



Facilitated Tabletop Games in a Mediated Environment

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Abstract. Tabletop games that require the aid of a human facilitator are typically designed for a physical environment. However, during the COVID-19 pandemic, lockdown measures prevented people from gathering. Therefore, tabletop games were sometimes played and facilitated in a mediated environment using online communication tools instead. But this setting possibly deteriorates the players' game experience. To understand the effect of playing facilitated tabletop games in a mediated environment we measured the player experience of the game *Cue Kitchen* in a mixed-method study comparing physical and mediated game sessions. Forty-four players played eleven game sessions, three in a physical environment and eight in a mediated environment. Of all seven dimensions of game experience measured, only one differed significantly between the two experimental conditions: players in a mediated environment became significantly more tired than players in a physical environment. The qualitative results explained why: players in a physical setting can wander off, while players in an online setting have to stay focused on their screen and, therefore, grow more tired. The research results suggest that facilitated tabletop games may be played in a mediated environment instead of a physical environment, without significant loss of player experience.

Keywords: Tabletop games · Game experience · Mediated environment · Sense of presence · Zoom fatigue

1 Introduction

Playing a tabletop game such as a board game, card game or role-playing game can be a useful method for analysing and designing complex systems. As opposed to games played for fun, game technologies can be used for purposes beyond entertainment [1, 2]. In other words, players play a tabletop game with a serious purpose, while having a good experience (i.e., being entertained) [3]. A game may support multi-actor decision-making to create an experimental environment for stakeholders to 'play around' with different policies and technologies [4]. Games can also be used to raise awareness or educate people about complexities in socio-technical systems like energy or public transport systems.

In a tabletop game, players sit together around a table and make decisions based on the gameplay in front of them [5]. These games are usually played in a physical environment, not only because it is a physical game but also because it is intended to reflect reality [6, 7]. Players can look at each other to interpret mimics and gestures which can help them understand each other's actions, even without verbal communication [8–10]. In the social environment of the game, the players can share emotions, laugh together and confront each other. Tabletop games for purposes beyond entertainment usually require a facilitator for storytelling and making the game reactive to the decisions of the players [11, 12]. The consensus in the field of gaming and simulation is that these games should therefore be played in a physical environment, but this is not always possible.

During the coronavirus pandemic in 2020, it was not possible to play a (facilitated) tabletop game in a physical environment. The use of digital tools such as Teams, Zoom or Skype could enable a mediated environment for players to play a facilitated tabletop serious game. However, playing a game in a mediated way does not feel the same as playing the game in a physical environment. Players are not able to feel each other's presence, use non-verbal communication, convey emotions, or physically hold the cards, dies, coins or pawns. In other words, a mediated environment likely changes the game experience, which is not trivial, because experience is a reason for people to play a game [13]. To our knowledge, the current scientific literature does not give a clear answer how playing a (facilitated) tabletop game in a mediated environment changes the game experience.

The question that will therefore be answered in this paper is: *How does playing a facilitated tabletop game in a mediated environment affect the players' experience when compared to playing face to face* [14]?

2 Expected Effects of a Mediated Environment

It is possible to obtain insight into the expected effects of a mediated environment on game experience by combining different ideas emerging from literature on game session design and facilitation, Zoom fatigue, and mediated presence.

2.1 Game Session Design and Facilitation

Designing a game session is part of the game design process [5]. A wrong game session design could cause the game to not being played as intended and therefore, cause the game to fail to achieve its intended objective. Playing a game in a mediated environment (e.g., using a screen and audio connection) instead of playing face to face may affect the players' ability to share emotions in the right way, including facial expressions and posture. This can change the interpretation of these emotions, and therefore the player experience. This also relates to the key characteristics of tabletop games where players sit around a table and can see each other, allowing them to understand each other's actions, even without verbal communication [8–10, 15].

Yuan et al. observed that the lack of environmental perception and player awareness may cause frustration and conflict among the players [16]. They conducted a multi-method qualitative study to research design opportunities for a socially connected game

experience for (social) tabletop games in light of the recent COVID-19 pandemic. As environmental perception and player awareness are crucial in tabletop games, their advice is to include cameras and other technologies in the remote tabletop gaming setup to increase social awareness and empathy. They conclude that future research may benefit from (existing) quantitative methods measuring the social connectedness as part of the players' experience, including relationship salience, relationship satisfaction, feeling of closeness, loneliness, and quality of life [16].

