

**CS449**  
**ASSIGNMENT 5**

User Based Usability Testing of Virtual Environments



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## 1.Methodology

The primary objective of this comprehensive study on usability testing was to conduct an in-depth analysis of the virtual reality (VR) game application known as To the Earth's core VR. The main goals were to assess user preferences, immersion factors, and the advantages and disadvantages of creating a compelling virtual reality experience. In order to ensure that our study could be replicated, we carefully considered and implemented the following strategy.

### Users:

Creating a clear identity that reflected our intended user base was our first step. Consequently, we chose four participants—two women and one man—who had never used virtual reality before. Demographic data was collected for each participant, including background, gender, and age. The goal of recruiting these volunteers was to attain parity in terms of background and gender. The users' more thorough demographic data is as follows:

- **Names of the Participants:**
  1. Can Narin (Male)
  2. Doğukan Özbakır (Male)
  3. Ceyda Çağcı(Female)
  4. Ece Erten (Female)
- **Occupation:** All Students
- **Age:** 3 of them 23 one of them is 22
- **Current Education Level:** Bachelor Degree
- On a scale from 1 (Not Comfortable) to 5 (Very Comfortable), how would you rate your comfort level with using new technology?: All said 5
- Have you ever used a Virtual Reality (VR) system before? (Yes/No): All said no
- How frequently do you play video games?: 25% frequently, 75 % none
- Do you experience motion sickness while using VR or 3D environments?: 75% no, 25% not sure



Subject 1: Can Narin - Computer Science Student



Subject 2: Ceyda Çağcı - Economy Student



Subject 3: Ece Erten - Industrial Engineering Student



Subject 2: Doğukan Özbakır - Industrial Engineering Student

**Task Procedure:**

In order to fully immerse users in the VR applications and gather feedback on their overall experiences, a task technique was developed. For fifteen minutes, each participant used the VR game To the Earth's core. While playing the game, users provided comments based on a variety of parameters. These comprise their impressions, observations, and any noteworthy aspects of their encounter. Users were asked to share their thoughts on what they considered fascinating or interesting, but they were not required to make any specific choices. In addition, questions about the VR experience's level of enjoyment, the realism and quality of the pictures, and any suggestions for improvement were asked of the participants.

**Context:**

To lessen the impact of outside factors and distractions, the study was conducted in controlled environments. The perfect setting for virtual reality immersion was created for each user by placing them in a calm setting. The socio-technical context of the study—such as the dorms and quiet hallways—as well as user interaction were also taken into consideration. Our contextual research allowed us to account for the bigger ambient variables influencing the user experience. Knowing the location helped us evaluate possible environmental factors, including lighting and background noise, that could impact the user experience as well as space comfort. This viewpoint helped us to understand the comments and responses that research participants provided.

**Tool:**

To maintain consistency across all user testing sessions, we provided each participant with the identical smartphone and cardboard VR glasses. For the study, an iPhone 11 was utilized. Any differences in user experiences might be attributed to the VR programs themselves rather than discrepancies in technology because of this consistency.

**FOTOĞRAFLAR - KİŞİLER****2.Results**

We gathered both quantitative and qualitative data from our participants during the usability testing of the VR game "To the Earth's Core VR." A thorough analysis of the information gathered from the tests, post-test questionnaires, and post-test interviews is provided in this part.

**Quantitative Data:**

**1. Immersion Ratings:** Participants rated their level of immersion on a scale from 1 (Not Immersive) to 5 (Highly Immersive). The results were as follows:

- Participant 1: 5
- Participant 2: 5
- Participant 3: 5
- Participant 4: 5
- Average Immersion Rating: 5

The graph shows that participants found the VR experience to be highly immersive, with all ratings being the maximum score of 5. This indicates a very positive reception towards the game's ability to create an engaging and immersive environment.

**2. Ease of Navigation:** Participants rated the ease of navigation on a scale from 1 (Very Easy) to 5 (Very Difficult). The results were as follows:

- Participant 1: 2
- Participant 2: 3
- Participant 3: 1
- Participant 4: 1
- Average Navigation Rating: 1.75

The navigation ratings suggest that most participants found navigation to be relatively easy, with an average rating below 2. However, some participants experienced more difficulty than others, indicating room for improvement in the navigation mechanics.

