Developing Mahakarya Vokasi Virtual Reality Game: Player-Centered Design (PCD) with UEQ-Based Analysis

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***Abstract*— This research describes the process of doing vocational work in a Virtual Reality (VR) adventure game called VR Mahakarya Vokasi. The game is designed to provide an interactive experience that allows players to engage directly in a virtual adventure using VR technology. The development process involves the design, implementation, and evaluation stages, focusing on vocational product content. This research is based on Player-Centric Design, which places the player at the center of attention. The User Experience Questionnaire (UEQ) method was used to assess the quality of user experience and can help identify issues related to game usage while providing valuable feedback for game development. User experience analysis of 20 respondents at the Vokasi Fest x Festival Kampus Merdeka event at Ismail Marzuki Park, Jakarta, on December 12-13, 2023. This research shows that the VR adventure game is considered "Worthy" of use, which aligns with the UEQ benchmark. Specific aspects include Attractiveness (Excellent), Stimulation (Good), Novelty (Above Average), Efficiency (Above Average), Dependability (Below Average), and Perspicuity (Below Average). Overall, this game, VR Adventure Mahakarya Vokasi, developed as a vocational work, is considered worthy of use.**

Keywords—Virtual Reality, Adventure, Vokasi, User Experience Questionnaire, Player-Centric Design.

I. INTRODUCTION

The development of information technology has had a significant impact on digital games and entertainment. These developments have enabled other technological innovations to facilitate the design and development of newer digital game concepts. Thus, a wide range of interaction possibilities have been opened up to the users. One digital game concept that has greatly benefited from recent technological advancements is Virtual Reality (VR) games, which have provided users with a more realistic and interactive interaction experience [1].

However, despite the promising potential of VR, the technology still faces several challenges. The main problem in VR game development is the difficulty in creating fully immersive and intuitive experiences [2][3]. This challenge arises from issues such as hardware limitations, the complexity of designing interactive environments, and the need for more sophisticated user interfaces that can match the level of immersion expected by players . Moreover, VR can sometimes cause discomfort or motion sickness in users, which can hinder its adoption and limit its audience reach [4]. To overcome these issues, a deeper understanding of user interaction within VR environments is crucial. Focusing on software improvements, like more intuitive interfaces, optimized rendering, and adaptive features, can enhance user experience and reduce motion sickness. Prioritizing immersive storytelling and interaction can further expand VR's appeal.

In 2016, Virtual Reality (VR) devices such as HTC Vive and Oculus Rift have provided game developers with a vast and growing opportunity to reach a broader and more diverse audience in VR computer game development [5]. While the industry looks forward to a positive impact on hardware and software sales, Virtual Reality (VR) game players hope for a more exciting, realistic, and interactive gaming experience [6]. Empirical research has shown that VR technology can significantly enhance the gaming experience in various ways, including increasing gaming satisfaction [6][7].

VR technology has been used in a wide range of applications, including education, gaming, entertainment, military, skills training, tourism, and physical exercise, offering a variety of varied and innovative usage possibilities [8]. In the gaming and entertainment sectors, the potential for VR is particularly significant. In Indonesia, the potential for VR technology to grow is vast, especially given the country's rich cultural heritage, which can be incorporated into games to create unique and interactive content. [9].

Player-Centered Design (PCD) is a critical approach in addressing the challenges of VR game development. PCD focuses on designing games that prioritize the player's experience, ensuring that the game is intuitive, engaging, and tailored to the player's needs [10]. Previous research has emphasized the importance of user-centered tutorial design in VR games to enhance user engagement and provide a fun and interactive experience. [11]. By applying PCD and supplementing it with the User Experience Questionnaire (UEQ) method, designers can evaluate aspects such as Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty. These categories are essential for measuring a good user experience and ensuring that the game design meets the expectations and preferences of players.

In this draft, we developed a VR adventure game titled "Virtual Reality Adventure Mahakarya Vokasi," in the adventure genre made by Digiars Studio. Eight members are involved in the creation of this game, with the author responsible for game assets, one person handling the UI, and the remaining six people working as front-end and back-end programmers. This game is intended for young people, ranging from ages 15 to 25 and above. It was showcased at the Vokasi Fest x Festival Kampus Merdeka at Taman Ismail

Marzuki, Jakarta, on December 12-13, 2023. During the event, we surveyed visitors who tried our game to collect data using the UEQ Method. The survey participants were chosen to be representative of the target age group, ensuring that the feedback collected was relevant and applicable to the intended audience. The information obtained from this survey will be utilized to refine and improve the gaming experience. In this draft, we discuss our game development process, the methodology used, and the valuable insights we gained from analyzing the UEQ data.

II. RESEARCH METHODS

A. Player Cetric Design (PCD)

Player-Centered Design (PCD) is a specialized approach to game development that prioritizes the player's experience at every stage of the design process [12], Building upon the principles of user-centered design, which aim to create products that are efficient, effective, and satisfying for users, PCD specifically tailors these principles to the unique context of gaming. This approach emphasizes understanding and integrating the player's perspective to create an engaging and meaningful gaming experience.

Unlike broader user-centered design, PCD focuses on the interactive and entertainment aspects of games. It involves immersing oneself in the player's viewpoint, considering how they interact with the game, perceive its elements, and fit it into their overall gaming experience. By doing so, designers aim to craft games that not only meet functional requirements but also resonate emotionally with players, providing them with a sense of enjoyment and achievement.

