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Evaluating QR Code-Based Attendance System Using User Experience

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***Abstract*—Efficient attendance tracking and academic schedule management are critical for students and lecturers in higher education. However, many existing systems lack user-friendly interfaces and integrated functionality, resulting in inefficiencies and reduced user satisfaction. This study aims to develop and evaluate the user experience of 'Attend', a mobile application designed to address these challenges. The target population consisted of higher education students and lecturers, with 35 student respondents participating in the evaluation phase through interviews and focus group discussions (FGDs) to inform the design of an intuitive and functional interface prototype. The authors conducted usability testing using the Maze App to assess task completion efficiency, followed by a user experience evaluation using the User Experience Questionnaire (UEQ). The results showed that users were able to complete tasks efficiently, although some interface components required refinement. The UEQ scores showed 'Above Average' ratings for attractiveness, efficiency, dependability, and novelty. The app also received 'Good' ratings for perspicuity and stimulation for improving clarity. These findings suggest that Attend effectively meets the needs and expectations of users in academic settings. This study contributes to the development of mobile-based educational tools by demonstrating the importance of incorporating user feedback in the design process to improve usability and user satisfaction.**

***Index Terms*—Evaluation, user experience, usability testing, user experience questionnaire.**

I. Introduction

In the digital era, integrating information technology across sectors, including education, is vital for improving efficiency, accuracy, and service delivery. One innovation gaining attention is the use of quick response (QR) codes in online attendance systems, offering a fast and reliable alternative to manual methods prone to error and inefficiency.

In education, QR code-based attendance systems can enhance accuracy, reduce administrative workload, and increase institutional efficiency. However, their effectiveness depends on user experience (UX), as acceptance, satisfaction, and engagement influence adoption and long-term use. Thus, UX evaluation is essential to assess both functionality and usability from the user's perspective.

Previous studies have explored various applications of QR codes within educational contexts. For example, QR codes have been used as interactive learning tools to promote student engagement and support creative teaching strategies [1]. They have also been implemented for real-time attendance recording, allowing academic institutions and parents to access timely and accurate student attendance data [2]. Additionally, QR codes have been integrated into instructional materials to support thematic learning [3], enhance digital literacy [4], and facilitate the development of contextual mathematics modules [5]. While previous studies highlight the functional and pedagogical benefits of QR code usage in educational settings—such as improving engagement, supporting thematic learning, and enhancing digital literacy—they primarily focus on system functionality and learning outcomes rather than user-centred aspects, e.g., usability, satisfaction, and experience.

Some studies have attempted to evaluate usability and user acceptance. A study by [6] reported high user acceptability of a QR-based attendance system among students and instructors; however, it primarily focused on perceived usefulness and overall satisfaction, without exploring the deeper dimensions of user experience. Similarly, an evaluation conducted using the System Usability Scale (SUS) achieved a very high usability score (95.2), indicating that the system was well-received by users; however, the study did not provide insights into qualitative user interactions or emotional responses [7]. Another development based on user-centred design principles reported improved interface intuitiveness but lacked a structured UX assessment [8].

These findings suggest that while QR code-based systems offer clear functional benefits, a noticeable gap remains in the literature regarding the systematic evaluation of UX in such applications. This gap is significant because understanding how users interact with these systems—what they find intuitive, frustrating, or engaging—can inform more effective and sustainable design improvements. A user-centred evaluation helps developers and institutions refine system features to better align with the actual needs and preferences of students

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and educators.

Usability is defined as the extent to which users can achieve specified goals with effectiveness, efficiency, and satisfaction when interacting with a system [9]. Evaluating usability typically involves two primary approaches: Heuristic evaluation—where experts assess the interface based on established usability principles—and user testing, which involves observing real users as they interact with the system to identify potential issues [10]. A range of techniques is employed in usability testing to better understand user needs and enhance user–system interaction. Among the commonly applied methods are card sorting, focus group discussions, and task-based testing, each of which provides distinct insights into user behavior and preferences [11].

The System Usability Scale (SUS) is a globally recognized, quick, and reliable tool for evaluating the usability of a wide range of systems. It consists of 10 items rated on a Likert scale, producing a single composite score that reflects overall perceived usability [12], [13]. While the SUS focuses on usability, the broader concept of user experience encompasses emotional, aesthetic, and functional aspects of system interaction [14]. A user-centred approach to design (emphasizing user needs, preferences, and context, which plays a crucial role in creating positive UX outcomes) [15].

