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User Experience Analysis of a Mobile Augmented Reality Campus Visualization Using User Experience Questionnaire (UEQ) Approach

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ABSTRACT

This study investigates user interactions within augmented reality (AR) applications designed for campus visualization in Universitas Trilogi, utilizing the User Experience Questionnaire (UEQ) methodology. Despite the increasing integration of AR technologies in education, research on user experience remains scarce, particularly regarding the effectiveness of markerless tracking methods. Prior studies have largely focused on the technical development of AR applications, neglecting user perception and engagement. The effectiveness, usability, and overall satisfaction of AR applications in educational environments. This research involved a sample of 110 students from the Department of Informatics at Universitas Trilogi and addresses this gap by providing empirical data on user experience, revealing average UEQ scores of 1.77 for Stimulation, 1.77 for Efficiency, 1.72 for Dependability, suggesting that users find the application engaging and capable of facilitating task completion with ease. 1.57 for Perspicuity, 1.57 for Attractiveness, indicating that the application is relatively easy to use and visually appealing, and 1.40 for Novelty, need for further innovation to enhance user engagement on a scale ranging from -1 to 2.5. These scores suggest a medium to high level of user satisfaction and engagement. The findings underscore the importance of prioritizing user experience in AR applications, indicating their potential to enhance educational engagement and satisfaction.

Kata Kunci : Augmented Reality, User Experience Questionnaire, Campus Visualization, UEQ Analysis

CHAPTER I. INTRODUCTION

1.1 **Background of Study**

1.2 **Background of Study**

. Advances in digital technology have significantly transformed the educational landscape, particularly through the integration of immersive technologies such as Augmented Reality (AR) [1]. AR enables the overlay of digital information onto the physical environment, allowing users to interact with virtual objects in real time. In higher education, AR has been increasingly adopted to support interactive learning, spatial understanding, and information visualization, including applications for campus navigation and visualization. These capabilities are especially relevant for universities seeking to enhance student engagement and improve access to institutional information through innovative digital media. Despite the growing adoption of AR in educational contexts, much of the existing research has predominantly emphasized technical development aspects, such as system architecture, rendering techniques, and tracking accuracy. Comparatively less attention has been given to evaluating how users perceive and experience these applications. In particular, studies that systematically examine user experience in AR applications utilizing markerless tracking remain limited. Markerless AR[2],[3], which allows users to interact with digital content without relying on predefined markers, offers greater flexibility and a more natural interaction experience; however, its effectiveness from the user's perspective has not been sufficiently explored.

User experience plays a critical role in determining the success and sustainability of educational technologies. An AR application that is technically advanced may fail to achieve its intended impact if it is perceived as difficult to use, inefficient, or insufficiently engaging. Therefore, understanding user perceptions related to usability, efficiency, attractiveness, and stimulation is essential to ensure that AR applications effectively support learning and information dissemination[4],[5]. Systematic evaluation of these aspects can provide valuable insights into how AR systems can be optimized to better meet user needs. In the context of Universitas Trilogi, the development of an AR-based campus visualization application presents an opportunity to enhance how students interact with and understand their campus environment. However, without empirical

evaluation of user experience, it is difficult to determine whether the application effectively delivers its intended benefits. To address this gap, this study proposes the use of the User Experience Questionnaire (UEQ) as a standardized and validated instrument for assessing multiple dimensions of user experience[6],[7].

By investigating user experience through the UEQ framework, this study aims to provide empirical evidence regarding the perceived quality of an AR campus visualization application. The findings are expected to inform future design and development improvements, support the effective integration of AR in educational environments, and contribute to the growing body of research on user experience evaluation in augmented reality technologies.

1.3 Problem Identification

The problem identification of this proposed research is as follows::

1. The integration of augmented reality (AR) applications in higher education has increased, particularly for purposes such as campus visualization and interactive information delivery. However, many AR-based educational applications are developed with a primary focus on technical functionality, while systematic evaluations of user experience are often overlooked. As a result, there is limited empirical evidence regarding how users perceive the usability, efficiency, engagement, and overall quality of these applications.