To implement PCD effectively, designers gather detailed insights into players' motivations and preferences through methods such as surveys, interviews, and playtesting. This player-focused research helps designers understand what aspects of a game will be most compelling and enjoyable, guiding the creation of game mechanics, narratives, and interfaces that align with player expectations. The iterative design and testing processes in PCD allow for continuous refinement based on player feedback, ensuring that the game evolves to better meet their needs.

Ultimately, PCD recognizes that a game's success depends on more than just technical features or aesthetics [13]. It highlights the importance of factors like narrative depth, emotional impact, and immersive gameplay. By focusing on these elements, PCD ensures that games offer a richer and more rewarding experience, making them not only functional but also deeply engaging and enjoyable for players.

1) Understand the Player

PCD involves several steps, including the Understand the Player stage. At this stage, developers need to understand who the players are, what they need, and what they like based on trends. This helps developers understand how players think, what they want, and how they interact with the game [14]. In addition, developers also need to understand the player's views and how they engage in the game.

One way that the author uses this is to use the survey method with Google Forms, using the question format in the User Experience Questionnaire (UEQ) guidebook for visitors who try our game during the event. The author creates a questionnaire using the template provided by UEQ, not only containing questions but also equipped with questions about respondent information such as Email, Gender, Age, Origin / Agency, Gaming experience, and average duration of playing games.

2) Understand the Mission

This step involves understanding the game scenario the author is working on, identifying the desired game outcome or target outcome (what the developer wants to achieve), and determining the appropriate mission for the gamification project being worked on [15]. Another thing that can be integrated into this step is to identify the results of the research being done by the author and provide the results obtained from surveys and other test results. This is so that readers can use the research as another source to develop the game they are working on. Thus, the research can become more varied and make a more significant contribution to the development of better and more interesting games.

3) Understand Human Motivation

This step refers to the drive or desire that drives a person to participate, interact, and stay engaged in a game or other interactive experience. The desire to participate and interact in a game or other interactive experience involves understanding what drives players to continue playing, achieve goals, and feel satisfied with a given experience. This understanding includes the psychological, social, and emotional aspects that influence player behavior and their motivation to continue participating and interacting in a game or other interactive experience. In the game that the author and the Digiars team made, many game systems are included in the game including using unique ways to defeat enemies, such as defeating mini spiders by spreading poison in jugs, weakening the boss spider by destroying cocoons around the boss spider, and collecting Key Item puzzles found on the altar which is closed by a barrier, players must destroy mini crystals along the way to the altar to open the barrier.

4) Apply Game Mechanics

In this stage, game developers need to understand the game goals and how players achieve these goals. Understanding game goals can help game developers understand how game goals can influence players' thoughts, desires, and actions [12]. We implemented a puzzle system and the final boss on each stage in the VR Adventure Mahakarya Vokasi game we created. The puzzle contains some of the Mahakarya Vokasi products. An example of a product used as a puzzle is the Surabaya State Shipbuilding Polytechnic lifeboat, which will be divided into five parts and placed in several locations on stage six. The player must collect the five parts to get the puzzle result or the complete form of the lifeboat. There is a final boss on each stage, which, if defeated, will drop a Kristall, which will be used as a teleport to the next stage.

5) Manage, Monitor and Measure

Game developers monitor and organize game development, monitor and measure game performance, and monitor and measure player thoughts, desires, and actions. Data can be used to change the game, as well as the player's thoughts, desires, and actions. Game developers also need to understand how data can be used to change the game, as well as players' thoughts, desires, and actions [10]. By incorporating PCD into game development, developers can create more enjoyable games for users, increasing satisfaction in playing games. The author only used the

Measure stage due to the need for more time to effectively execute the manage and monitor stages. In this situation, the author can maximize the results by using the User Experience Questionnaire (UEQ) Method:

B. User Experience Questionnaire (UEQ)

The User Experience Questionnaire (UEQ) method has proven to be effective in measuring the quality of user experience and providing useful feedback for game development:

Although the author was unable to execute the manage and monitor stages more effectively, the UEQ Method can help collect accurate data, identify problems, and measure the quality of user experience more effectively, maximizing the research results.

The UEQ method calculates the overall average amount of data consisting of several scales, one of which is six subscales, which include 26 questions [16]. The concept of "Attractiveness" in this context refers to the general impression left by the product on the user. In contrast, when we talk about "Perspicuity," we consider the extent to which it is easy for users to become familiar with or understand the product.

Understanding "Efficiency" involves evaluating the extent to which the product enables the user to accomplish tasks without excessive effort. The aspect of "Dependability" addresses the feeling of control the user feels during interaction with the product. Likewise, "Stimulation" is evaluated based on the user's excitement and motivation while using the product. Meanwhile, "Novelty" addresses the extent to which the product reflects innovation and creativity. The last scale is the 3 main scales, namely Attractiveness, Pragmatic, and Hedonic quality. Attractiveness quality still has the same meaning as Attractiveness, which is on 6 subscales; this subscale is included in the 3 main scales because it measures the general impression (pure valence) about the product directly for the subscale, and on the other hand, it contributes to the broader emotional aspects of the main scale [16].