**3. Post-Test SUS Scores:** The System Usability Scale (SUS) was used to evaluate overall usability. Participants' scores were:

- Participant 1: 65
- Participant 2: 70
- Participant 3: 85
- Participant 4: 75
- Average SUS Score: 73.75

The SUS scores reflect that participants found the game quite usable, with scores ranging from 65 to 85. The average score of 73.75 indicates a generally positive usability experience, though there are areas that could be refined to enhance usability further.

### **Qualitative Data:**

**1. User Feedback on Immersion:** Participants provided qualitative feedback on their immersive experience. Comments included:

- "The graphics were engaging and made me feel like I was actually exploring the Earth's core."
- "The background music and sound effects enhanced the immersive experience."

Participants appreciated the visual and auditory elements, which significantly contributed to their sense of immersion. These elements were key in creating a compelling VR experience.

**2. Ease of Navigation Feedback:** Participants provided qualitative feedback on navigation. Comments included:

- "It was challenging to navigate using the VR glasses initially, but I adapted after a while."
- "The controls could be more intuitive and user-friendly."

While navigation was generally manageable, some participants experienced initial difficulties. This feedback suggests the need for more intuitive control mechanisms to improve the user experience.

**3. Post-Test Interview Results:**

- Participants were interviewed to gather detailed qualitative data about their overall experience. Common themes included:
  - The need for better control mechanisms.
  - Desire for more interactive elements.
  - Positive feedback on the audio and visual quality.

The interviews revealed consistent feedback regarding the need for improved controls and additional interactive features. Participants appreciated the audio and visual quality, which contributed to their overall positive experience.

**4. Post-Test Questionnaire Results:** The questionnaire assessed various aspects of the user experience. Key findings included:

- High ratings for sound and visual quality.
- Mixed reviews on ease of navigation.

- Suggestions for improvement in control intuitiveness and interactivity.

The questionnaire results support the feedback gathered from interviews and quantitative data. While sound and visual quality were praised, there is a clear indication that navigation and interactivity need enhancements.

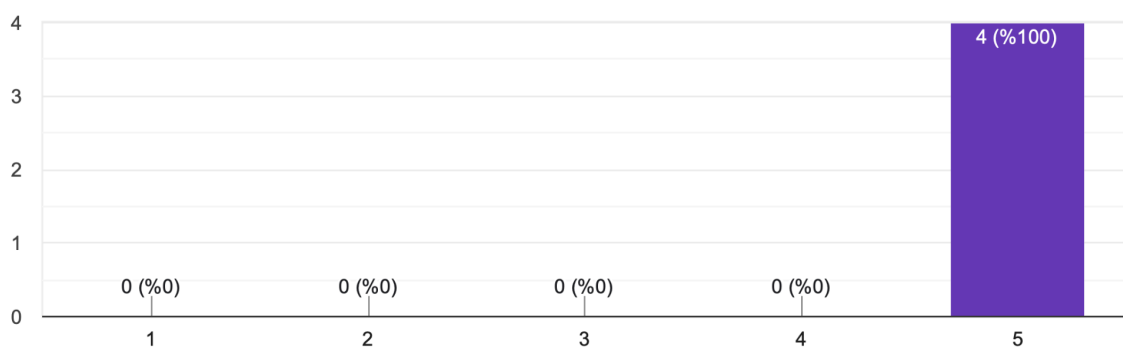
**Immersion Ratings:** Participants were asked to rate the engagement level of their VR experience on a scale from 1 (not immersive) to 5 (highly immersive). All participants rated their experience as highly immersive, with a score of 5.

- **Average Immersion Rating: 5**

This indicates that the participants found the VR game extremely engaging and immersive, as reflected by the unanimous high scores.

2-) How would you evaluate the engagement level of your VR experience on a scale of 1 (not immersive) to 5 (highly immersive)?

