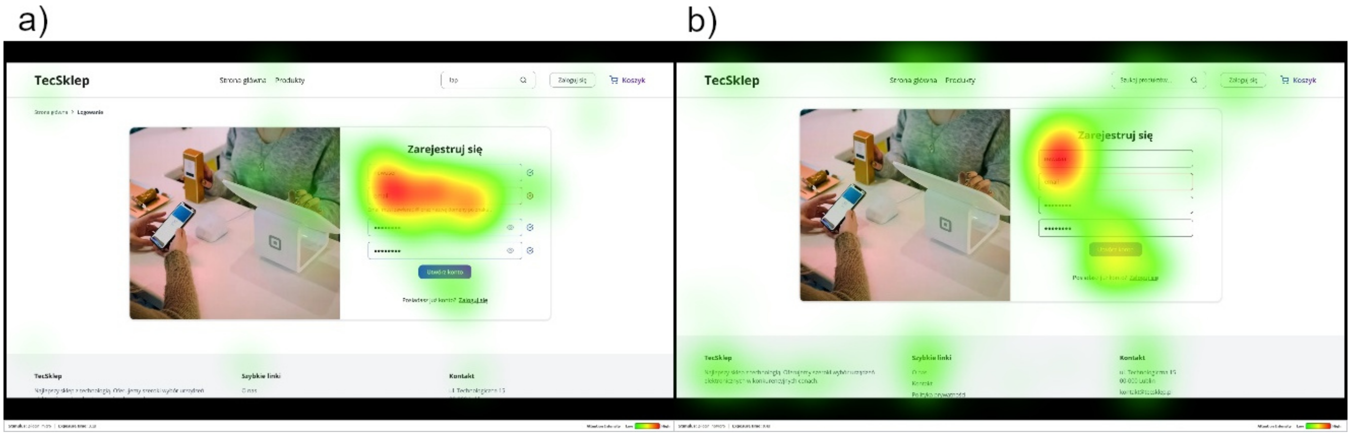

Figure 5. Heat map for Task 5: a) with microinteractions, b) without microinteractions.

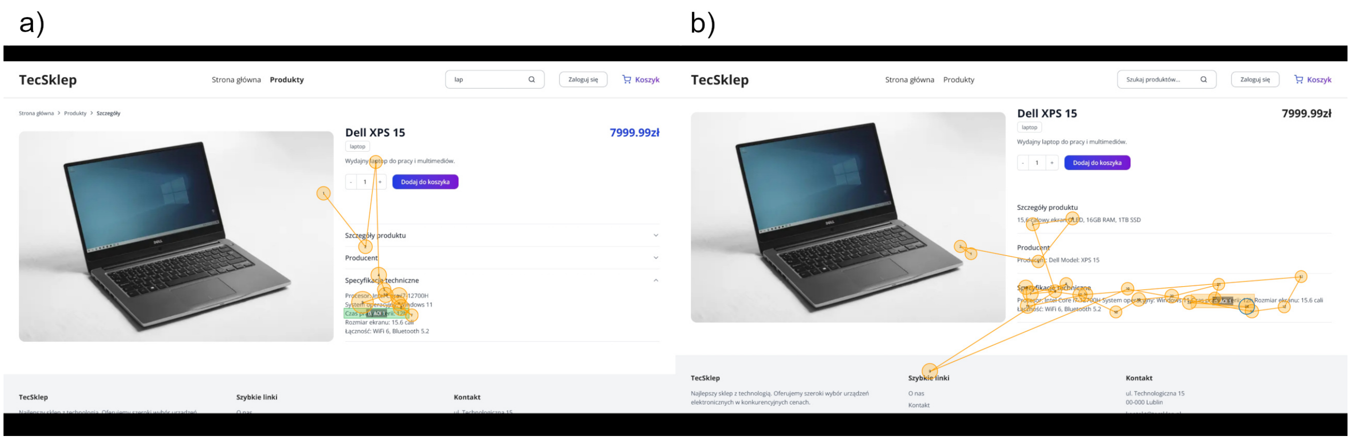

Figure 6. Scanning paths for Task 3: a) with microinteractions, b) without microinteractions.

The second part of the questionnaire comprised 14 statements evaluated on a 7-point Likert scale. Twelve statements were positively worded, while two were negatively worded. For the purpose of aggregated analyses, responses to the negatively worded statements were reverse-coded so that higher values consistently reflected more positive evaluations across all items.