1.4 Purpose of Research

The purpose of this research is to analyze user experience in an augmented reality (AR) based campus visualization application at Universitas Trilogi using the User Experience Questionnaire (UEQ)[8]. Specifically, this study aims to evaluate users' perceptions across the six UEQ dimensions Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty. Through this analysis, the research seeks to obtain a comprehensive understanding of the usability, effectiveness, engagement level, and innovative qualities of the AR application from the users' perspective[9]. The results of the UEQ analysis are expected to provide empirical insights that can serve as a basis

for improving the design and implementation of AR applications in educational environments.

1.5 Research Output

The research output is as follows :

a. Internasional Conference Indexed in IEEE Xplore

CHAPTER II. RELATED WORKS

2.1 Augmented Reality in Educational Environments

Augmented Reality (AR) has been widely recognized as a promising technology for enhancing learning experiences in higher education. By integrating virtual elements into real-world environments, AR enables interactive visualization, spatial understanding, and contextual learning. In educational settings, AR has been applied to various domains, including laboratory simulations, engineering visualization, medical training, and campus navigation. Studies have shown that AR can increase student engagement, improve motivation, and support experiential learning by allowing users to interact directly with digital content in a physical context.

Recent developments in AR technology have shifted from marker-based approaches to markerless tracking techniques. Markerless AR leverages device sensors, computer vision, and spatial mapping to detect surfaces and objects without requiring predefined markers. This approach offers greater flexibility and a more natural user interaction experience, making it particularly suitable for applications such as campus visualization. However, while markerless AR enhances technical capability and realism, its success in educational contexts depends heavily on how users perceive and interact with the system.

2.2 User Experience Evaluation in AR Applications

User experience (UX) is a critical factor in determining the effectiveness and acceptance of interactive systems, including AR applications. UX encompasses not only usability but also emotional responses, engagement, efficiency, and perceived value during interaction. In the context of AR-based learning tools, a positive user experience is essential to ensure sustained use and meaningful interaction.

Several studies have highlighted that technically advanced AR applications may fail to achieve their intended educational impact if users perceive them as difficult to use, inefficient, or visually unappealing. As a result, evaluating user experience has become increasingly important alongside performance and functional testing. UX evaluation allows researchers and developers to identify strengths and weaknesses of an application from the user's perspective and to guide iterative improvements.

Despite this importance, many AR studies still prioritize system development and performance metrics, such as tracking accuracy and rendering quality, while offering limited empirical analysis of user experience. This gap is especially evident in AR applications developed for non-instructional purposes, such as campus visualization, where user engagement and satisfaction play a central role.

2.3 User Experience Questionnaire (UEQ)

The User Experience Questionnaire (UEQ) is a standardized and widely used instrument for measuring user experience in interactive systems. UEQ is designed to capture both pragmatic and hedonic aspects of user experience through six dimensions: Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty. These dimensions provide a comprehensive evaluation of how users perceive a system in terms of usability, clarity, reliability, engagement, and innovation.

UEQ has been applied in various domains, including software applications, mobile systems, e-learning platforms, and immersive technologies. Previous studies have demonstrated that UEQ is effective in identifying usability issues and emotional responses in a relatively short time, making it suitable for evaluating emerging technologies such as AR. Its standardized scale also allows results to be compared across different systems and studies.

However, the application of UEQ specifically in markerless AR-based campus visualization systems remains limited. Most existing UEQ-based AR studies focus on learning content delivery or instructional simulations, leaving a gap in understanding how users experience AR applications designed for spatial exploration and informational purposes within university environments.

2.4 Research Gap

Based on the review of related work, it can be concluded that while AR technologyparticularly markerless ARhas strong potential in higher education, empirical evaluations of user experience are still insufficient. There is a lack of studies that

systematically analyze user experience using standardized instruments such as UEQ, especially in the context of campus visualization applications.

Therefore, this research addresses this gap by proposing a UEQ-based evaluation of a markerless AR campus visualization application at Universitas Trilogi. By focusing on user perceptions across multiple UX dimensions, this study aims to contribute empirical evidence to the literature and provide practical insights for the development and improvement of AR applications in educational environments.

CHAPTER III. METHOD

3.1 Research Design

This study adopts a quantitative research design aimed at evaluating user experience in an augmented reality (AR)–based campus visualization application. A quantitative approach is chosen to enable systematic measurement and analysis of user perceptions using a standardized instrument. The research focuses on assessing multiple dimensions of user experience through structured data collection and statistical analysis.