Evaluating UX can be achieved through a combination of techniques, including questionnaires and biometric assessments [16]. One of the most commonly used instruments for UX evaluation is the User Experience Questionnaire (UEQ), which measures users' subjective impressions based on six key dimensions: attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty [17].

In response to the identified research gap, this study aims to conduct a comprehensive evaluation of the user experience with a QR code-based attendance application within an academic setting. Theoretically, it contributes to the UX literature by extending the application of SUS and UEQ to this underexplored domain. Methodologically, the study integrates usability testing via the Maze App with standardized UX instruments to deliver structured and replicable insights. Practically, it offers a validated prototype of the "Attend" application, which combines QR-based attendance and academic schedule management.

II. Related Work

Several studies have evaluated UX in mobile applications using usability-based approaches. For instance, Arifin and Maharani assessed the Eden Farm application by employing a combination of usability questionnaires and testing via the Maze App. The results indicated a significant improvement in usability scores (from a Maze Usability Score of 73 to 94) and user satisfaction (from 41 to 86 according to SUS), underscoring the importance of user-centered design methods in enhancing mobile application experiences [18].

In the context of QR code-based attendance systems, Pujastuti and Laksito conducted usability testing on a QR scanner application for lecture attendance. Their findings reported a system usability score of 65%, with effectiveness at 70%, efficiency at 54%, and user satisfaction at 70.85% [19]. The study also offered concrete design recommendations, such as implementing a student ID) prompt, incorporating a zoom feature for the scanner camera, and using more intuitive interface icons. These suggestions highlight the critical influence of user interface design on the overall UX. Similarly, a study by Balqis and Subiyakto on the usability of the YouTube application using SUS found a high final score of 87.6, categorized as "Excellent" and "Very Good" [20]. This confirms that a well-designed popular application can achieve a high level of usability and meet user expectations.

In the context of redesigning applications, studies have shown that using the Goal-Directed Design (GDD) approach can lead to significant improvements. For example, a project to redesign a complaint service mobile application saw its Maze Usability Score (MAUS) increase from 43.5 to 90.75 and its SUS score rise from 40.3 to 80.55 after the redesign [21]. Another study on an Integrated Farming System using GDD reported increases in effectiveness from 76.67% to 100% and efficiency from 68.52% to 100% after a redesign [22]. These findings underscore the importance of a structured design process that focuses on user needs to achieve tangible improvements in usability and satisfaction.

Furthermore, research by Agripa and Astillero developed a QR code-based employee attendance system at Sorsogon State University in the Philippines. The system achieved an overall evaluation score of 3.8 out of 5.0 (≥ expected), indicating good user acceptance and high operational efficiency [23].

Although these studies emphasize functionality, security, and system efficiency, a considerable portion of the literature lacks a comprehensive exploration of UX—particularly in subjective dimensions such as perspicuity, stimulation, novelty, and dependability. The aforementioned studies primarily focus on general usability outcomes without utilizing structured evaluation tools such as SUS or UEQ, both of which can provide deeper insights into the emotional and aesthetic dimensions of user interaction.

UX is a very frequently discussed topic in human-computer interaction (HCI) and product design. User experience is the experience that users feel when interacting with a product, system, or service. It includes user perceptions of the usability, ease of use, and efficiency of a digital product such as a website or application [24].

Measuring and evaluating UX is critical to determining the success of a digital product. Some methods that are often used include:

1) *User experience questionnaire (UEQ)*
   A questionnaire used to measure UX across six dimensions: Attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty.
2) *System usability scale (SUS)*
   A tool used to assess overall system usability and user satisfaction [25].

The SUS is a testing tool designed to evaluate the usability of a system or application. Developed by John Brooke in 1986, SUS consists of ten questions that provide a subjective description of the user's experience of the system being tested. Each question uses a Likert scale, which allows respondents to

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rate statements from "strongly agree" to "strongly disagree" [26].

Results from SUS testing can provide a score between 0 and 100, which can then be interpreted to determine whether the system is acceptable or not. Scores above 68 are often considered good, while scores below 68 indicate usability problems [27].