At the Vokasi Fest x Festival Kampus Merdeka event held at Taman Ismail Marzuki, Jakarta, on December 12-13, 2023, the author provided a questionnaire containing 26 questions. During the event, 20 respondents gave replies. With these 20 respondents, calculation testing covering six scales, Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty, can be carried out. This test focuses on these six scales because they cover aspects that are important in assessing the performance and quality of the game and help game developers improve the quality of the game.

C. Testing Protocol

This test protocol consists of several parts to collect data and information related to game testing and survey taking. One of them is the Prototype Game Results. The results of this prototype game contain a description of how the game is designed, how the features are contained in the game function, and how the game flowchart flows. The results of this prototype game are very important in discovering the extent to which the game has been developed, how the game structure is made, what kind of storyline is run, and others. Another stage is how field testing is carried out. This field testing includes several parts, such as event posters, game logos, and evidence of surveys conducted during the event. Overall, the testing protocol includes data and information related to game testing when carried out, as well as complete information about the structure and flow of the game presented during the survey.

III. GAME DEVELOPMENT

A. Player Centric Design

1) Understand the Player

This study utilized a detailed questionnaire to analyze player demographics and gaming habits during the Vokasi Fest X Event. The results revealed diverse characteristics among the respondents, including gender distribution, age, gaming experience, and session durations. These insights highlight important trends such as gender differences in playtime and varying engagement levels across age groups.

The specific counts and detailed analysis of these findings will be explained in the Results chapter, offering a thorough understanding of how these player characteristics impact game development and design.

2) Understand the Mission

VR Mahakarya Vokasi offers a unique Virtual Reality (VR) experience that highlights various aspects of Indonesian culture through an innovative VR Adventure Game approach. The game combines educational content with interactive entertainment, providing players with a distinctive exploration of Indonesian traditions and landmarks.

The research employs the Player-Centric Design (PCD) method to enhance the game's development. This approach prioritizes the player's perspective, ensuring that the game is not only functional but also engaging and satisfying for users. By focusing on player needs and preferences, the research aims to create a more compelling and enjoyable gaming experience.

To accurately assess player experience, the study uses the User Experience Questionnaire (UEQ) Method. This method provides detailed insights into how players interact with the game, offering valuable feedback for developers to refine the game. The UEQ helps identify strengths and areas for improvement, ensuring that the game evolves to better meet player expectations.

Overall, the research contributes to the development of engaging games by using player-centered methods and precise measurement techniques. By integrating feedback and focusing on user experience, the study aims to enhance the quality of the game and effectively showcase Indonesian culture through an immersive VR experience.

3) Understand Human Motivation

The VR game "Mahakarya Vokasi" uses many concepts, including traditional houses, historical buildings in Indonesia, and famous tourist areas, with the adventure or exploration genre. This game offers an immersive and interactive experience with various interesting obstacles in each stage. These obstacles increase the player's curiosity, such as facing very difficult and somewhat impossible opponents. Therefore, other ways exist to defeat monsters, such as destroying crystals to weaken monsters, lighting torches to scare monsters, and running away from players.

Various kinds of interesting obstacles and ways to solve each obstacle that vary make players keep playing.

Each stage is equipped with various types of interactive environments, such as crystals that can be destroyed to get points and several weapons that must be collected based on the player's needs to pass each stage. Other environments that can fill the player's activities during the game include fighting various types of monsters and collecting puzzle parts. Each stage has 5 puzzle parts that must be arranged so the player can proceed to the next stage and pass other obstacles, such as destroying all cocoons to kill Boss Monster and many other diverse obstacles to defeat monsters in each stage.

One example of the stage is Mount Merapi, inhabited by the boss monster, Fire Dragon. The idea was obtained from the story of Javanese people who believe that Mount Merapi is guarded by a dragon that has magical powers [18]. Using this myth, we build stages with fire elements such as fire crystals, fire golems, fire dragons, and other monsters that contain fire elements. Another concept that we use is the monument of Monas. Due to the absence of interesting mythical monsters, we place interesting fantasy monsters such as Treant or living trees guarding the Monas monument on the stage, as well as Prambanan temple, which is guarded by a giant Laba Laba, Borobudur temple, which a giant Golem and others guard. Providing a variety of interesting obstacles, as mentioned just now, and solving each obstacle diversely and uniquely makes the player keep playing and trying to complete each stage.

4) Apply Game Mechanics

VR Mahakarya Vokasi is an innovation that introduces various types of Indonesian culture through a unique VR experience. In this game, players will be invited to explore traditional houses, historical buildings, and myths (folklore) of Indonesia through interesting adventures and puzzles. With 10 scenes to pass, players will face various types of monsters and interesting puzzles. By integrating various aspects of Indonesian culture, video games can have a significant impact, including the dissemination of traditional Indonesian culture through Virtual Reality (VR) technology [20] Based on similar research that discusses Playing Virtual Chess Games using VR can provide an immersive and real-time environment of the game by allowing users to have a more interesting experience [2].

Each stage has challenging obstacles. You must Pass all obstacles, like solving a puzzle, to be able to proceed to the next scene. Every time you complete a scene, the player will be introduced with a gift item that represents the work produced by the Mahakarya Vokasi institution.

By passing various obstacles and puzzles, players can see the unique architecture of Indonesian traditional houses and explore the cultural diversity in each stage. They will also be able to explore interesting architectural details and the stories behind these historic buildings. By presenting legendary creatures and folklore characters, players will be invited to solve puzzles and uncover the mystery behind these stories.