During a physical session, a facilitator has a physical overview of players around the table and the playing board or cards, which enable them to steer the game. In a mediated environment, the facilitator does not have a physical overview of the players and is also responsible for carrying out the gameplay and moderating the discussion. These limitations in facilitation can jeopardize the game experience [6].

2.2 Zoom Fatigue

During the COVID-19 pandemic in 2020, the term 'Zoom fatigue' was introduced to indicate tiredness when using video conferencing applications like Zoom. Grey literature such as traditional media and lifestyle websites were observing an increased level of tiredness during video calling [17, 18]. Large studies have been set up to investigate the psychological effect of video conferencing but results are not published yet. A recent article based on academic research and small experiments provides interesting arguments for the cause of Zoom fatigue [19]. People in an online video session look to be really close on a screen compared to someone who is 1–2 m away. In a physical meeting, a majority of the people in the room are not looking at the speaker and apart from people having sidebar conversations, people close to each other do not look at each other's eyes, where everyone seems to be looking directly at you in a virtual meeting.

2.3 Mediated Presence

Sense of presence is considered to be a part of game experience [20, 21]. The exact meaning of presence can be considered vague and hard to grasp, but it is related to our very own existence and perception of reality. Presence is closely linked to ontology, the study of being [22]. Schloerb defined presence as something physical: "[Presence] designates the existence of an object in some particular region of space and time" [23]. However, according to Mantovani and Riva "[...] the meaning of presence depends on the concept we have of reality and different ontological positions generate different definitions of presence" [22]. They argue that presence should not be defined as something physical but propose an alternative conception of presence: (social) presence is a social construct, as part of reality, including relationships between actors and their surroundings.

The second interpretation creates more possibilities to see presence than only in its physical form. In other words, to have a sense of presence, despite physical absence. This phenomenon can be described as *mediated presence* [24]. Other authors are using similar terms such as virtual (co)presence or telepresence. The difference between these terms is mainly a different emphasis of context: 'tele' as in presence at or over a distance, virtual as in presence using software, and mediated as in using a medium. These terms have a similar notion of presence that is not physical; using a (digital) tool to make the

communication and interconnection possible to experience presence over a distance. Through immersive, interactive and perceptually realistic media, people can have a similar experience of social presence to those in non-mediated environments [25]. People playing a facilitated tabletop game in a mediated environment could have a similar game experience as playing face to face, at least regarding their sense of presence.

To summarize, the game experience may be negatively affected by the choice of the environment since a mediated environment changes the ability of players to interact and recognize emotions. A mediated environment can limit facilitation and might jeopardize the outcome of the game. A mediated session may cause players to be more tired, similar to Zoom fatigue. However, it should also be possible to have some similarities between the game experience of players in both environments, when a *mediated presence* is created.

3 Method

To answer the question ‘*How does playing a facilitated tabletop game in a mediated environment affect the players’ game experience when compared to playing face to face*’, an experiment was conducted where the players’ game experience in a mediated environment was compared to playing face to face.

3.1 Design of the Study

The research question focuses on comparing the game experience between a physical and mediated environment and on finding an explanation for a possible difference. Therefore, a mixed-methods research methodology has been used, combining a qualitative and quantitative perspective. This method is not limited or constrained by the characteristics of typical quantitative or qualitative research such as a focus on deduction, confirmation and prediction from a quantitative perspective and focus on discovery, exploration, and induction from a qualitative perspective [26]. Instead, it offers the opportunity to collect, analyse and integrate both quantitative and qualitative data in a single study [27, 28]. The qualitative and quantitative data have been integrated following an explanatory design: the observations during the game sessions can give context and explanation to the measured game experience.

3.2 Experimental Setup

The game in this study was *Cue Kitchen*, a game developed in 2019, which aims to create awareness about the invisible symptoms of Parkinson’s Disease (PD) in the social environment of people with PD [29]. *Cue Kitchen* is a cooperative tabletop card game in which four players have the objective to run a successful service in a professional kitchen by using ingredient cards to cook dishes. While playing, each player has an invisible symptom, something that limits the player in its play. Others need to guess this symptom and by providing the right cue, players can help each other to overcome this symptom. While the game is fun to play, the player can experience what it is to have an invisible symptom and needing a cue from others that relates to Parkinson’s disease. During the

debriefing, the players reflect on this. With the help of the facilitator, the players relate their experience in the game to the invisible PD symptoms and to the importance of cues that can help people with PD. A game session consists of two games of *Cue Kitchen* followed by a debriefing. Each game play takes 30–40 min and the debriefing takes about 30 min.