- Scores above 68 are considered above average and acceptable.
- Scores below 68 are considered below average and unacceptable.
- For example, if a system gets an SUS score of 75, it can be interpreted as follows:
- A score of 75 is above average and Acceptable.
- It is categorized as Grade B (Good).
- Included in the Adjective Rating Good category.

This interpretation of the SUS score can provide a comprehensive picture of the usability of a system from the user's perspective. The higher the SUS score, the better the usability level of the system.

B. User Experience Questionnaire (UEQ)

UEQ is a tool used to evaluate a user's experience of a product or application. This method provides insight into how users perceive their interactions with the product, based on six key dimensions [28]:

- Attractiveness (ATT). Assesses the overall attractiveness of the product.
- Perspicuity (PERS). Measures how clear and easy to understand the interface is.
- Efficiency (EFFIC). Assesses how efficiently users can complete tasks.
- Dependability (DEPE). Measures the reliability of the product in delivering consistent results.
- Stimulation (STIM). Assesses how interesting and fun the product is to use.
- *Novelty (NOV).* Measures the extent to which the product offers new and innovative experiences.

The use of UEQ has proven effective in various studies, such as in the evaluation of mobile applications, academic information systems, and augmented reality-based applications. The results of this questionnaire can help developers to understand the strengths and weaknesses of their products, as well as provide a basis for design and functionality improvements [28].

The UEQ is a standardized tool for measuring user experience across six scales, which are grouped into three main categories: attractiveness, pragmatic quality, and hedonic quality. Each category captures different aspects of how users perceive and interact with a product [29]. UEQ tool analysis can be used to process UEQ data. This is done by comparing the calculated values of each UEQ scale with the values found in Table 1.

Table 1.
UEQ Benchmark Ranges

	ATT	PERS	EFFIC	DEP	STIM	NOV
Excelent	≥ 1,75	≥ 1,9	≥ 1,78	≥ 1,65	≥ 1,55	≥ 1,4
Good	≥ 1,52 <1,75	≥ 1,56 <1,9	≥ 1,47 <1,78	≥ 1,48 <1,65	≥ 1,31 <1,55	≥ 1,05 < 1,4
Above Average	≥ 1,17 < 1,52	≥ 1,08 < 1,56	≥ 0,98 < 1,47	≥ 1,14 < 1,48	≥ 0,99 < 1,31	≥ 0,71 < 1,05
Below Average	≥ 0,7 < 1,17	≥ 0,64 < 1,08	≥ 0,54 < 0,98	≥ 0,78 < 1,14	≥ 0,5 < 0,99	≥ 0,3 < 1,71
Bad	< 0,7	< 0,64	< 0,54	< 0,78	< 0,5	< 0,3

UEQ usually consists of a questionnaire with 26 questions rated on a scale of 1–7, allowing researchers to collect quantitative data on user experience.

III. RESEARCH METHOD

The research commenced with a comprehensive review of the literature to establish a theoretical foundation for user experience, usability, testing, and evaluation frameworks such as SUS and UEQ, as illustrated in Fig. 1, which outlines the research steps. These references informed the selection of evaluation parameters and instruments used in this study. During the data collection phase, both scenario-based testing and questionnaires were employed. Respondents interacted with the “Attend” application—an attendance system based on QR code scanning—while completing a series of predefined tasks aligned with common use-case scenarios.

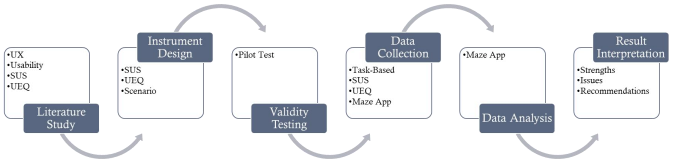

Fig. 1. Research steps.

Four key parameters were evaluated during this scenario-based usability testing:

- Effectiveness, measured through task success rates and the number of errors committed during task execution.
- Efficiency, measured using metrics such as task completion time and the number of clicks required to complete a task.

To assess user satisfaction, SUS was administered following task completion. The SUS instrument consists of ten items, each rated on a five-point Likert scale. The questions alternate between positively and negatively worded statements to minimize response bias. Each response is weighted and aggregated to produce a composite usability score ranging from 0 to 100.

