Investigating Players' Social Interactions in IOT Board Games

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Abstract: This study aims to investigate the impact of integrating Internet of Things (IoT) technology with board games to enhance social interaction among players. Given the widespread application of IoT in various domains, incorporating it into board games can offer more intricate gameplay mechanisms and a broader array of interactions. Subsequent to gameplay, interviews will be conducted to gather players' reflections on the gaming process and their motivations for engaging with different players. This study anticipates that the interdisciplinary board game, combined with IoT technology integration, will further augment the diversity and richness of social interaction among players.

Keywords: Internet of Things, Game-Based Learning, Board Games, Social Interactions

1. Introduction

In recent years, Internet of Things (IoT) technology has found broad application across various domains such as IoT transportation, IoT healthcare, and IoT home automation. Nevertheless, the utilization of IoT in education remains relatively uncommon. Thus, this study aims to integrate IoT technology into educational board games, using Taiwan's history as a backdrop. This approach enables players to assume diverse roles and immerse themselves in historical events, effectively recreating past scenes. By means of this interdisciplinary board game, players can engage in more intricate social interactions with one another.

2. Related work

2.1 Internet of Things System

The Internet of Things (IoT) technology enables different objects to receive and transmit information through the internet, achieving information sharing and automated operations (Al-Fuqaha et al., 2015). IoT can be applied in various fields; sensors embedded in household appliances can remind users to refill water, while agricultural sensors can assist in determining the best planting time and improving yield (Chaudhary et al., 2019). This study employs IoT technology in board games, introducing novel experiences to the gameplay through object communication and calculations. This integration serves to amplify the educational and learning aspects of the game.

2.2 Social interaction

Social interaction is an essential part of human society, and the foundation for building relationships among people. With the advancement of technology and the development of IoT, the way people interact socially is constantly changing. After introducing technology elements into teaching, technologically-rich classroom interactions are more complex and diverse comparing to traditional classrooms. This complexity is not only reflected in the increase of interaction frequency, variation of interaction targets, and amount of interaction contents, but also has a significant improvement in interaction quality (Wang, Kong, & Huang, 2016). This paper investigates the incorporation of IoT in board games, accomplished through the

continuous display of varying values on students' mobile devices via background computation. Such an application has the potential to encourage social interactions among students, enrich their interest in social learning, and enhance their participation in the game.

3. IOT Board Game

This board game is based on Taiwanese history. The app was developed using APP Inventor, as shown in Figure 1, and game objects composed of Mbot and RFID sensors, as shown in Figure 2. Each group of players has a mobile devices that displays the basic values of the Mbot they control. The buildings on the map contain RFID chips that affect the values of each player when Mbot senses them, and players can view the value changes displayed on the mobile devices. During the game, players need to use the mobile devices to control the movement of the Mbot on the map. Each game round triggers various significant historical events from Taiwan's history. Players assume the roles of different historical figures and collaborate to solve these events. Additionally, each team is assigned unique tasks, and players must collect various items during the game to enhance the capabilities of their respective teams.

This interdisciplinary board game fuses technology and social interaction, delivering a more immersive gameplay experience compared to traditional board games. While playing, player-to-player communication and interaction, as well as tactile engagement with game objects, are processed in the background and reflected on mobile devices. This enables players to visually observe value changes and attain data visualization. These values, stemming from these interactions, can directly or indirectly influence every move a player makes. Beyond in-person social engagement during gameplay, the integration of the Internet of Things also ensures that each player's decision yields distinct outcomes, consequently impacting social interaction and elevating the overall gaming experience.

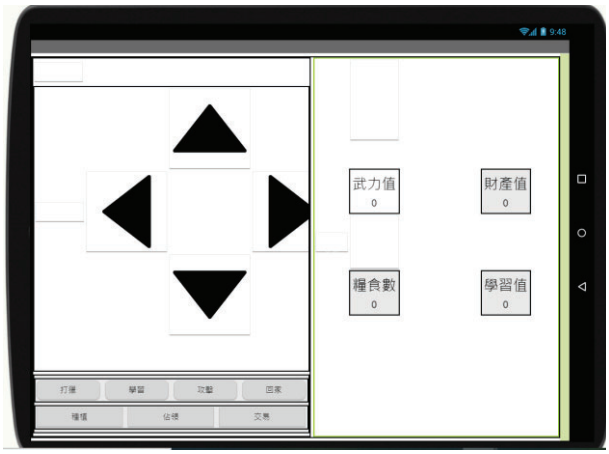

Figure 1. APP introduction design

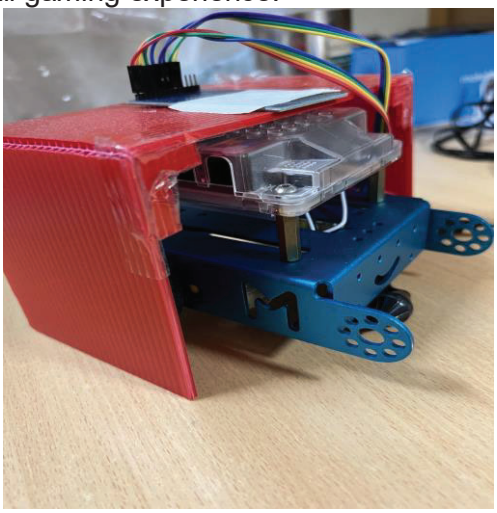

Figure 2. Mbot and RFID sensor

4. Research design

This study investigates the integration of IoT into a board game to augment social interactions. Students will be randomly divided into four groups, each assuming an ethnic role within the game. The game is expected to span approximately two hours. Following the game, individual players will be interviewed to ascertain whether fluctuations in game values influenced their strategies, perceptions, or inclination to interact with particular ethnic groups. Additionally, players will receive guidance to reflect on their experiences and complete a feedback questionnaire.

5. Expected Result

Currently, games are primarily categorized into two groups: digital games and physical board games, each carrying its own set of advantages and drawbacks. Digital games tend to emphasize audio-visual effects but lack social interaction, whereas traditional board games offer social engagement while having somewhat restricted game mechanics.

Thus, this study seeks to merge physical board games with Internet of Things (IoT) technology to enrich the depth of social interaction among players. The study incorporates IoT technology into physical board games, preserving the intricacy of digital games along with the interpersonal social interaction characteristic of physical board games. This endeavor not only enriches the game's diversity and entertainment quotient but also utilizes the data gathered from the game to analyze players' interaction patterns and collaborative behaviors. This aids in comprehending the extent of their social interaction during gameplay and allows for the assessment of players' learning performance within the game. The study uncovers their approaches to problem-solving and sheds light on their problem-solving abilities. By scrutinizing learning data, strengths and weaknesses in learning can be pinpointed, offering valuable insights for instructional design.

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