Fig. 1. Screenshot of the playing table



Fig. 2. Experimental setup

In a mediated session, all players can see the playing field of the game on their screen (Fig. 1), including the playing cards. By giving the facilitator directions for their desired actions, they participate in the gameplay. To achieve this, the software of Big Blue Button has been used. This is an open-source web conferencing software, similar to Zoom, specially set up for TU Delft for educational purposes¹. To make a mediated environment possible, no professional tools have been used, but only day-to-day objects that are available to everyone. The playing table was filmed using a smartphone and a construction made of kitchen stairs, some books, rope, tape, and a bookshelf (Fig. 2).

3.3 Participants

The participants in the study were persons with PD and people in their social network like family, friends, colleagues or health-care providers. Participants (with PD) were recruited using the channels of the MaySways foundation² (e.g., the newsletter) and via a social media call from the Dutch Parkinson Association. Registered participants did not receive any compensation for their participation. Every participant was at least 18 years old. The research setup was officially approved by the TU Delft HREC.

¹ See <https://bigbluebutton.org/> for more information.

² The MaySways foundation is committed to creating awareness of invisible symptoms of persons with PD by artfully expressing their invisible thought and emotional world.

3.4 Procedure

The first step was to contact a participant with PD who selected three or four players in their social environment. Participants from the same household were allowed to play the game face to face, while the other participants played the game in a mediated environment. After the selection of participants, the players were asked to fill in an online informed consent form, using the Qualtrics platform. A video tutorial explaining the game was shared beforehand, except for the first session.

The game was played twice, the first time without invisible symptoms so that the players could get used to the gameplay, and the second time with invisible symptoms. Each gameplay took about 30–40 min to complete. The debriefing started with a reflection on the game, followed by a conversation about the personal situation of the person with PD.

One to three days after the game session, players were emailed a questionnaire on the Qualtrics platform. Completing the questionnaire took about 10–15 min.

3.5 Data Collection

Quantitative Data. Game experience has been measured using a questionnaire based on the Game Experience Questionnaire (GEQ) [21], measuring game experience with 12 variables in three different modules. Each variable is an average, constructed out of two to six items using a five-point Likert-scale (from 0 = totally disagree to 4 = totally agree). The GEQ Core Module measures seven *in-game experience* variables: Competence, Sensory and Imaginative Immersion, Flow, Tension/Annoyance, Challenge, Negative affect and Positive affect. The GEQ Social Presence Module measures *sense of presence* using three variables: Behavioural Involvement, Psychological Involvement (Empathy) and Psychological Involvement (Negative Feelings). The GEQ Post-game Module measures how players felt *after* they had stopped playing, in contrast to the Core Module which is based on the experience *during* the game. The four variables measuring the post-game experience are Positive experience, Negative experience, Tiredness and Returning to reality.

Qualitative Data. By observing the game sessions, qualitative data has been collected on how a playing environment affects the game session. Most of the sessions have been recorded (with informed consent of the players) to make it possible to re-watch the session and describe the events in the session as specific as possible. In some cases, the session was not recorded, but notes were taken during the sessions. The observations are extensively described in game session reports focusing on 1) how the quality of the game was affected by the player environment, 2) how the playing environment affected the gameplay and 3) how the playing environment affected the debriefing.

3.6 Data Analysis

The data has been analysed using SPSS, with playing environment as the independent variable (physical vs. mediated) and the constructed game experience variables as dependent variables. A Mann-Whitney test has been used to determine the differences between

the independent variables. This non-parametric test is an alternative for an independent samples t-test. A Mann-Whitney test is suitable for small and non-normally distributed outcome variables in small and uneven samples, and suitable for analysing variables that are not continuous but ordinal. When reporting the results of a Mann-Whitney test, the median (Mdn) is used as the measure of central tendency.

4 Results

In this research, 11 sessions have been played. Table 1 gives an overview of the number of sessions and the number of completed questionnaires per playing environment.