3.2 Research Object

The object of this research is a markerless augmented reality campus visualization application developed for Universitas Trilogi. The application allows users to explore and interact with digital representations of campus buildings and environments without the use of physical markers. The AR system is designed to support spatial understanding and interactive information access within the campus context.

3.3 Participants

The research participants will consist of students from the Department of Informatics at Universitas Trilogi. Students are selected as respondents because they represent the primary users of the campus environment and are familiar with mobile technology usage. Participation in the study will be voluntary, and respondents will be required to interact with the AR application before completing the evaluation questionnaire.

3.4 Research Instrument

Data will be collected using the User Experience Questionnaire (UEQ) as the primary research instrument. UEQ is a standardized questionnaire designed to measure user experience across six dimensions:

- Attractiveness – overall impression of the product
- Perspicuity – ease of understanding and learning
- Efficiency – ability to complete tasks with minimal effort

- Dependability – feeling of control and predictability
- Stimulation – level of excitement and motivation
- Novelty – perceived creativity and innovation

The questionnaire uses a semantic differential scale with values ranging from negative to positive extremes, allowing respondents to express their perceptions accurately.

3.5 Data Collection Procedure

The data collection process will be conducted in several stages:

- **Application Introduction**
  Participants will receive a brief explanation of the AR application and its features.
- **Application Interaction**
  Respondents will be asked to use the AR campus visualization application for a specified duration, allowing them to explore its functionalities and content.
- **Questionnaire Distribution**
  After interacting with the application, participants will complete the UEQ questionnaire to evaluate their user experience.
- **Data Compilation**
  All responses will be collected and prepared for analysis.

3.6 Data Analysis Technique

The collected data will be analyzed using descriptive statistical methods based on the UEQ analysis framework. Mean scores will be calculated for each UEQ dimension to identify user perceptions across pragmatic and hedonic aspects. The results will be interpreted using UEQ benchmark guidelines to categorize the user experience levels (e.g., low, medium, or high).

The analysis aims to provide an overall overview of user experience and to identify dimensions that may require improvement in future application development.

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CHAPTER IV. RESLUTS & DISCUSSION

User Experience Analysis of a Mobile Augmented Reality Campus Visualization Using User Experience Questionnaire (UEQ) Approach

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***Abstract*—This study investigates user interactions within augmented reality (AR) applications designed for campus visualization in Universitas Trilogi, utilizing the User Experience Questionnaire (UEQ) methodology. Despite the increasing integration of AR technologies in education, research on user experience remains scarce, particularly regarding the effectiveness of markerless tracking methods. Prior studies have largely focused on the technical development of AR applications, neglecting user perception and engagement. The effectiveness, usability, and overall satisfaction of AR applications in educational environments. This research involved a sample of 110 students from the Department of Informatics at Universitas Trilogi and addresses this gap by providing empirical data on user experience, revealing average UEQ scores of 1.77 for Stimulation, 1.77 for Efficiency, 1.72 for Dependability, suggesting that users find the application engaging and capable of facilitating task completion with ease. 1.57 for Perspicuity, 1.57 for Attractiveness, indicating that the application is relatively easy to use and visually appealing, and 1.40 for Novelty, need for further innovation to enhance user engagement on a scale ranging from -1 to 2.5. These scores suggest a medium to high level of user satisfaction and engagement. The findings underscore the importance of prioritizing user experience in AR applications, indicating their potential to enhance educational engagement and satisfaction.**

Keywords—Augmented Reality, User Experience Questionnaire, Campus Visualization, UEQ Analysis

I. INTRODUCTION

The emergence of augmented reality (AR) technology has created new opportunities for improving user experiences in multiple fields, especially in education. This research builds upon prior studies that concentrated on the creation of AR applications while lacking examining user perspectives and experiences in Universitas Trilogi [1]. While prior studies have focused primarily on the creation of AR applications, they often overlooked the critical aspect of user feedback. The subsequent application is a product of prior study, as illustrated in Figure 1.