By combining virtual reality (VR) and interesting game stages, VR Mahakarya Vokasi is the right platform to introduce Indonesia's rich culture to the younger generation. Through an interactive gaming experience, players can not only learn about various types of Indonesian culture but can also feel the beauty and uniqueness of these cultures directly [21].

5) Measure

To evaluate the VR game Mahakarya Vokasi, the User Experience Questionnaire (UEQ) was employed to gauge various facets such as attractiveness, stimulation, novelty, efficiency, dependability, and perspicuity. This assessment aims to capture a detailed picture of user interactions and perceptions regarding the game.

The findings and specific metrics derived from this measurement will be thoroughly discussed in the Analysis chapter, providing a comprehensive overview of user feedback and game performance. This detailed analysis will guide further improvements and adjustments to enhance the overall gaming experience.

IV. Results and Analysis

A. Result

This stage begins with the author giving a questionnaire to entrants or guests at the Vokasi Fest X Event at Merdeka Campus based on the UEQ Method question format and getting 20 respondents, as shown in Table 1.

TABLE I. List Of Participants Who Filled Out The Questionnaire

Gender	Age	Gaming Experience	Average duration of playing game
Male	21	More than 1 year	More than 30 minute
Female	27	More than 2 year	More than 15 minute
Male	18	More than 1 year	More than 60 minute
Male	22	More than 2 year	More than 60 minute
Female	22	6 Month	More than 15 minute
Female	22	More than 1 year	More than 60 minute
Female	20	Never	Never
Female	20	More than 2 year	More than 15 minute
Female	19	Never	More than 15 minute
Male	41	More than 2 year	More than 30 minute
Female	22	More than 2 year	More than 30 minute
Male	51	Never	Never
Male	20	More than 2 year	More than 60 minute
Female	20	More than 2 year	More than 15 minute
Male	21	More than 2 year	More than 30 minute
Female	18	3 Month	More than 30 minute
Male	23	More than 2 year	More than 3 Hour
Male	21	More than 2 year	More than 2 Hour
Female	22	More than 2 year	More than 15 minute
Male	21	More than 2 year	More than 2 Hour

In the data collection of participants, the questionnaire is divided into 4 sections, namely Gender, Age, Gaming Experience, and Average Duration of Playing Games.

1) Gender

After analyzing the available data, it was observed that there is a fairly even distribution of male and female users for the VR Adventure Mahakarya Vokasi game, with approximately 56% female and 44% male players. This balance suggests that the game appeals to both genders, indicating its broad appeal and potential to engage a diverse audience [17].

Further investigation into the data revealed interesting correlations. For instance, it was found that female players tended to spend slightly more time playing the game compared to their male counterparts.

Additionally, there was a noticeable trend where younger players, particularly those in their late teens and early twenties, exhibited longer average play durations compared to older players. These findings highlight that both gender and age can influence gaming habits, and understanding these patterns can inform game design to better meet the needs of different user groups.

Considering these insights is crucial for game development, as they emphasize the importance of designing inclusive and engaging content for all players. By acknowledging the preferences and behaviors of various demographic groups, developers can create more tailored and relevant gaming experiences [18]. This approach not only enhances player engagement but also ensures that the game remains accessible and enjoyable for a diverse audience.

2) Age

The analysis of user demographics for the VR Adventure Mahakarya Vokasi game reveals that the majority of players are relatively young, with 86% of users falling within the age range of 18 to 27 years old. This trend suggests that the game is particularly popular among younger individuals. However, the data also shows a notable presence of older players, with 13% of users between 41 and 51 years old, indicating that the game attracts a diverse age range.

Correlations found in the data indicate that younger players, particularly those in their late teens and early twenties, generally spend more time playing the game compared to older users. This trend suggests that age may influence gaming habits, with younger players more likely to engage in longer play sessions. Conversely, older players tend to have shorter average play durations, reflecting different gaming preferences and available time.

Understanding these age-related patterns is crucial for game development, as it highlights the need for content that appeals to a broad audience. By recognizing and addressing the diverse needs and preferences of various age groups, developers can create more engaging and satisfying experiences for all players. This inclusive approach helps ensure that the game remains relevant and enjoyable across different generations, enhancing its potential to connect players of all ages through compelling and meaningful gaming experiences [19].

3) Gaming Experience

The analysis of users' gaming experience reveals a diverse range of experience levels among players. It is evident that a significant portion of the user base, approximately 50%, consists of individuals who have been gaming for over two years, suggesting a deep understanding of the gaming world. Conversely, there is also a notable presence of newer players, with about 19% having been gaming for more than a year, highlighting the gaming industry's ongoing efforts to attract fresh interest and engagement. Additionally, around 12% of users have less than six months of gaming experience, indicating a new interest in gaming, while 19% of users had never played a game before.

The data indicates that experienced players tend to spend more time playing games compared to those who are newer to gaming. This correlation suggests that players with more extensive gaming backgrounds are likely to engage in longer play sessions. Additionally, there is a trend where less experienced users, including those who have recently started gaming, generally have shorter play durations. This difference in play time between experienced and novice players reflects varying levels of engagement and familiarity with game mechanics.

Understanding these patterns allows developers to tailor their strategies to address the needs of both seasoned gamers and newcomers. By creating content that caters to a wide range of experience levels, developers can enhance the overall appeal and relevance of the game. This approach not only helps attract and retain new players but also ensures that the game continues to engage and satisfy long-time gamers. In summary, recognizing and addressing these variations in gaming experience is crucial for designing features and mechanics that resonate with a diverse player base.