In addition to the SUS, UEQ was used to evaluate the

broader user experience of the application. UEQ includes 26 items grouped into six dimensions: Attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty. After all testing and data collection were completed, responses were processed using the standard UEQ methodology. This involved converting raw data into standardized scores, followed by analysis and interpretation according to established benchmark intervals.

We recruited a purposive sample of 35 participants (25 students, 10 lecturers) from an Indonesian university. Table 2 summarizes their demographic characteristics.

Table 2.
Participant Demographics

Characteristic	Students (*n*=25)	Lecturers (*n*=10)
Age (years)	18–24	30–56
Gender (Male)	15	6
Gender (Female)	10	4
High Tech Experience	20	7
Moderate Tech Experience	5	3

This sampling method ensured that the participants had relevant context and practical engagement with academic scheduling and mobile technology.

The instruments used in this research were validated standardized tools: the SUS and UEQ. Both instruments, extensively tested in prior international studies, were adapted into Indonesian using validated translations. To enhance content validity, two academic experts in UX and educational technology reviewed the instruments. A pilot test with five respondents also ensured clarity and consistency before full-scale deployment.

Quantitative data from the SUS were analyzed using the standard scoring formula: each item's response was normalized (odd-numbered items minus 1; even-numbered items subtracted from 5), summed, and multiplied by 2.5. The resulting scores, which ranged from 0 to 100, were interpreted using benchmark thresholds, where scores above 68 indicated acceptable usability

UEQ data were processed using the official UEQ Data Analysis Tool. Raw responses on a 7-point Likert scale (from -3 to +3) were standardized, and we calculated mean scores for each of the six dimensions. We then benchmarked these scores against a database of over 200 product evaluations to categorize user experience perceptions as 'Excellent,' 'Good,' 'Above Average,' or lower.

Simultaneously, we descriptively reviewed performance data from the Maze App, including task time, click paths, and heatmap patterns, to identify usability strengths and friction points. We also thematically coded qualitative data from focus group discussions and interviews to inform and support the prototype's design recommendations.

IV. Result

The results from the initial user feedback phase, conducted through interviews and focus group discussions (FGDs), yielded valuable insights into the needs and expectations of both students and lecturers regarding the interface design of the "Attend" application. Participants provided diverse perspectives on features and visual elements deemed essential for supporting academic activities.

During interviews, students expressed a preference for a simplified and intuitive navigation structure, alongside a clean and visually appealing interface that does not distract from their academic focus. Meanwhile, lecturers emphasized the importance of quick access to attendance records, student reports, and timely updates regarding system changes or enhancements. A detailed summary of user feedback and the resulting design recommendations from both students and lecturers is presented in Table 3.

Based on the qualitative feedback, the development team produced several improved interface design prototypes. These prototypes incorporated a more structured layout, a harmonized color palette, easily recognizable icons, and streamlined navigation. Additional features were also introduced, such as an enhanced dashboard tailored for lecturers and automated notifications for class schedules and assignment deadlines.

Following the prototype development, usability testing was conducted using the Maze App. A sample group of students and lecturers was recruited to perform key tasks using the "Attend" application prototype. The test scenarios included: logging in, scanning QR codes for attendance, viewing weekly class schedules, and accessing attendance statistics.

Table 3.
User Feedback

User Group	Feedback	Design Recommendations
Student	Desire simple and easy-to-understand navigation.	Improved the menu structure with clear categories and recognizable icons.
	Preference for a subtle yet attractive colour scheme.	Using a softer and more harmonious colour palette to improve visual comfort.
	Expect an automatic reminder feature for class schedules and assignments.	Put the class schedule on the dashboard section
Lecturer	Requires quick access to the attendance list and student attendance report.	Add shortcut feature for direct access to the attendance list and attendance report.
	Request for a more informative dashboard	Redesign the dashboard with clearer and more interactive graphs and data summaries.

One example of the evaluated tasks is illustrated in Fig. 2, which presents a usability matrix summarizing various performance metrics, including click rate, exit rate, and average task duration. The findings demonstrated a high level of usability. Specifically:

- Direct task completion rate was 100%, indicating that all participants successfully completed the task following the intended interaction path.
- Mission unfinished rate was 0%, suggesting no users abandoned the task midway.
- Misclick rate was relatively low at 55.6%, highlighting occasional user uncertainty but within acceptable bounds.