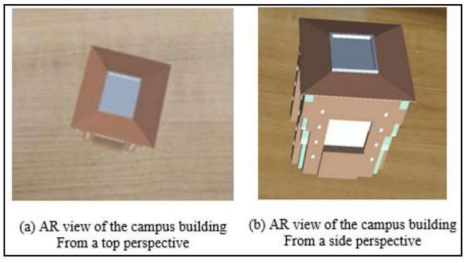

Fig.1 AR Campus Visualization Application with 2 Perspective View

The AR application, as illustrated in Figure 1 utilizes a smartphone's camera to interact with a flat surface, thereby initiating the display of a three-dimensional (3D) model of the campus buildings at Universitas Trilogi. By integrating digital content with the physical environment, the application allows users to visualize the campus layout and architectural features in an immersive manner.

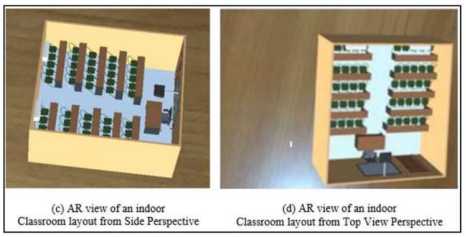

Fig.2 AR indoor Classroom with 2 Perspective View

Figure 2 illustrates an augmented object within an indoor classroom environment, utilizing markerless tracking as part of the augmented reality AR application. This innovative approach allows users to interact with digital content seamlessly integrated into the physical classroom setting, enhancing the learning experience. Markerless tracking enables the application to recognize and respond to the spatial context of the environment without the need for physical markers, providing a more flexible and immersive interaction. This functionality not only enhances the user experience but also serves as an educational tool, facilitating a deeper

understanding of the spatial relationships and design elements of the university's infrastructure.

Given the importance of user experience in the development of technology, this study employs the User Experience Questionnaire (UEQ) as a key instrument for evaluating user impressions of the AR application [2]. The UEQ is a standardized tool intended to assess user experience across multiple dimensions, such as stimulation , attractiveness, efficiency, perspicuity, dependability, and novelty. Its extensive adoption in user experience research arises from its capacity to deliver thorough insights into user interactions with technology. Its widespread acceptance in the field of user experience research stems from its ability to provide comprehensive insights into how users interact with technology[3],[4]. Understanding user experience is crucial for designing systems that not only meet functional requirements but also resonate with users on an emotional level [5]. Moreover, the UEQ's robust psychometric properties make it an ideal choice for this research, enabling a nuanced understanding of user satisfaction and engagement with the AR application.

Several studies underscore the importance of utilizing the UEQ in technology assessments which demonstrated that user experience evaluation using UEQ significantly enhances the development process of immersive technologies by providing actionable insights that guide design improvements [6],[7]. Similarly, employing standardized measures like the UEQ can lead to better alignment between user needs and technological capabilities, ultimately fostering a more engaging user experience[8].

This study aims to systematically evaluate and quantify user experience with the markerless AR application created for campus visualization using the UEQ methodology[9]. By analyzing the six key dimensions of user experience stimulation, attractiveness, efficiency, perspicuity, dependability, and novelty [10] provides a comprehensive understanding of user engagement with the AR application [11]. The findings will not only highlight the strengths and areas for improvement within the application but also contribute valuable insights into the overall user experience, guiding future enhancements in AR technology within educational contexts.

II. METHOD

This research was carried out utilizing the UEQ method, which involved multiple stages to ensure a comprehensive assessment of user experience [12],[13]. As illustrated in Figure 3, the process included various phases, each designed to gather detailed insights into usability and user satisfaction. These stages encompassed the development of the questionnaire, participant selection, data collection, and analysis, allowing for a thorough evaluation of the user experience across different dimensions. This structured approach not only enhances the validity of the findings but also provides a clear framework for understanding user interactions.

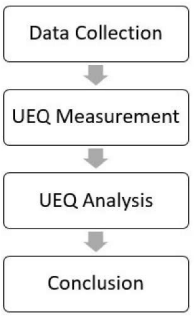

Fig.3 Research Stage Phase

A. Data Collection

The UEQ measurement [14], [15] was conducted among students in the informatics department at Universitas Trilogi. This study utilized quantitative data by distributing online questionnaires to 110 students, employing Google Forms to streamline the questionnaire distribution process from March 2025 until May 2025. The questionnaire consists of 26 questions based on the UEQ instrument[16].