4) Average duration of playing game

The data on users' gaming habits reveals a wide range of play durations and preferences. It is evident that while many users are actively engaged in gaming, their session lengths vary significantly. Specifically, 31% of users engage in gaming sessions lasting more than 30 minutes, with 25% preferring sessions longer than 60 minutes. Additionally, another 31% of users play for more than 15 minutes per session. Conversely, around 13% of users never engage in gaming at all, indicating that gaming habits are influenced by factors such as personal interests and time constraints.

The findings suggest that there is a notable difference in gaming habits based on experience and availability. Players who are more experienced or have more free time tend to participate in longer gaming sessions, whereas those with less gaming experience or limited leisure time generally opt for shorter sessions. Additionally, some users do not engage in gaming at all, indicating that gaming habits are influenced by factors such as personal interests and time constraints.

These insights highlight the importance of understanding the diverse gaming patterns among users. By recognizing these variations, developers can create adaptive game designs that cater to different play preferences. This approach ensures that the game remains engaging and relevant to a broad audience, accommodating both casual players who prefer shorter sessions and dedicated gamers who enjoy extended play.

B. Analysis

In the User Experience Questionnaire (UEQ) analysis method, several stages need to be carried out, including providing 26 questions according to the format in the handbook that is available along with an explanation of the 26 questions:

1) 26 types of UEQ questions with Scales

In this research, we have collected 20 respondents. Using the UEQ Method, we measured the playing experience of the

20 respondents by answering several questions based on the UEQ Handbook [16].

TABLE II. LIST OF UEQ QUESTIONS GROUPED BY 6 UEQ SUBSCALES ATTRACTIVENESS (PURPLE), PERSPICUITY (GREEN), NOVELTY (ORANGE), STIMULATION (RED), DEPENDABILITY (BLUE), EFFICIENCY (GRAY) [16]

No	Left	Right
1	annoying	enjoyable
2	not understandable	understandable
3	creative	dull
4	easy to learn	difficult to learn
5	valuable	inferior
6	boring	exciting
7	not interesting	interesting
8	unpredictable	predictable
9	fast	slow
10	inventive	conventional
11	obstructive	supportive
12	good	bad
13	complicated	easy
14	unlikable	pleasing
15	usual	leading edge
16	unpleasant	pleasant
17	secure	not secure
18	motivating	demotivating
19	meets expectations	does not meet expectations
20	inefficient	efficient
21	clear	confusing
22	impractical	practical
23	organized	cluttered
24	attractive	unattractive
25	friendly	unfriendly
26	conservative	innovative

All questions in the table have been grouped based on 6 sub-scales based on color: purple represents the Attractiveness scale, Green represents the Perspicuity scale, Orange represents the Novelty scale, Red represents the Stimulation scale, Blue represents the Dependability scale, and finally, the Gray color represents the Efficiency scale.

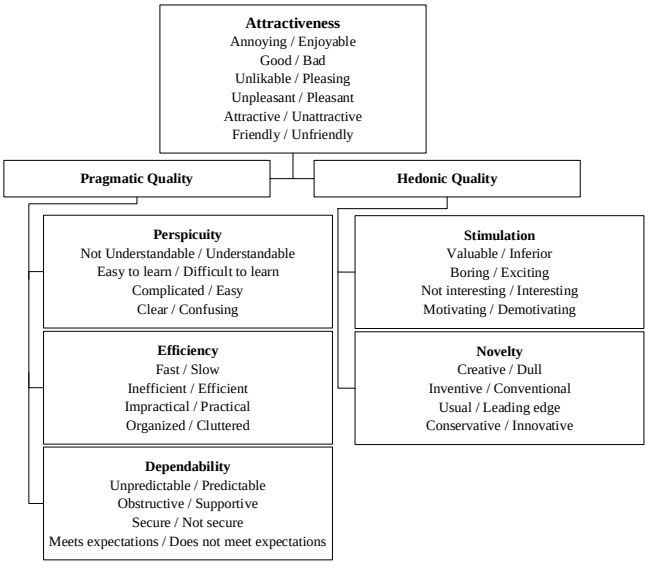


Fig. 1. UEQ scale structure of Attractive Quality, Pragmatic Quality and Hedonic Quality

Based on Table 2, the 26 types of questions are grouped into six more specific and structured scales, as seen in Figure 1. The following is a more detailed explanation of the six scales:

In the context of UEQ, attractiveness means the overall impression that the product gives to the user. This awareness can be in the form of pleasure, satisfaction, or disappointment experienced by the user toward the product. This scale helps determine whether the user will use the product again or not.

Perspicuity in UEQ means the ease with which users can understand the product and how to use it. This perspicuity can be in clear information, easy-to-understand displays, or easy-to-follow procedures. This scale helps determine whether the user can use the product effectively and efficiently.

Efficiency in UEQ means the product can help users accomplish their tasks effectively and efficiently. It can also refer to the product's ability to save time, cost, or other resources. This scale helps determine whether the user will re-use the product.

Dependability in UEQ means the user can control the product's interaction. It can be the user's ability to set, change, or stop the interaction with the product. This scale helps determine whether the user will return to using the product.

Stimulation means the product's ability to attract and motivate the user. It can also be the product's ability to provide the user pleasure, satisfaction, or pride. This scale helps determine whether the user will return to use the product.