Figure 10 presents the mean scores for individual statements for both interface versions. In the majority of cases, higher scores were observed for the version with microint-

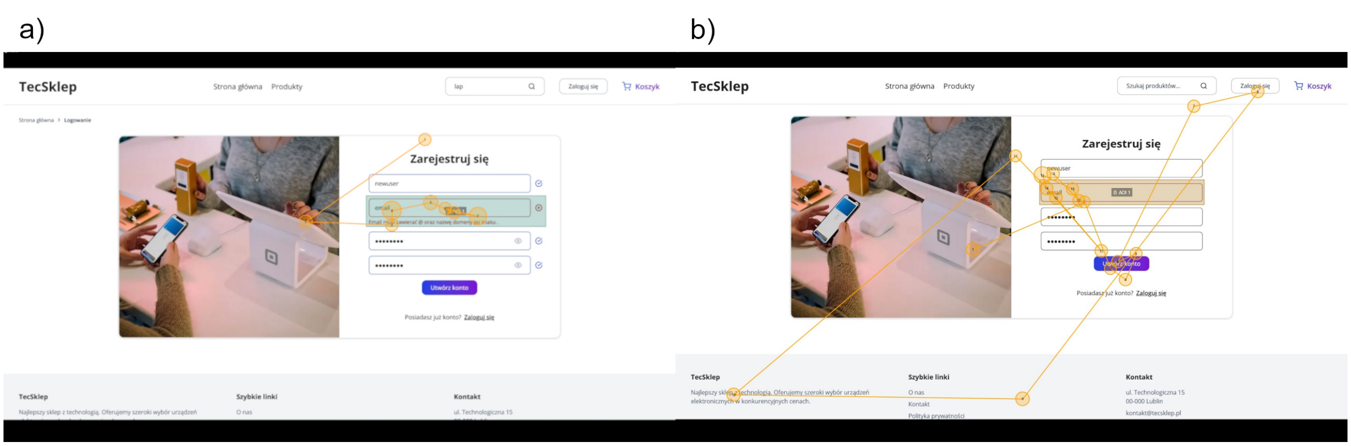

Figure 7. Scanning paths for Task 5: a) with microinteractions, b) without microinteractions.

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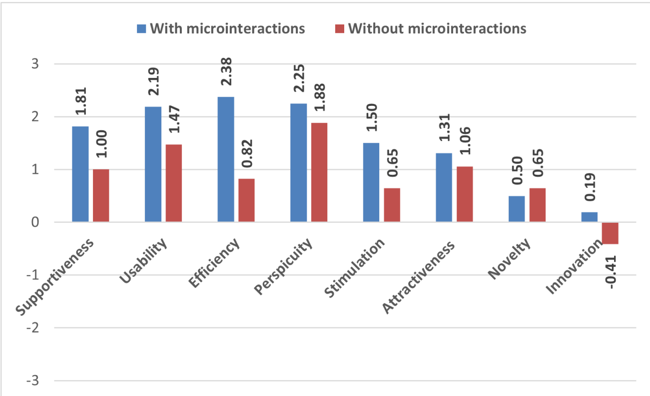

Figure 8. Average user UEQ-S ratings for both interface versions.

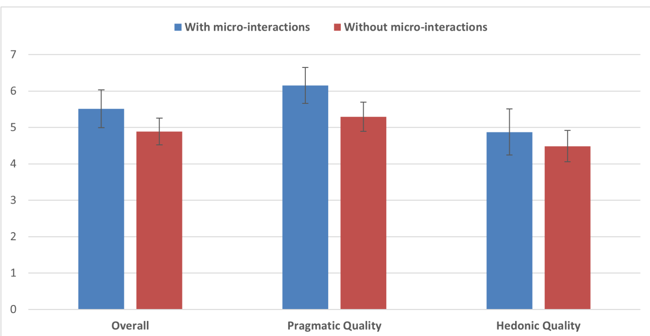

Figure 9. Average UEQ-S ratings by dimension.

TABLE II. Statistical test results for UEQ-S for each dimension

Scale	Test result	Stat. sig. diff.
UEQ-S overall	0.063	None
Pragmatic quality	0.004	Present
Hedonic quality	0.328	None

eractions. The largest differences between the two versions were recorded for statements S4–S6 (usability dimension) and S12–S13 (user experience dimension).

For statements S2, S7, and S9–S11, higher mean ratings were observed for the interface without microinteractions. Overall, the independent samples t-test results (Table III) revealed statistically significant differences between the two interface versions for usability, acceptability, and overall user experience.