B. User Experience Questionnaire (UEQ) Method

UEQ is a validated instrument designed to measure user experience across multiple dimensions [17], [18]. It provides insights into how users perceive and interact with products and applications, making it particularly suitable for evaluating augmented reality (AR) applications. The UEQ consists of six key scales[19], where each scale is assessed through a series of statements that users rate based on their experiences with the application.

In this research, the UEQ was employed to gather user feedback on an AR application developed for campus visualization using markerless tracking. The importance of using the UEQ in this context stems from the need to bridge the gap identified in previous studies, which primarily focused on application development without analyzing user opinions. By utilizing the UEQ, this research seeks to deliver a thorough assessment of user experience, essential for guiding future enhancements in AR application design.

The UEQ is beneficial because it provides a comprehensive perspective on user experience rather than concentrating exclusively on usability or functionality. Understanding user experience is crucial for creating products that resonate with users on an emotional level using UEQ can lead to better alignment between user needs and technological capabilities, ultimately enhancing engagement [20]. The UEQ method is a usability testing technique aimed at obtaining a comprehensive and pragmatic understanding of usability and experiential characteristics via a subjective quality evaluation survey. The findings from the UEQ evaluation can help identify areas where enhancements will be particularly beneficial. It consists of six scales encompassing a total of 26 elements, which are classified according to the measurement scales included in the UEQ.as can be seen in Figure 4.

Fig.4 User Experience Questionnaire Instruments

C. *UEQ Method Calculation and Data Analysis*

The UEQ data is typically analyzed using a scoring system where responses are aggregated to provide an overall score for each of the six scales[21]. The formula used to calculate the average score for each scale is as follows:

$$X = \frac{\sum x\,[Scale]}{\sum Items} \quad (1)$$

Where: X is the scale means results, $\sum x\,[Scale]$ is the sum of the total items per UEQ scale, and lastly $\sum Items$ is the total respondents in this research. In addition to the average scores, the results can be interpreted against benchmarks established in prior research, allowing for a comparative analysis of user experience across different applications.

III. Result and Discussion

This study intends to evaluate user experience and the quality of the Augmented Reality Campus Visualization application utilizing the UEQ approach, which includes 26 question items across 6 variables, and has successfully gathered responses from 110 participants, all of whom are students from the Department of Informatics at Universitas Trilogi . Detailed information about these 110 respondents is presented in the table 1.

TABLE I. Respondents Demographic Criteria

Demographic	Respondent Criteria	Number of Respondents	Percentage
Gender	Men	94	94%
	Women	16	16%
	Total	**110**	**100%**
Age	17-19	72	72%
	20-29	38	38%
	Total	**110**	**100%**
Student Year Entrance	Freshman Student (Year 2024)	15	14%
	Sophomore Student (Year) 2023)	32	29%
	Junior Student (Year 2022)	28	25%
	Senior Student (Year 2021)	35	32%
	Total	**110**	**100%**

Table 1 outlines the demographic characteristics of 110 respondents, revealing a predominantly male sample, with 94 men (94%) and only 16 women (16%). Age-wise, the majority are young, with 72 individuals (72%) aged 17-19, while 38 respondents (38%) are between 20-29 years old. In terms of academic standing, seniors (Year 2021) make up the largest group at 35 respondents (32%), followed by sophomores (Year 2023) at 32 (29%), juniors (Year 202) at 28 (25%), and freshmen (Year 2024) at 15 (14%). The Respondents Responses on the UEQ measurement can be seen on table 2.

TABLE II. Respondents Responses on UEQ Measurment

	Items								
Total Respondent	**1**	**2**	**3**	**4**	**5**	**…**	**24**	**25**	**26**
1	6	5	3	2	2	…	2	2	4
2	7	7	1	1	1	…	1	1	6
3	6	6	1	1	1	…	1	1	6
4	6	7	2	1	1	…	3	2	5
5	6	7	2	1	1	…	3	2	5
…	…	…	…	…	…	…	…	…	…
109	5	5	4	4	4	…	2	2	4
110	5	5	4	4	4	…	2	2	4

The values presented in Table 2 are initially on a scale of 1 to 7. Subsequently, a data transformation is performed to convert the assessment scale to a range of -3 to +3. Subsequently, an inconsistency check was performed on the 110 responses obtained from participants. Three responses were classified as invalid due to a critical inconsistency level that surpassed 3, resulting in their exclusion from the dataset.