Table 1. Experimental conditions

Environment	# sessions	# completed questionnaires
Physical	3	13
Mediated	8	31
<i>Total</i>	<i>11</i>	<i>44</i>

4.1 Quantitative Results

Participants in a mediated environment were more tired (Mdn = 1) than participants playing face to face (Mdn = 0) which was confirmed with a Mann-Whitney test ($U = 91.5$, $z = -2.915$, $p = .003$). The *Tiredness* construct was found to be highly reliable (2 items; $\alpha = .839$).

In Fig. 3, the difference in the experience of *Tiredness* between the two environments is clearly visible. In a physical environment, all players disagreed or totally disagreed with the statements ‘I felt exhausted’ and ‘I felt weary’. In a mediated environment, participants responded in a wider range, sometimes totally agreeing with this statement. This result indicates that participants in a mediated environment are more tired after having played the game.

The other game experience variables do not show any significant differences in the (ranked) scores between a physical and mediated environment (Fig. 3). These results indicate that, apart from tiredness, the playing environment does not affect the player experience in a significant way. The feeling of presence without the other players physically present was not significantly different from playing face to face.

4.2 Qualitative Results

Our observations related to the playing environment were not unambiguous and consistent. Some mediated sessions went very well with only a few problems and resulted in enthusiasm among the players. Some other mediated sessions had several problems,

taking a long time to be remedied. We observed that most players in a physical environment had more social interactions with each other than players in the mediated sessions. Some players were quite comfortable in the mediated environment.

When playing face to face, players were able to have many fast and one-on-one interactions while interrupting each other. This does not necessarily mean that these sessions were more chaotic. Instead, a physical player was able to have a quick conversation with another player without bothering other players. During some physical sessions, non-active players (i.e., it was not their turn) were able to tune out for a moment. The opposite was true for players in a mediated environment, where players had to stay focused on their screen to follow the gameplay. Some of these players indicated that this was quite intense. Participants in a mediated environment showed more symptoms of fatigue than participants in a physical session. In many cases, we observed a decreased concentration during the second game as well as during the debriefing. In some sessions, there were connection issues that needed to be restored causing the game to start later or to interrupt the session. These observations were incidental and not consistent over all sessions. In some cases, the players seemed to be more focused after a short break, whether or not this was caused by a technical problem.

Clear differences between the facilitation in both environments were visible. In the physical sessions, the facilitator has a supportive role, only intervening in the game as needed. During one session, with the facilitator physically present, the debriefing became a little uncomfortable when discussing the personal situation of the person with PD. The facilitator had to ask questions which were answered by the participant, but almost without a conversation between the participants. During two physical sessions with the facilitator present through a video connection, an intimate atmosphere was created in which the conversation became more personal. During the mediated sessions, the role of the facilitator was much greater, because he controlled the playing table and acted as a moderator during the debriefing. The advantage of a mediated environment is that everyone takes turns speaking and allows others to speak.

During some mediated sessions, several people were in the same room. In these sessions, we observed increased interactions between the physical players but also significant noise. As a result, comments from the other players could not be heard and the interactions with and between these players were reduced.

5 Discussion

In this experiment, no significant difference between the game experience in a physical and mediated environment was found. From the literature, it could be expected that reduced non-verbal communication or the inability to convey emotions in a mediated environment would have affected the game experience. Although some difference has been observed in this study, these observations were not significant.

Although presence could be defined as something physical [23], the literature also suggested a feeling of presence could be established without a physical presence [22, 24, 25]. No difference was found in the feeling of presence between a physical and mediated environment, so it seems the latter is true.