Within the usability dimension (S1–S7), statistically significant differences in favor of the interface with microinteractions were found for action awareness (S4: $p = 0.007$), feedback clarity (S5: $p < 0.001$), and sense of control (S6: $p < 0.001$). The difference for information findability did not reach statistical significance (S1: $p = 0.059$). For statement S7, higher ratings were recorded for the interface without microinteractions ($p = 0.027$).

In the acceptability dimension (S8–S11), the interface with microinteractions received higher ratings for willingness to reuse the interface (S8: $p = 0.021$). No statistically significant difference was observed for perceived distraction (S10: $p = 0.154$). Higher ratings for the interface without microinteractions were found for statement S9 ($p = 0.033$).

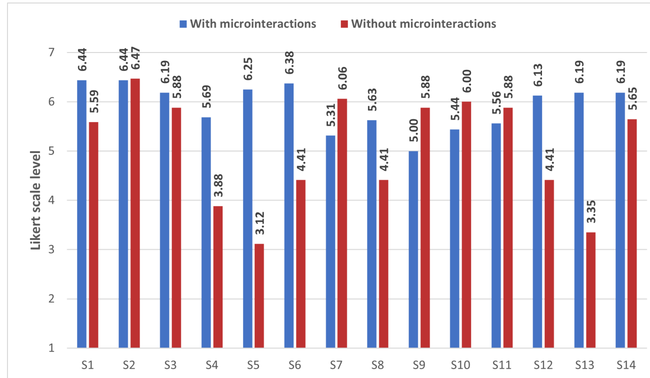

Figure 10. Average user ratings for additional statements.

TABLE III. Statistical test results for additional questions

Statement	S1	S2	S3	S4	S5
p-value	0.059	0.915	0.527	0.007	0.000
Statement	**S6**	**S7**	**S8**	**S9**	**S10**
p-value	0.001	0.027	0.021	0.033	0.154
Statement	**S11**	**S12**	**S13**	**S14**	**Total**
p-value	0.423	0.004	0.000	0.139	0.017

For the user experience dimension (S12–S14), statistically significant differences in favor of the interface with microinteractions were observed for enjoyment (S12: $p = 0.004$) and perceived responsiveness (S13: $p < 0.001$). The difference for navigational fluidity was not statistically significant (S14: $p = 0.139$).

Aggregated analysis across all statements showed a statistically significant difference between the two interface versions ($p = 0.017$).

IV. Discussion

The study demonstrates that microinteractions positively influence interface usability, User eXperience (UX), and overall acceptability. Objective eye-tracking measures and subjective assessments (UEQ-S and additional Likert items) provide converging evidence of their impact.

Eye-tracking results indicate that interfaces with microinteractions achieved shorter average TTFF, higher Fixation Count, longer Dwell Time in the AOI, and higher Peak Saccade Velocity, suggesting increased engagement and more dynamic visual exploration. Analyses of heatmaps and scanpaths further confirm that microinteractions improved visual focus on key elements, reduced attention dispersion, and supported faster localization of relevant information. In more

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complex interface structures, they led to fewer fixations and shorter scanpaths, indicating more efficient visual processing.

UEQ-S results confirmed the positive effect of microinteractions on perceived supportiveness, usability, and efficiency. Additional questionnaire items supported these findings, with users rating the interactive version as more responsive and more effective in providing feedback. The statistically significant difference in pragmatic quality between interfaces further reinforces the positive influence of microinteractions on usability. These results are consistent with prior studies showing that microinteractions improve engagement, feedback clarity, and interaction efficiency [2][5][7]. Research by [3][6][22] similarly emphasizes their role in enhancing interface intuitiveness, reflected in the improved perspicuity scores observed in this study. An exception was novelty, which was rated higher for the non-interactive version, likely due to the widespread presence of microinteractions in contemporary interfaces, such as TikTok [13].

The results also demonstrate a positive impact of microinteractions on UX. Questionnaire data showed significant improvements in stimulation, enjoyment, perceived responsiveness, and sense of control. These findings align with studies indicating that animation-based microinteractions enhance engagement and intuitiveness [12][16]. Microinteractions also increased perceived interface attractiveness and users' willingness to reuse the system. Eye-tracking data corroborated these outcomes by revealing more focused and less chaotic navigation patterns. Importantly, no negative impact on user comfort was observed, consistent with findings that microinteractions enhance UX by capturing attention and stimulating interest [4][10][15]. Users of the non-interactive version more often indicated that adding microinteractions could improve functionality and expressed a stronger preference for their inclusion in future interfaces, suggesting that their absence was noticeable [3][16][21].