TABLE III. Means, Variance and Standard Deviation

Item	Mean	Variance	Std. Dev.
1	1.59	0.61	0.78
2	1.77	1.02	1.01
3	1.42	1.75	1.32
4	1.75	1.81	1.34

5	1.78	1.86	1.36
6	1.76	1.01	1.00
7	1.54	0.62	0.79
8	1.41	0.90	0.95
9	2.12	0.47	0.69
10	2.13	0.48	0.69
11	1.58	0.59	0.77
12	1.25	2.52	1.59
13	1.55	0.65	0.81
14	1.25	0.47	0.68
15	1.32	0.51	0.72
16	1.29	0.56	0.75
17	2.05	1.08	1.04
18	1.98	0.62	0.79
19	1.82	1.12	1.06
20	1.23	1.11	1.05
21	1.20	0.55	0.74
22	1.72	1.16	1.08
23	2.01	0.21	0.46
24	1.89	0.61	0.78
25	2.15	0.33	0.58
26	0.75	1.05	1.03

In Table 3 are the average values, variances, and std deviations per item. These results are obtained from the sum of all respondents grouped per item. The analysis of the 26 items reveals varying levels of respondent perceptions, as indicated by their mean scores, variances, and standard deviations. Items 9 (mean: 2.12) and 10 (mean: 2.13) received the highest ratings, reflecting favorable perceptions, while Item 26 (mean: 0.75) showed significant dissatisfaction among respondents. Notably, Item 12 exhibited the highest variability (variance: 2.52; standard deviation: 1.59), indicating mixed opinions, whereas Item 23 had the lowest variability (variance: 0.21; standard deviation: 0.46), suggesting a strong consensus. Overall, the data highlights areas of user satisfaction and concern, providing valuable insights for potential improvements.

TABLE IV. UEQ SCALES MEANS VARIANCES

UEQ Scales	Means	Variances
Attractiveness	1.57	0.23
Perspicuity	1.57	0.65
Efficiency	1.77	0.45
Dependability	1.72	0.57
Stimulation	1.77	0.66
Novelty	1.40	0.62

Table 4 indicates that all average scores exceed 0.8, suggesting a positive influence[22]. The Stimulation variable received a score of 1.77, categorizing it as positive, which implies that respondents perceive the AR Campus Visualization as beneficial. Similarly, the Efficiency variable also scored 1.77, indicating that respondents regard the AR Campus Visualization application as efficient and user-friendly. The Dependability variable achieved a score of 1.72, reflecting that respondents feel a strong sense of control over the application. The Perspicuity variable scored 1.57, which falls within the positive category, suggesting that users find the AR application comprehensible and easy to navigate. The Attractiveness variable, with a score of 1.57, indicates that users have a favorable impression of the application's appearance. Lastly, the Novelty variable received the lowest score of 1.40, indicating that the AR application requires enhancements in creativity and innovation. The Pragmatic and Hedonic quality can be determined and evaluated by additional analysis of these six scales. Figure 5 shows the results of the Attractiveness, Pragmatic Quality, and Hedonic Quality ratings.

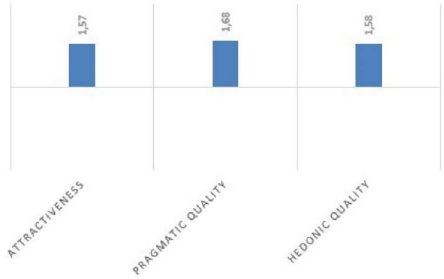

Fig.5 Attractiveness, Pragmatic Quality, and Hedonic Quality ratings

Based on Figure 5, it can be seen that the respondents' assessment of Pragmatic Quality received the highest score, namely 1.68, users can use the application successfully, but also feel satisfaction related to the performance and efficiency of the application. Followed by Hedonic Quality with a score of 1.58 and the attractiveness score with a score of 1.57. Benchmark refers to the graphical representation of data, where all variables will be displayed visually based on the obtained values, as illustrated in Figure 5.