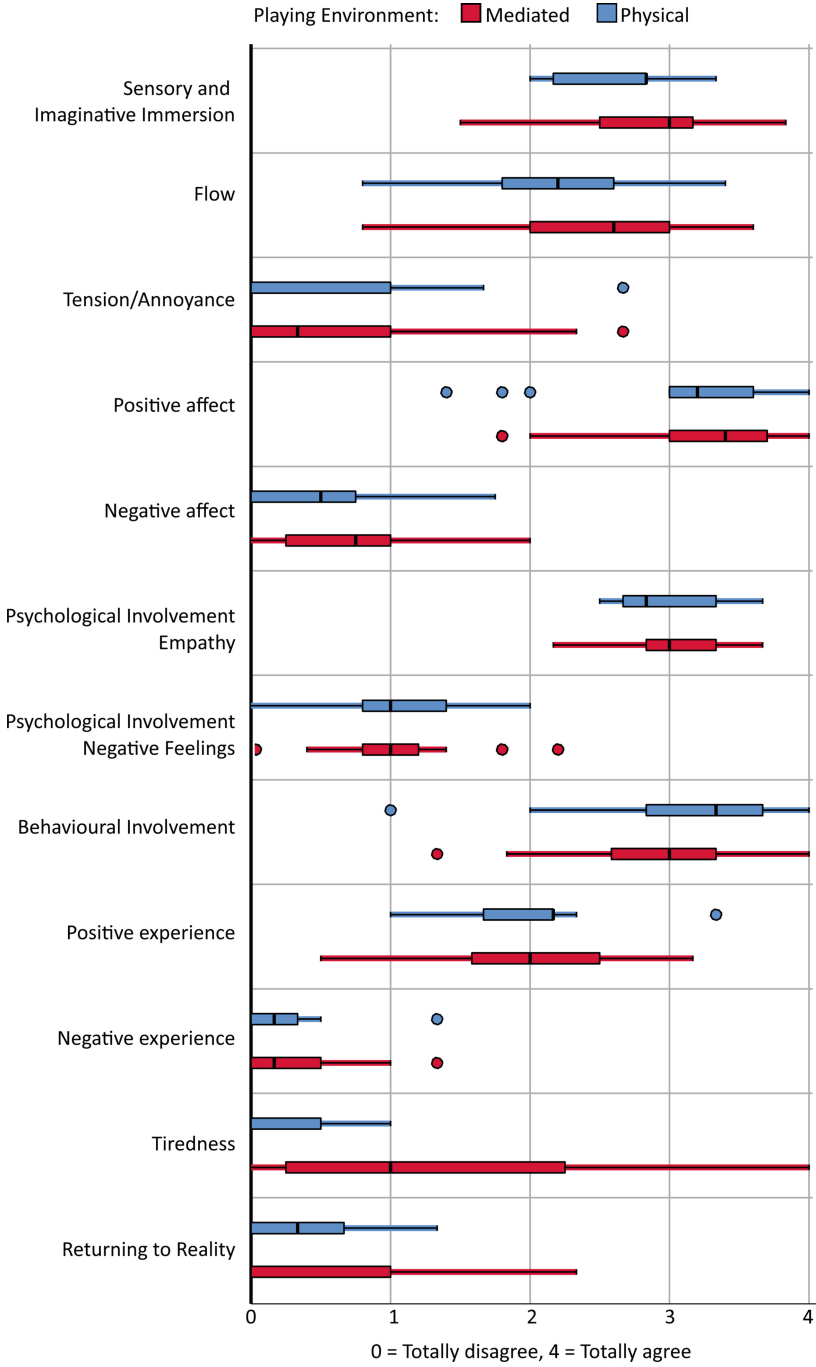


Fig. 3. Game experience in a physical and mediated environment

5.1 Tiredness and Zoom Fatigue

Participants in a mediated environment are significantly more tired than in a physical session. A decreased concentration during the second game and the debriefing was observed. In several cases where fatigue was higher than average, connection issues needed to be restored, causing the game to start later or resulting in interruption of the session. Although some sessions were longer for these reasons, no significant correlation was found between session duration and tiredness.

The result that mediated sessions cause more tiredness is supported by scientific literature that a mediated setting can be indeed more tiresome than a physical meeting and causing so-called ‘Zoom fatigue’ [19]. People have to stay focused on a screen up close, looking the other players in the eye, while players in a physical meeting can stare into the distance. It was observed that non-active players (i.e., it was not their turn) in a physical setting were able to ‘tune out’ for a moment, while players in a mediated environment had to stay focused. This possibility of being able to have a moment without concentration could contribute to the players being more energetic at the end of the game.

5.2 Differences Between Physical and Mediated Environment

The difference between a physical and mediated environment becomes clear in the quantitative results where no significant differences were established in the outcome variables except for tiredness. A clear dividing line could not be drawn between the performance of a physical and a mediated session for three reasons.

First, the outcome and game experience are highly dependent on the quality of each session. A mediated session can have no or only a few (technical) problems, resulting in a successful session. But if things go wrong and it takes a long time for a problem to be remedied, the outcome is visibly less good, as can be seen from the quantitative results. In mediated sessions, the dependence on digital technology increases the likelihood that something may go wrong, resulting in fatigue and a less positive experience.