Microinteractions did not significantly affect navigation fluidity, potentially due to the need for more refined animation timing, as noted in prior work [18][19]. Nevertheless, consistent with earlier research [8]–[10][15][17], microinteractions elicited positive emotional responses, leading to higher hedonic ratings.

In conclusion, the findings indicate that microinteractions significantly enhance usability, UX, and interface acceptability, confirming their value as an effective design tool in user interface development.

A. *Limitations of the study*

Certain subjective evaluations, including preferences for the version without microinteractions and assessments of interface originality, revealed discrepancies between participants. This suggests that individual expectations and prior experience may significantly influence the perception of microinteractions, thereby limiting the conclusiveness of findings regarding their perceived attractiveness and innovativeness.

Another limitation may be the laboratory-based experimental setting, which does not fully reflect naturalistic user behavior in real-world environments. The tasks were short and strictly defined (e.g., information search, shopping cart interaction, registration form completion), which may reduce the validity of the findings.

Additionally, the sample size was relatively small (n = 33) and homogeneous, consisting exclusively of computer science students with high digital literacy and prior experience with e-commerce systems. This limits the generalizability of the results to broader and more diverse user populations.

Finally, the analysis was restricted to two interface variants (with and without microinteractions), without considering different types or combinations of microinteractions, which may exert varying effects on attention allocation and cognitive load.

V. Conclusion and Future Work

The study confirmed that microinteractions significantly enhance interface usability and UX, as evidenced by improved eye-tracking metrics and questionnaire results indicating greater engagement, clarity, supportiveness, enjoyment, sense of control, and willingness to reuse the interface.

However, some results, such as mixed ratings of originality and occasional preference for the non-interactive version, suggest that user expectations and prior experience influence the perception of microinteractions, particularly in terms of innovativeness.

Future research should examine interactive website implementations, broader usage scenarios, and diverse types of microinteractions, while including participants with varying levels of technological proficiency to better understand their overall impact.

References

[1] D. Saffer, Microinteractions. O'Reilly, 2013, p. 151, ISBN: 9781449342807.

[2] R. McDaniel, "Understanding microinteractions as applied research opportunities for information designers," Communication Design Quarterly, vol. 3, pp. 55–62, 2 Mar. 2015, ISSN: 2166-1642. DOI: 10.1145/2752853.2752860

[3] S. Gonzales et al., "User testing with microinteractions," Information Technology and Libraries, vol. 40, 1 Mar. 2021, ISSN: 2163-5226. DOI: 10.6017/ital.v40i1.12341

[4] K. Boyd and R. Bond, "Can micro interactions in user interfaces affect their perceived usability?" In European Conference on Cognitive Ergonomics 2021, ACM, Apr. 2021, pp. 1–5, ISBN: 9781450387576. DOI: 10.1145/3452853.3452865

[5] J. Falkowska, B. Kilijańska, J. Sobecki, and K. Zerka, "Microinteractions of forms in web based systems usability and eye tracking metrics analysis," in 2019, pp. 164–174. DOI: 10.1007/978-3-319-94334-3_18

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[6] P. Bajda, R. Baliński, and M. Dzieńkowski, "Research on user experience during interactions with mobile applications for diabetics," Journal of Computer Sciences Institute, vol. 29, pp. 333–340, Dec. 2023, ISSN: 2544-0764. DOI: 10.35784/jcsi.3779

[7] Z. Shwany, C. Salh, H. Abdulrahman, and K. Khoshnaw, "Evaluating the impact of micro-interactions on user engagement," Qalaai Zanist Scientific Journal, vol. 9, pp. 1468–1485, 2 Jul. 2024, ISSN: 25186558. DOI: 10.25212/lfu.qzj.9.2.54

[8] J. Ahn, J.-M. Park, W.-H. Lee, and G.-Y. Noh, "Website interactivity and processing: Menu customization and sense of agency are keys to better interaction design," International Journal of Human-Computer Studies, vol. 147, p. 102 581, Mar. 2021, ISSN: 10715819. DOI: 10.1016/j.ijhcs.2020.102581

[9] R. Reyneke, "Improving interactive user experience with microinteractions: An application of biometric and affect detection systems on landing pages [Master's thesis]," Brigham Young University, 2019.

[10] J. Y. Ma and C.-C. Chen, "Evaluating user perception and emotion of microinteractions using a contradictory semantic scale," Journal of the Society for Information Display, vol. 30, pp. 103–114, 2 Feb. 2022, ISSN: 1071-0922. DOI: 10.1002/jsid.1075

[11] L. F. Burge, "The impact of website interface micro animations on user perceptions of trust, credibility, and design quality [Undergraduate honors project]," University of Texas at Arlington, 2024.