Novelty means the product's ability to offer something new, innovative, and creative. Novelty can be the product's ability to capture user interest, provide new pleasure, or provide satisfaction that has never been felt before. This scale helps determine whether the user will return to using the product.

2) UEQ Data Calculation

After the questionnaire data has been collected, the data will be converted from a scale of 1-7 to a scale of -3, -2, -1, 0, 1, 2, 3. The following are the results of the conversion of questionnaire data:

TABLE III. LIST OF UEQ QUESTIONNAIRE RESPONDENT RESULTS

	Respondents																			
Question No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	3	1	0	-1	1	3	3	0	0	-1	2	3	1	3	3	3	2	1	3	-3
2	3	2	3	3	3	3	3	3	3	3	1	3	3	3	3	3	3	3	2	3
3	-1	-1	-1	-1	0	-2	-3	-3	0	1	-1	1	-1	-1	-1	-1	1	1	1	-1
4	1	2	2	1	2	-3	3	-1	3	1	1	2	2	3	1	1	3	2	2	1
5	2	1	-1	0	-1	3	2	1	0	-2	1	-1	1	2	1	1	-2	-1	-1	1
6	1	1	-1	-1	-1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1
7	2	0	2	0	2	-2	-2	-1	1	0	-1	3	1	1	1	1	2	2	2	-1
8	1	1	0	2	0	1	2	0	0	1	1	2	2	3	1	1	1	2	2	2
9	2	1	-1	2	2	2	2	2	2	2	1	2	1	1	2	2	-2	3	1	-1
10	1	1	1	1	-1	1	1	-1	0	2	1	2	1	1	1	1	1	2	1	1
11	2	2	0	2	1	2	3	2	-1	-2	1	2	0	3	3	2	0	2	1	1
12	3	3	2	3	2	3	3	-1	2	2	3	2	3	3	3	3	3	2	3	3
13	3	3	-3	2	-3	3	3	3	-3	-3	3	3	3	3	3	3	-3	3	3	3
14	2	1	2	3	2	3	3	1	2	2	2	3	2	3	3	2	3	2	2	2
15	2	1	-2	-2	-2	1	2	1	2	-2	2	0	2	2	1	2	-2	1	1	2
16	3	3	1	3	2	3	3	3	-1	0	3	3	3	3	3	3	3	0	3	3
17	0	1	2	2	2	2	2	-2	1	2	0	0	-1	3	3	0	3	3	1	-1
18	2	3	0	1	2	3	1	1	0	2	2	3	1	3	2	2	3	2	3	1
19	3	2	3	0	3	3	3	1	2	3	3	3	1	3	3	1	2	3	3	3
20	1	1	1	2	1	1	1	0	1	2	1	2	3	1	2	2	2	2	1	-1
21	3	1	0	-1	1	3	3	0	0	-1	2	3	1	3	3	3	2	1	3	-3
22	3	2	3	3	3	3	3	3	3	3	1	3	3	3	3	3	3	3	2	3
23	-1	-1	-1	-1	0	-2	-3	-3	0	1	-1	1	-1	-1	-1	-1	1	1	1	-1
24	1	2	2	1	2	-3	3	-1	3	1	1	2	2	3	1	1	3	2	2	1
25	2	1	-1	0	-1	3	2	1	0	-2	1	-1	1	2	1	1	-2	-1	-1	1
26	1	1	-1	-1	-1	1	1	1	0	0	1	0	1	1	1	1	1	1	1	1

The table above is the result of the 20 questionnaire participants who have been converted from points 1-7 to poles -3, -2, -1, 0, 1, 2, 3 (Negative - Positive). Based on these poles, the following questionnaire questions have been calculated and grouped into six scales, as well as the negative and positive side statements of the Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty scales.

TABLE IV. MEAN RESULTS OF 26 QUESTIONS WERE BASED ON SIX SUBSCALES: ATTRACTIVENESS, PERSPICUITY, EFFICIENCY, DEPENDABILITY, STIMULATION, AND NOVELTY

No	Mean	Scale	No	Mean	Scale
1	1.8	*Attractiveness*	14	2.2	*Attractiveness*
2	1.5	*Perspicuity*	15	2.0	*Novelty*
3	0.5	*Novelty*	16	1.7	*Attractiveness*
4	1.1	*Perspicuity*	17	1.2	*Dependability*
5	0.9	*Stimulation*	18	1.8	*Stimulation*
6	1.6	*Stimulation*	19	1.8	*Dependability*
7	1.8	*Stimulation*	20	1.0	*Efficiency*
8	0.5	*Dependability*	21	0.6	*Perspicuity*
9	0.7	*Efficiency*	22	1.3	*Efficiency*
10	0.7	*Novelty*	23	1.8	*Efficiency*
11	1.4	*Dependability*	24	1.7	*Attractiveness*
12	1.9	*Attractiveness*	25	1.9	*Attractiveness*
13	1.5	*Perspicuity*	26	2.0	*Novelty*