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- Average completion time for the task was 12.3 seconds, which reflects an efficient user interaction with minimal delays.

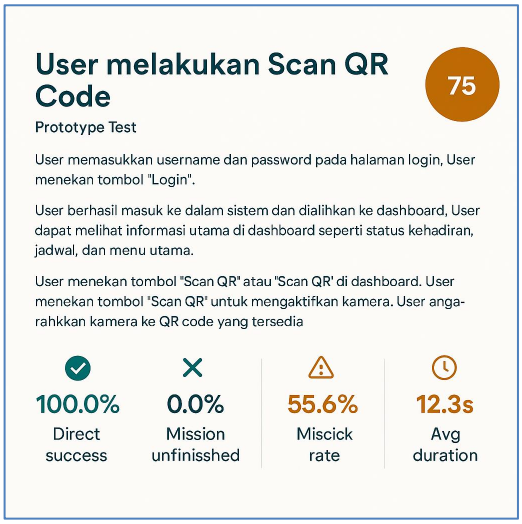

Fig. 2. Usability matrix of the scan QR code scenario.

These results affirm the effectiveness of the redesigned interface and the overall usability of the "Attend" prototype in a real-world educational context.

In addition to task completion metrics, a heat map analysis was conducted to identify interaction patterns and potential usability issues within the prototype. Heatmap analysis revealed navigation inefficiencies on the login screen, with some users experiencing confusion and misclicks. These micro-frictions led to task delays.

As illustrated in Fig. 3, many users failed to enter their username and password in the correct sequential order as prescribed by the test scenario, leading to confusion during the interaction process.

Despite these isolated issues, the overall usability testing results demonstrated that the application is generally intuitive and easy to use. Most participants successfully completed tasks without significant difficulty, and the average completion time per task remained within acceptable thresholds, indicating a high level of interface efficiency. Additionally, qualitative user feedback highlighted that the visual design of the app contributed positively to user comfort and facilitated effective management of academic schedules and attendance.

To further assess the quality of user experience, UEQ was distributed to a group of 35 respondents. The respondents were drawn from a pool of active students, including both prior usability test participants and new users. The UEQ evaluated six core UX dimensions: Attractiveness, efficiency, perspicuity, dependability, stimulation, and novelty.

Respondents completed the 26-item UEQ instrument via an online form. Each item was scored on a 7-point Likert scale, ranging from -3 (most negative impression) to +3 (most positive impression). The raw scores were standardized by subtracting 4, in accordance with UEQ guidelines, and average values were computed for each UX dimension.

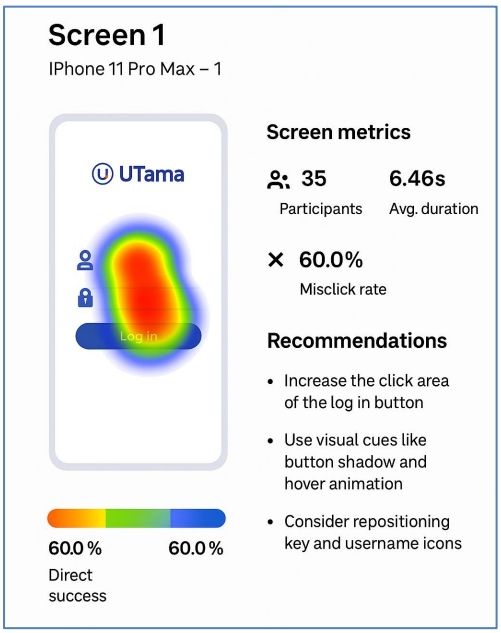

Fig. 3. Login screen heat maps analysis.

Table 4.
UEQ Calculation Results

	UEQ Scale Value	UX Aspect	UEQ Scale Value
Attractiveness	1.270	attractiveness	1.270
Pragmatic Quality	1.42	Perspicuity	1.550
		Efficiency	1.345
		Dependability	1.360
Hedonic Quality	1.08	Stimulation	1.330
		Novelty	0.821