4 yanıt



*Figure 2.1- Immersion Evaluation*

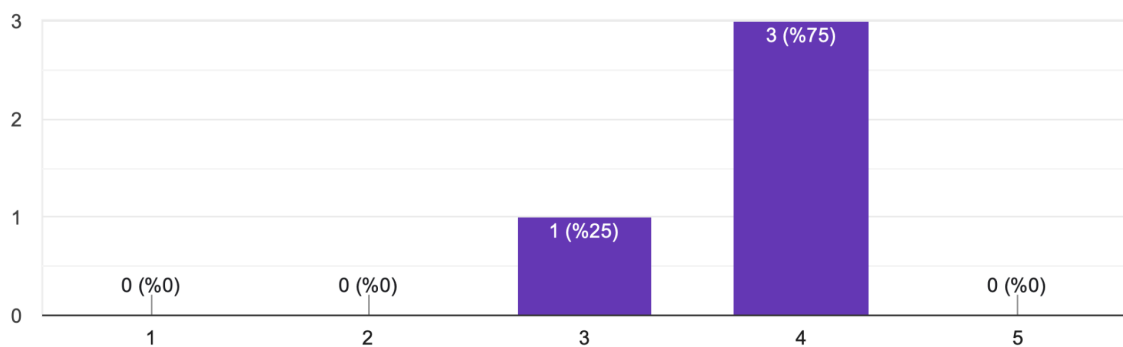
**Ease of Navigating:** Participants rated the ease of navigation within the VR environment during their experience. The ratings were:

- 1 participant rated it as 3 (somewhat easy).
- 3 participants rated it as 4 (easy).
- **Average Navigation Rating:** 3.75

The majority of participants found navigating the VR world to be easy, with one participant finding it somewhat easy. This suggests that while the navigation was generally considered straightforward, there is still room for improvement.

4-) How easy did you find it to navigate within the VR environment during your VR experience? On a scale from 1 (not immersive) to 5 (highly immersive)

4 yanıt



*Figure 2.2- Ease of Navigating*



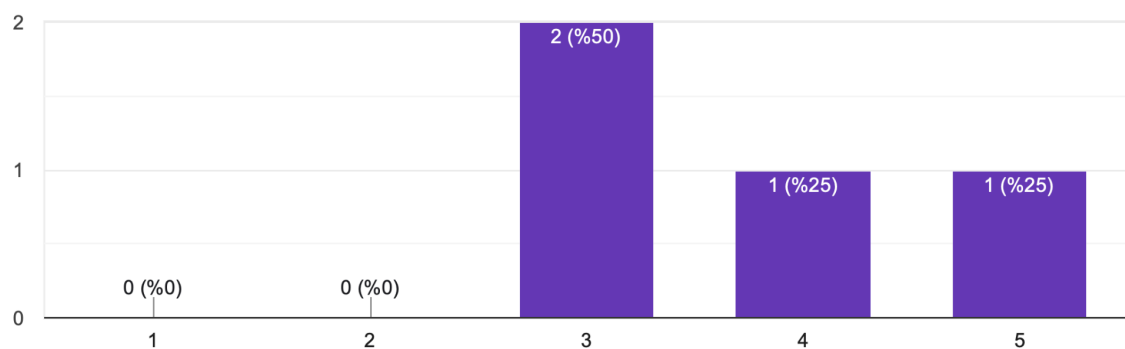
**Complexity of the System:** Participants evaluated the complexity of the system on a scale from 1 (very simple) to 5 (very complex). The ratings were:

- 2 participants rated it as 3 (moderate complexity).
- 1 participant rated it as 4 (somewhat complex).
- 1 participant rated it as 5 (very complex).
- **Average Complexity Rating: 3.75**

The results show that participants found the system to be moderately complex to very complex, indicating that the system's complexity might be a barrier for some users and could be simplified.

6-) On a scale from 1 to 5, how would you evaluate the complexity of the system?