[12] M. Lomakina, "Defining microinteractions: Animation in UX [Bachelor's thesis]," University of Applied Sciences, 2017.

[13] J. Cai and Y. Luo, "Micro-interaction in SNS interface: Research on the design of micro-interaction in SNS interface [Master's thesis]," Jönköping University, 2022.

[14] E. S. Ari, "Cognitive effect of product-based animation on interface aesthetics of web-based stores," Entertainment Computing, vol. 52, p. 100 895, Jan. 2025, ISSN: 18759521. DOI: 10.1016/j.entcom.2024.100895

[15] O. Sosa-Tzec and E. S. Bergqvis, "Delight by motion: Investigating the role of animation in microinteractions," in the Motion Design Educators Summit Conf Proc, 2021, pp. 10–13.

[16] M. Jergović, N. S. Loknar, T. K. Ivančević, and A. A. Cmrk, "Micro-interactions within user interfaces," in Proceedings - The Twelfth International Symposium GRID 2024, University of Novi Sad Faculty of Technical Sciences Department of Graphic Engineering and Design 21000 Novi Sad, Trg Dositeja Obradovića 6, Nov. 2024. DOI: 10.24867/GRID-2024-p23

[17] M. Donati, G. Mori, and F. Paternò, "Understanding the transitions between web interfaces designed to stimulate specific emotions," Universal Access in the Information Society, vol. 19, pp. 391–407, 2 Jun. 2020, ISSN: 1615-5289. DOI: 10.1007/s10209-019-00649-y

[18] Y. Ge et al., "User perception of animation fluency: The effect of time duration in different phases of animated transitions during application usage," International Journal of Human-Computer Studies, vol. 186, p. 103 257, Jun. 2024, ISSN: 10715819. DOI: 10.1016/j.ijhcs.2024.103257

[19] F. Huth, T. Blascheck, S. Koch, and T. Ertl, "Studies and design considerations for animated transitions between small-scale visualizations," Journal of Visualization, vol. 26, pp. 1421–1443, 6 Dec. 2023, ISSN: 1343-8875. DOI: 10.1007/s12650-023-00937-z

[20] X. Yan, Y. Li, B. Huang, S. Y. Park, and M. W. Newman, "User burden of microinteractions: An in-lab experiment examining user performance and perceived burden related to in-situ self-reporting," in Proceedings of the 23rd International Conference on Mobile Human-Computer Interaction, ACM, Sep. 2021, pp. 1–14, ISBN: 9781450383288. DOI: 10.1145/3447526.3472046

[21] S. Betz and R. Hall, "Self-archiving with ease in an institutional repository: Microinteractions and the user experience," Information Technology and Libraries, vol. 34, pp. 43–58, 3 Sep. 2015, ISSN: 2163-5226. DOI: 10.6017/ital.v34i3.5900

[22] R. Avila-Munoz, J. Clemente-Mediavilla, and P.-L. Perez-Luque, "Communicative functions in human-computer interface design: A taxonomy of functional animation," Review of Communication Research, vol. 9, pp. 119–146, 2021, ISSN: 22554165. DOI: 10.12840/ISSN.2255-4165.030

[23] A. Antal, "Micro-interactions and animations in UX design for mobile applications," MASTERCOM – Politehnica Graduate Student Journal of Communication, vol. 7, pp. 32–44, 2 2022.

[24] F. Quin, D. Weyns, M. Galster, and C. C. Silva, "A/B testing: A systematic literature review," Journal of Systems and Software, vol. 211, p. 112 011, May 2024, ISSN: 01641212. DOI: 10.1016/j.jss.2024.112011

[25] M. García and S. Cano, "Eye tracking to evaluate the user eXperience (UX): Literature review," in 2022, pp. 134–145. DOI: 10.1007/978-3-031-05061-9_10

[26] J. Š. Novák, J. Masner, P. Benda, P. Šimek, and V. Merunka, "Eye tracking, usability, and user experience: A systematic review," International Journal of Human–Computer Interaction, vol. 40, pp. 4484–4500, 17 Sep. 2024, ISSN: 1044-7318. DOI: 10.1080/10447318.2023.2221600

[27] M. Schrepp, A. Hinderks, and J. Thomaschewski, "Design and evaluation of a short version of the user experience questionnaire (UEQ-S)," International Journal of Interactive Multimedia and Artificial Intelligence, vol. 4, p. 103, 6 2017, ISSN: 1989-1660. DOI: 10.9781/ijimai.2017.09.001

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