According to the processing results found in Table 4, the pragmatic quality aspect received the highest score, with 1.42. Perspicuity scored highest (1.55), reflecting strong interface clarity. Since the factors of clarity and ease received positive scores, the app shows that it is easy for students to understand and learn. The attractiveness score of 1.270 indicates that users were generally satisfied and found the app's overall look and interaction appealing. The efficiency aspect has a positive value, which indicates that users can complete tasks quickly by using the Attend application. The dependability score of 1.36 suggests that users found the application to be reliable and trustworthy in its performance. The test results also show that the hedonism quality aspect has an average value of 1.08, with stimulation and novelty being its components. The UEQ value for the stimulation aspect was 1.330. A novelty score of 0.821 suggests the app is user-friendly but lacks innovative differentiation. The results of this study showed that the evaluation results for all aspects had positive values, with an average impression value between -0.8 and 0.8 considered normal, a value higher than 0.8 considered positive, and a value lower than 0.8 considered negative. To determine the meaning

of each value, the average value of the UEQ calculation results was compared with the benchmark values in Table 1. The benchmark values are shown in Table 5. UEQ scale measurement results compared to benchmark values.

Table 5.
Benchmark Result Value

Scale	Mean	Comparison to Benchmark
attractiveness	1.27	Above Average
perspicuity	1.55	Good
efficiency	1.345	Above Average
dependability	1.36	Above Average
stimulation	1.33	Good
novelty	0.821	Above Average

Table 5 summarizes the UEQ results for the 'Attend' app across six UX dimensions.

The following is the interpretation of these results:

1) *Attractiveness*
With a mean value of 1.27, the attractiveness of this app is rated "Above Average". This indicates that users are generally satisfied and attracted by the overall look and interaction of the app. High attractiveness signifies that the app provides an overall positive experience.
2) *Perspicuity*
The clarity scale has a mean of 1.55 and is categorized as 'Good'. This indicates that users find the app easy to understand and use. Users can quickly understand how the app functions, which is important for efficiency and ease of use.
3) *Efficiency*
The mean value for efficiency was 1.345, categorized as 'Above Average'. This indicates that users feel the app is reasonably fast and responsive in completing tasks. Good efficiency means that the app helps users achieve their goals easily and quickly.
4) *Dependability*
With a mean of 1.36, accuracy is rated 'Above Average'. This indicates that users feel the app is reliable, both in terms of the data presented and the functionality. The app gives users confidence that they can rely on the app for their needs.
5) *Stimulation*
The mean value of 1.33 on the stimulation scale also falls into the 'Good' category. This means that the app provides a fun and engaging experience for users. Users feel motivated and enjoy using the app, which is a positive indication for user retention.
6) *Novelty*
The novelty scale recorded a mean of 0.821 and was categorized as 'Above Average'. This indicates that users feel the app offers features or elements that are innovative and different from other apps. Although the score is slightly lower than the other scales, it is still above average, signalling that the app has successfully introduced something new and exciting.

In summary, the UEQ results demonstrate that the "Attend" application effectively fulfills user expectations in terms of usability and user experience. The app is perceived as attractive, efficient, reliable, and easy to use. However, the slightly lower score in the novelty dimension suggests an opportunity for future design enhancements aimed at increasing the perceived innovation and freshness of the app's features. Continuous user-centered development and refinement are recommended to sustain high levels of user satisfaction and engagement over time.

To examine role-based differences in user experience, independent-samples t-tests were conducted comparing UEQ dimension scores between students (n = 25) and lecturers (n = 10). As shown in Table 6, lecturers reported significantly higher dependability scores (M = 1.62, SD = 0.21) than students (M = 1.28, SD = 0.19), t (33) = 4.32, p < .001. This indicates lecturers perceived the system as more reliable for administrative tasks like attendance verification and reporting.

While no other dimensions showed statistically significant differences (p > .05), marginal trends emerged:

- Lecturers rated efficiency higher (M_{lect} = 1.47 vs. M_{stud} = 1.33, p = .07)
- Students rated novelty slightly higher (M_{stud} = 0.85 vs. M_{lect} = 0.75, p = .12)

Table 6.
UEQ score comparison: Students vs. lecturers

Scale	Students	Lecturers	t-value	p-value
attractiveness	1.26 ± 0.24	1.32 ± 0.21	0.72	.476
perspicuity	1.53 ± 0.28	1.60 ± 0.25	0.68	.502
efficiency	1.33 ± 0.25	1.47 ± 0.18	1.84	.074
dependability	1.28 ± 0.19	**1.62 ± 0.21**	**4.32**	**<.001**
stimulation	1.31 ± 0.26	1.38 ± 0.23	0.79	.436
novelty	0.85 ± 0.17	0.75 ± 0.14	-1.61	.118

These findings suggest that while both groups found the system functionally adequate (no difference in perspicuity or attractiveness, p > .20), role-specific needs influenced reliability perceptions.