4 yanıt



*Figure 2.3- Complexity of the System*

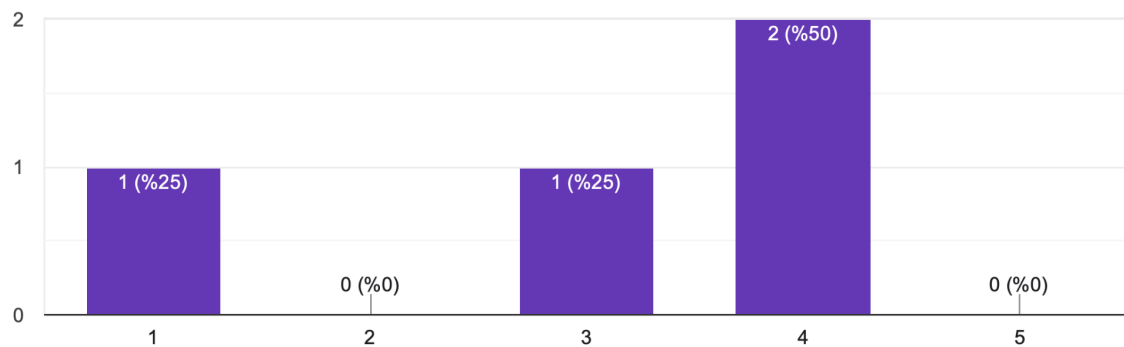
**Ease of Use:** Participants rated the ease of use of the system on a scale from 1 (very difficult) to 5 (very easy). The ratings were:

- 1 participant rated it as 1 (very difficult).
- 1 participant rated it as 3 (somewhat easy).
- 2 participants rated it as 4 (easy).
- **Average Ease of Use Rating: 3**

The ease of use scores indicate mixed experiences, with some participants finding it very difficult and others finding it easy. This suggests that the system may need improvements to be more user-friendly.

7-) On a scale from 1 to 5, how would you assess the easiness of using the system?

4 yanıt



*Figure 2.4- Ease of Use of the System*

### 3. Discussion and Conclusion

- **Immersiveness and Realism:** The data indicates that the game "To the Earth's Core VR" generally succeeded in creating an immersive experience. The high immersion ratings were primarily due to the compelling visual and auditory elements, which effectively simulated a virtual exploration of the Earth's core. However, some participants felt that the realism could be enhanced with more interactive features and dynamic environments.
- **Audio and Visual Quality:** Participants consistently praised the audio and visual quality of the game. The background music and sound effects were noted as significant contributors to the immersive experience. The graphics were described as engaging and realistic, although there were suggestions for further improvements in visual detail and interactivity.
- **Ease of Navigation and User:** Ease of navigation received mixed feedback. While the basic mechanics were understood by most participants, some found the controls to be unintuitive initially. This suggests that while the navigation system is functional, it

could benefit from more user-friendly design enhancements to reduce the learning curve for new users.

- **Emotional and Physical Sensations:** Most participants reported positive emotional responses, such as excitement and curiosity, during the VR experience. Physical comfort was generally maintained, although one participant mentioned minor discomfort related to the VR glasses after prolonged use. This indicates that while the game is engaging, the physical design of the VR setup could be optimized for better comfort.
  
- **Limitations of the Study:**
  1. **Sample Size:** The study involved only four participants, which limits the generalizability of the findings. A larger sample size would provide more robust data and a clearer understanding of user experiences.
  2. **Device Limitation:** All tests were conducted using a single model of smartphone and VR glasses, which may not represent the experience on different devices.
  
- **Future Study Suggestions:**
  1. **Increase Sample Size:** Future studies should include a larger and more diverse group of participants to gain more comprehensive insights into the usability and immersion of VR applications.
  2. **Device Compatibility:** Testing with a variety of smartphones and VR headsets could help identify device-specific issues and ensure a consistent experience across different platforms.
  3. **Control Enhancements:** Improving the intuitiveness and responsiveness of the control mechanics could significantly enhance the user experience. Future studies could explore alternative control schemes or provide tutorials to help users acclimate more quickly.

### **Conclusion:**

The usability testing of "To the Earth's Core VR" highlighted several strengths, including its immersive audio and visual elements, as well as areas for improvement, such as navigation controls and device comfort. By addressing these issues and expanding the scope of future studies, the overall user experience of VR games can be significantly enhanced.

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