Second, both physical and mediated sessions have advantages and disadvantages concerning facilitation. In a physical session, the facilitator plays a supportive role and can easily adjust intervention in the game as needed. However, the physical presence of the facilitator can also create an uncomfortable situation because the players play the game and do the debriefing under the ‘watchful eye’ of the facilitator. During a mediated session, the facilitator must be more active in guiding the conversation, with greater risks of making mistakes. On the other hand, a mediated environment makes the facilitator’s role as a mediator easier because everyone takes turns speaking and allows each other to speak.

Finally, mediated sessions are sometimes not fully mediated. In several cases in this study, some mediated players were physically in the same room or even behind the same screen while the other players were present in a fully mediated way. This is clearly reflected in the behaviour of the players. The interaction between the physical players increased because they communicated back and forth faster. This caused significant noise in the session, where some comments were missed by the players. It also reduced the interaction with and between the mediated players.

5.3 Limitations

The test setup of this study has been quite austere. Although many players responded positively to the way the mediated environment had been designed, some testing sessions might have benefited from the use of more professional tools.

This study has small and uneven samples: 13 participants in a physical environment vs. 31 in a mediated environment. Corresponding statistical tests were used but these tests have less power, increasing the chance of a Type II error. Finding reliable and significant differences between both conditions is more difficult with these small samples, because the quality of a game session plays an important role and is very different per session.

This game was designed for and played by a very specific player group, people with PD and their relatives. Therefore, the results may not be generalized to other players of facilitated tabletop games. For example, people with PD can become tired more quickly [30]. Still, in this study, no significant difference has been found in the game experience between participants with PD and other players, except for 'Returning to reality', where players with PD seemed to have more difficulty returning to reality than those without ($U = 73.5, z = -2.87, p = 0.003$) [14]. Future research should compare our results with those of different player groups.

Twelve statistical tests were performed to determine the differences between the game experiences in both conditions in this study, which increases the risk of a Type I error. Because of the use of the mixed-method approach that integrates both quantitative and qualitative data, this risk is reduced as the focus is on the relevance of significant relationships and differences. Only one significant statistical difference was found, the difference in tiredness between the two conditions, which was fully supported by the qualitative data and findings in the literature.

6 Conclusion

This article answers the question, '*How does playing a facilitated tabletop game in a mediated environment affect the players' game experience when compared to playing face to face?*' The players' game experience in a mediated environment is remarkably similar to the experience when playing face to face. The only significant difference we found between the two conditions was the degree of tiredness after the game session showing that playing a game in a mediated session makes players feel more tired than playing face to face.

Therefore, playing in a mediated environment does not have a significant effect on game experience compared to playing face to face. Apart from tiredness, no significant difference between the two conditions on all variables measuring game experience was found. This confirms the literature suggesting that it is possible to create a sense of presence without actually being present. To make this confirmation stronger, more research with a larger sample and statistical power, is needed.

Compared to players in a physical environment, players in a mediated environment had a more active posture at the beginning but were tired in the second part of a session. This was especially noticeable if the game had to start later or was interrupted due to video or audio problems.

All in all, the most striking result is that the game experiences in a mediated setting are so similar to those in a physical setting.

6.1 Recommendations for Future Research

This article fills the gap in scientific knowledge about playing facilitated tabletop games in a mediated environment instead of playing face to face. Some recommendations for future research are made below.

The effect of a mediated environment on the outcome of a game can be studied more extensively. Future research should include more participants and test sessions, evenly distributed between a physical and mediated environment, to measure the effect of mediated versus physical presence instead of being influenced by the quality of individual games. This research should also focus on other types of games and player groups.

Players in a mediated environment are more tired while other outcome variables are not significantly different. With working from home and meeting online being more common because of the coronavirus disease pandemic, it is important to study the effects of a mediated environment on people beyond gaming, such as psychological effects or health-related issues [19].

Finally, more scientific research needs to be done on how games can be played in a mediated way. Future studies can include more professional tools such as VR/AR 3D or holographic experiences. The effect of a fully digital game instead of a mediated tabletop game can be studied. There is much more to discover when researchers from several scientific disciplines (e.g., behavioural sciences, computer sciences and systems engineering) coordinate their academic efforts.

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