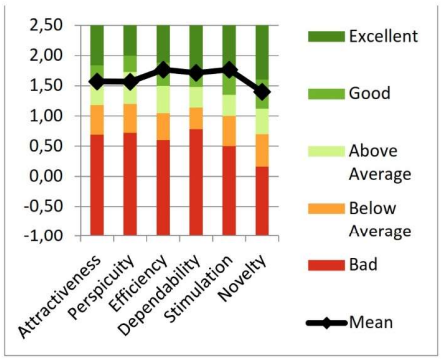

Fig.6 UEQ Benchmarks Results

It can be seen in Figure 6 that the user experience assessment on the AR Campus Visualization application received 2 excellent values including the variables of dependability and stimulation. Good values on the variables of Efficiency and Novelty. Above Average on the variable of Attractiveness and Perspicuity all assessments are positive.

TABLE V. BENCHMARK COMPARISON

Scale	Mean	Comparison to benchmark
Attractiveness	1.57	Above average
Perspicuity	1.57	Above Average
Efficiency	1.77	Good
Dependability	1.72	Excellent
Stimulation	1.77	Excellent
Novelty	1.40	Good

The results from the Table 5 indicate varying levels of user perceptions across different scales. Attractiveness and perspicuity both scored a mean of 1.57, categorizing them as above average. Efficiency and stimulation received higher ratings of 1.77, classified as good and excellent, respectively. Dependability stood out with an impressive mean of 1.72, also marked as excellent. However, novelty scored the lowest at 1.40, categorized as good. The low rating for novelty may suggest that users perceive the features or experiences offered as lacking innovation or uniqueness. This could indicate that the application does not significantly differentiate itself from existing solutions, leading to a sense of familiarity rather than excitement. Addressing this aspect could enhance user engagement and satisfaction, making the experience more compelling and distinctive.

IV. CONLUSION

Based on the data presented for UEQ scales, it can be concluded that the application generally elicits positive user experiences across several dimensions. The mean scores for attractiveness (1.57), perspicuity (1.57), efficiency (1.77), and dependability (1.72) indicate that users find the application appealing, easy to understand, efficient, and reliable. Additionally, the stimulation score (1.77) suggests that the application successfully engages users. However, the novelty score (1.40) is notably lower than the other dimensions, indicating that there may be room for improvement in terms of creativity and innovation within the application. The findings have both practical and academic implications. Practically, enhancing the novelty aspect could lead to higher user satisfaction and engagement, which is crucial for the application's success and adoption. This study contributes to the understanding of user experience in augmented reality applications, highlighting the importance of incorporating innovative features to maintain user interest. Limitations of this study include a potentially homogeneous sample, as the data were primarily collected from the Department of Informatics, which may not reflect the broader user base. Future research should focus on enhancing the novelty aspect of the application by incorporating innovative features such as interactive elements, gamification, and personalized content. Additionally, expanding the sample size to include diverse user groups from various disciplines and backgrounds will provide a more comprehensive understanding of user interactions and preferences. This approach will not only enrich the findings but also ensure that the application meets the needs of a wider audience.

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CHAPTER V. CONCLUSION

Based on the data presented for UEQ scales, it can be concluded that the application generally elicits positive user experiences across several dimensions. The mean scores for attractiveness (1.57), perspicuity (1.57), efficiency (1.77), and dependability (1.72) indicate that users find the application appealing, easy to understand, efficient, and reliable. Additionally, the stimulation score (1.77) suggests that the application successfully engages users. However, the novelty score (1.40) is notably lower than the other dimensions, indicating that there may be room for improvement in terms of creativity and innovation within the application. The findings have both practical and academic implications. Practically, enhancing the novelty aspect could lead to higher user satisfaction and engagement, which is crucial for the application's success and adoption. This study contributes to the understanding of user experience in augmented reality applications, highlighting the importance of incorporating innovative features to maintain user interest. Limitations of this study include a potentially homogeneous sample, as the data were primarily collected from the Department of Informatics, which may not reflect the broader user base. Future research should focus on enhancing the novelty aspect of the application by incorporating innovative features such as interactive elements, gamification, and personalized content. Additionally, expanding the sample size to include diverse user groups from various disciplines and backgrounds will provide a more comprehensive understanding of user interactions and preferences. This approach will not only enrich the findings but also ensure that the application meets the needs of a wider audience.

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