What is Mixed Reality?
- Mixed Reality (MR) expands a user's physical environment by overlaying the real-world with interactive virtual elements.
- Magic Leap 1 is an MR wearable spatial computer that brings the physical and digital worlds together (Figure 1).

What is the GUESS-18?
- GUESS-18 is a shorter version of GUESS, which is used to assess nine dimensions measuring video game satisfaction.
- The Social Connectivity dimension was eliminated in this study due to the nature of the game being single player.

Current Study
This study investigates the impact of mixed reality on video game satisfaction, enjoyment, and performance when compared to its mobile version.

Introduction

Mixed Reality Gameplay
- Compared to Virtual Reality and Augmented Reality, MR video games are new and have not been deeply investigated.
- Angry Birds game was used for comparison between mobile (Figure 4) and MR (Figure 5) versions.

Method
Participants
16 participants (9 male, 7 female); ages 18-24 (M = 20.5, SD = 1.51)
- 75% reported prior experience playing Angry Birds
- 56.3% reported prior experience with virtual reality (VR)
- 12.5% reported prior experience with augmented reality (AR)

Procedure
1. Participants were randomly assigned to which device to complete first.
2. Participants were asked to complete a tutorial of the game.
3. Participants then spent 20 minutes playing the Angry Birds game starting from level 1 on a given device.
4. Once the time was over, they completed the survey, including:
   - GUESS-18 (what aspects of a game contribute to satisfaction).
   - ENJOY (the enjoyment while playing the game).
   - SSQ (any symptoms of simulator sickness a person is feeling, completed only when the device given was the Magic Leap).
5. After completing the first device, they would complete the other type of display device with the exact same tasks.
6. Participants also gave any comments and thoughts about the overall experience with the gameplay on each of the device.

Results

Game User Experience Satisfaction Scale (GUESS-18)
The overall satisfaction scores (out of 56) indicated a statistically significant between:
- Magic Leap (M = 42.31, SD = 5.61) and mobile device (M = 38.31, SD = 6.49)
- With α = 0.05, Magic Leap was rated with higher satisfaction, t(15) = 3.09, p = 0.007.
- A comparison of GUESS-18 subscales is shown below (Figure 2).

User Performance
The stars (out of 3) collected from each level played represented a statistically significant difference in performance outcomes:
- Magic Leap (M = 2.49, SD = 0.30)
- Mobile device (M = 2.93, SD = 0.09)
- Mobile version showed better performances, t(15) = 6.03, p < 0.001

Future Research
- Other video game genres should be investigated further.
- Researchers should also investigate whether other MR headsets, such as the Hololens 2, would provide similar results.

Discussion
- Overall, participants were more satisfied with Angry Birds on the mixed reality device than the mobile version.
- The lack of differences across GUESS subscales (Visual, Audio, Enjoyment, and Usability) could be due to the gameplay’s nature.
- Performance outcomes had no relationship to user satisfaction.
- Some participants had difficulty concentrating and experienced headache and eye strain after using the Magic Leap for 20 minutes.

References

Simulator Sickness Questionnaire (SSQ)
In this study, the 20-minute use of Magic Leap is resulted with concerning symptoms (M = 16.83, SD = 15.51):
- Nausea is considered minimal (M = 9.54, SD = 12.07)
- Oculomotor is considered concerning (M = 17.53, SD = 16.31)
- Disorientation is considered concerning (M = 16.53, SD = 17.02)
Total scores can be associated with negligible (< 5), minimal (5 – 10), significant (10 – 15), concerning (15 – 20), and bad (> 20) symptoms.

ENJOY
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- Performance outcomes had no relationship to user satisfaction.
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Future Research
- Future research should examine if social interactions between players would influence satisfaction and enjoyment.
- Other video game genres should be investigated further.
- Researchers should also investigate whether other MR headsets, such as the Hololens 2, would provide similar results.

References