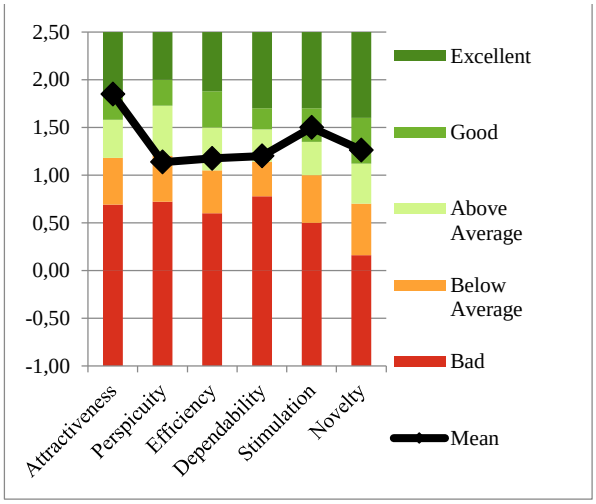
Based on the table above, the 26 questions have been grouped according to the sequential number of questions on the questionnaire; if the table above is simplified based on the scale, it will look like the following:

TABLE V. MEAN RESULT OF 26 QUESTIONS BASED ON 6 SUBSCALES OF UEQ

Scale	Mean
Attractiveness	1.85
Stimulation	1.14
Novelty	1.18
Dependability	1.20
Efficiency	1.50
Perpecuiti	1.26

The following are the results of the average value of the Questionnaire Using the UEQ Method based on the grouping of the six scales with five categories of benchmark classification per scale:

TABLE VI. UEQ QUESTIONNAIRE RESULTS TO SIX SCALES OF ATTRACTIVENESS, PERSPECTIVE, EFFICIENCY, DEPENDABILITY, STIMULATION, AND NOVELTY USING THE BENCHMARK GRAPH



Based on the results in Table 4, there are three highest results, including Attractiveness having very high results and entering into the Excellent category, Stimulation and Novelty into the Good category, and three lowest results, including Efficiency and Dependability into the Above Average category, while the lowest is Perspicuity in Below Average.

C. Testing Protocol

1) Game Prototype

"Mahakarya Vokasi" is an adventure genre game that applies several concepts about Indonesia, such as traditional houses, historic buildings, and famous tourist areas. This game is made by applying various Indonesian aspects, such as traditional houses, historical buildings, and Indonesian tourist areas, which are implemented into VR games. The following game flowchart is applied in the game flow of the VR adventure Mahakarya Vokasi game:

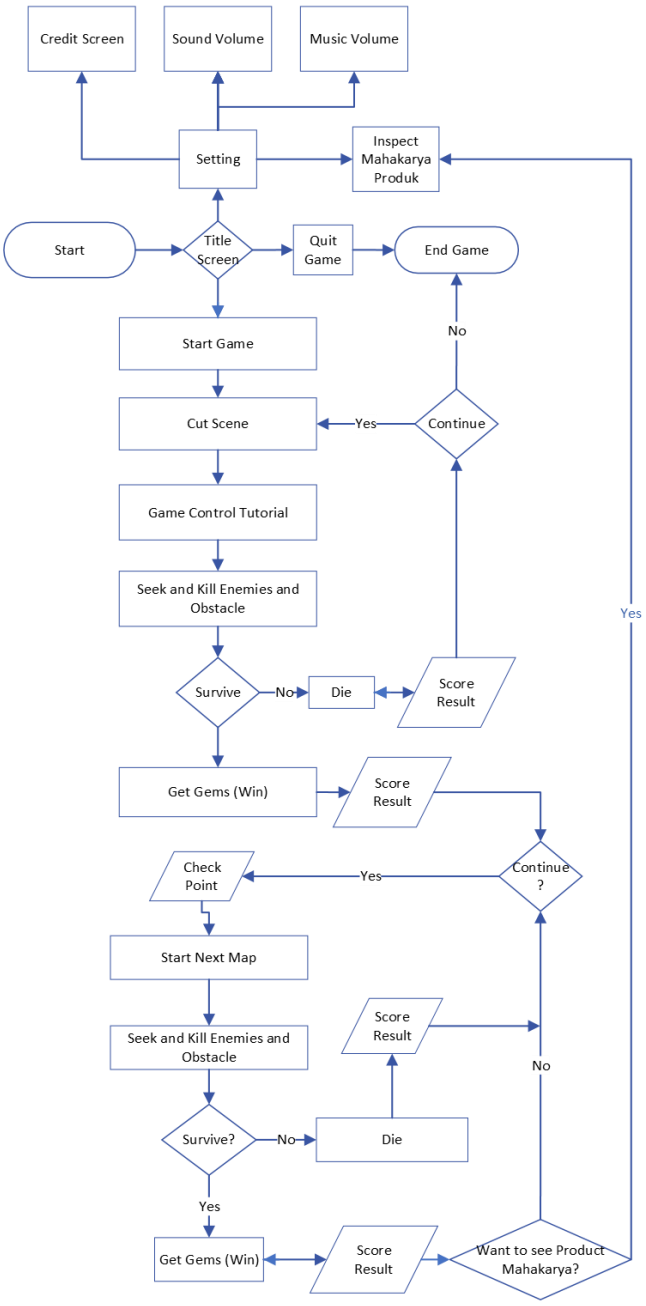


Fig. 2. VR Adventure Game Flowchart of Vocational Masterpiece.

Here are some of the design features used in the VR Adventure Mahakarya Vokasi game:

a) Collect puzzles to proceed to the next stage.

Fig. 3. The left image shows a barrier protecting the altar, so players must destroy crystals along the way to the barrier in order to open the barrier as shown on the right

Fig. 4. Puzzles that have been collected are put in the place that has been instructed

b) Destroying objects such as obstacles that block the player's path.