While the overall findings of this study indicate that the "Attend" application provides a positive user experience across key UX dimensions, a deeper reflection reveals several critical aspects that warrant further discussion.

First, although UEQ results showed scores of "Above Average" or "Good" across all dimensions, the novelty score (0.821) was the lowest among the six dimensions. This finding is in line with previous research on QR code-based systems, where high usability and reliability scores did not always coincide with perceptions of innovation [19], [23]. This suggests that while users find the app functional and reliable, it may lack features that are perceived as truly innovative or differentiating, a challenge also noted in mobile application UX evaluations where novelty often lags behind other UX dimensions [18], [24]. Given the competitive landscape of educational apps and the growing expectations of digital-native users, maintaining usability alone may not be sufficient to ensure long-term engagement. A more deliberate focus on

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creative interaction design, gamified features, or context-aware attendance mechanisms (e.g., geofencing or biometric options) could further enhance the perceived novelty and engagement levels of the app [15], [28].

Second, although task completion rates and usability metrics were high, the heatmap analysis revealed navigation inefficiencies, particularly on the login screen. Such micro-frictions have been documented in other usability studies of attendance and academic applications, where minor interface design gaps—such as unclear input sequences or non-intuitive iconography—can disrupt the user flow [19], [21]. While task success is important, micro-frictions like these can accumulate and impact user satisfaction over time, especially for first-time users or those with lower digital literacy [24]. The Maze app's simulated environment may overlook real-world constraints like network instability, device limitations, or classroom distractions, potentially overestimating usability [12].

In terms of sampling, the study involved 35 respondents, primarily students and lecturers within a specific academic institution. This mirrors the limitations noted in similar UX studies on educational technology, where homogeneous samples can limit the generalizability of findings [6], [8]. While sufficient for an initial exploratory study, this sample may not represent the diversity of user behaviors and preferences found in broader educational contexts, such as vocational schools, online learning platforms, or international institutions [23].

The study did not include a longitudinal evaluation. All usability and UX testing were conducted at a single point in time, which is a limitation also highlighted in prior mobile app UX research that emphasizes the importance of tracking evolving user perceptions [18], [29]. User perceptions are dynamic and often evolve with prolonged use, exposure to updates, and institutional policy changes. A longitudinal study could provide deeper insights into feature fatigue, adaptation curves, and sustained satisfaction [25].

V. Conclusion

The evaluation of the Attend application, using UEQ and supplementary usability testing, shows that it consistently delivers positive user experience in QR-based attendance tracking. The app achieved “Above Average” ratings in Attractiveness, Efficiency, Dependability, and Novelty, and “Good” ratings in Perspicuity and Stimulation, indicating that its interface and functionality not only meet but, in some areas, exceed user expectations. Users found the application intuitive, visually appealing, and effective in supporting both attendance tracking and academic schedule management, with clarity and reliability emerging as key drivers of satisfaction, especially for students seeking simplicity and lecturers requiring quick access to reports. These findings align with prior research highlighting the benefits of usability and user-centred design in fostering satisfaction and acceptance.

This study has four limitations. First, participants were recruited exclusively from a single Indonesian university, limiting generalizability to institutions with different infrastructures, cultural contexts, or pedagogical approaches. Second, usability testing via the Maze App, while controlled, may not capture real-world challenges such as unstable internet, classroom distractions, or multitasking demands. Third, cross-sectional design prevents assessment of long-term UX dynamics, such as sustained engagement, novelty effects, or adaptation to updates. Finally, unmeasured covariates—such as prior QR code experience, device proficiency, or institutional policy compliance—may have introduced confounding effects.

Future research should address these gaps through broader and more diverse samples, real-world testing, and longitudinal monitoring. For further development, the team is advised to maintain the application’s strengths in visual design, clarity, and usability, while adopting an iterative design process grounded in continuous usability testing and user feedback to ensure alignment with evolving user needs and technological advancements.

Acknowledgment

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