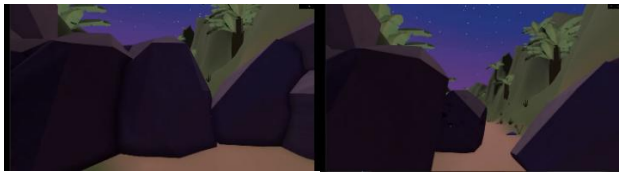


Fig. 5. A giant boulder is blocking the road in the left picture before it was demolished and the right picture after the boulder was demolished

c) Defeat Monsters along the way.

Fig. 6. Spider Monsters on the Prambanan Stage

d) Solve puzzles and defeat enemies to get past obstacles.

Fig. 7. One of the Instructions instructed us to collect wood to build a cross bridge

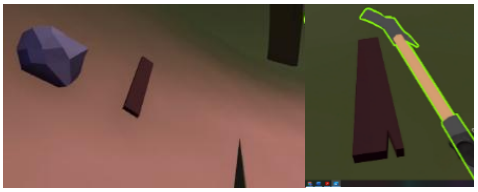


Fig. 8. Players Collect Wood to build a bridge to cross.

Fig. 9. Images of the river before the bridge was built are shown on the left and after the bridge was built are shown on the right.

2) Testing on field

VR Game Testing "Mahakarya Vokasi" was carried out at an international event in Jakarta called Vokasi Fest x Festival Kampus Merdeka at Taman Ismail Marzuki, Jakarta, on December 12-13, 2023, as for some of the things we provided before the event was held, namely making the following promotional posters that we have made:

Fig. 10. A poster was made by a member of Digiars studio to promote the Mahakarya Vokasi game at the Kampus Merdeka X Vokasi Vest Event.

Various visitors who try the game that the author and VR game developer "Mahakarya Vokasi" exhibit will be given a QR Code that visitors can voluntarily fill in. Here are some pictures at the time of the event:

Fig. 11. Opening of Vokasi Fest x Festival Kampus Merdeka

Fig. 12. One of the visitors tries out the VR adventure game Mahakarya Vokasi during the event.

V. Discussion and Conclusion

A. Discussion

Based on the results of data analysis obtained through data processing using the UEQ calculation method, which is divided into six scales, this study shows that the VR game "Mahakarya Vokasi" has enormous potential to attract user attention and interest.

The Attractiveness scale has the best results with a value of 1.85, which is included in the Excellent category. This is influenced by the rarity of VR-based adventure games that include elements of Indonesian culture, so many testers and players are interested in developing these VR games.

The Stimulation scale gets 1.14 points, which is included in the Good category. The "Mahakarya Vokasi" game attracts and motivates users through entertaining and interesting game elements, such as the concept of Indonesian culture implemented in VR games, varied challenges, and attractive visuals.

The Novelty scale gets 1.26 points, which is included in the Good category. The Novelty scale gets this score because the game "Mahakarya Vokasi" offers something new and innovative, especially by implementing Indonesian cultural elements in VR games. This provides a new and unique experience for users, which increases their interest and satisfaction with the game.

Meanwhile, the Efficiency Scale, with 1.18 points, is included in the above-average category. These results were obtained because the VR game Mahakarya Vokasi is designed with features that make it easy for players to access and use the application. The simple and easy-to-understand interface also increases player efficiency in completing tasks in the game.

The Dependability scale, with 1.20 points, falls into the Above Average category. These results are obtained because the VR game Mahakarya Vokasi allows user to control their interactions with the game. Nevertheless, some aspects still require improvement so that users feel more confident and secure in interacting with the game.

Lastly, the Perspicuity Scale has the lowest points among the other 5, with 1.14 points, included in the Below Average category. This point is obtained because the VR game developed has several parts that could be clearer to the player, so the player needs help understanding and using the application.

Despite these findings, there are some things that could be improved in the testing of this article, such as the lack of a wide range of testing. More extensive and representative testing of various demographic groups is needed. Examples such as whether the respondent has used VR or not, whether the respondent has played games using VR, and so on. Thus, the test results can be more accurate and representative.

B. Conclusion

After conducting an analysis using Player-Centric Design (PCD), we can conclude that the features and game design we have created improve the player's gaming experience. Through data collection using the User Experience Questionnaire (UEQ), we can identify some of the advantages and disadvantages of the game we have made.

Some essential points that can be concluded from using the UEQ analysis method on the game VR adventure Mahakarya Vokasi have the potential to attract user attention and interest and increase player awareness and pleasure in playing the game. The attractiveness scale has the best result with an Excellent benchmark, which is included in the Excellent category. The Stimulation and Novelty Scales also have high scores, falling into the Good category. In comparison, the Efficiency Scale and Dependability Scale have Average values, so the Mahakarya Vokasi VR Adventure game still has much room for development from the Efficiency and Dependability aspects, such as system development, which must be simpler and easier to use and UI that is easy for players to understand.

However, the Perspicuity Scale has the lowest score, included in the Below Average category, so it is necessary to improve the parts that are less clear. The storyline's direction could be more consistent. The storyline in the Mahakarya Vokasi VR Adventure Game looks and feels monotonous, and players tend to get confused and do not care about it. Therefore, clarifying the storyline and enriching the game with exciting stories on each map and gameplay can improve our game's shortcomings.

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