

A Remote Collaborative Decision-Making Training Game With a Real-Person Non-player Character

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Abstract

Decision making is a very important skill, under the COVID-19 pandemic environment, remote work is likely to become a future trend, and remote collaborative decision-making will become an important workplace competency in the future. Therefore, remote decision-making training activities that combine game mechanics and realistic situations should be a potential research topic. In this study, we designed a remote collaborative decision-making training game, “The Case of the Missing Xiaozhu”, and combined highly realistic real-person non-player characters (RNPC) as police officers and forensic teams to provide scaffolding for learners in their decision-making process. Through continuous exploration, investigation and forensics, and collaboration and division of labor among the team, learners form search teams to find the missing girl, and make decisions to successfully locate the possible suspects. This study conducted a preliminary empirical test with five participants who participated in the game experience. The study initially measured the learners' flow, game acceptance and perception of game design elements. According to the descriptive statistical analysis, the mean score of flow was 4, the overall game acceptance was above the median, and the game design element also received an average score of 4.4. Through the preliminary results, this study found that using the RNPC mechanism to enhance the game's realistic context and social interaction may help to improve the learners' flow and decision-making process. In addition, the game received positive feedback from the learners in terms of game design.

Keywords: Real-Person NPC, Educational Game, Situated Learning, Scaffolding, Decision-Making Training, Online Distance Learning

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Introduction

Decision-making and analytical thinking are important competencies in the past few years (WEF, 2020), and in the context of the COVID-19 pandemic, remote offline collaboration has become the trend of the day, hence the increasing popularity of digital game-based learning (DGBL) in education. (Bos & Shami, 2006; Pata, Lehtinen, & Sarapuu, 2006; Wishart, Oades, & Morris, 2007), DGBL is also effective in enhancing learners' learning effectiveness (Kiili, K., 2005), and in providing participants with a vivid and realistic learning experience (Prensky, 2003).

Contextual learning is a learning approach that explores and gains learning effectiveness and motivation through real-world situations and role-playing mechanisms (Sedig, 2008). However, most digital games today are relatively poorly designed in terms of realism, which not only degrades the gaming experience (Cross & Edmonds, 2003), but also makes it difficult to generate motivation and flow problems. In order to overcome this problem, a real-life non-player character (hereinafter referred to as RNPC) mechanism was added. Online educational games using RNPC can effectively promote learner engagement and performance (Shu-Wei.L, 2021).

Based on cognitive and flow theories (Lin & Hou, 2016; Hou & Lin, 2015; Hou & Liu, 2015; Hou et al., 2016), this study developed a contextual remote collaborative decision making game called “The case of the missing Xiaozhu”. A good state of flow not only enhances engagement and motivation, but also allows learners to be fully engaged in the activity and have good learning outcomes. (Engeser, 2012). The purpose of this game is to develop the decision making power of the participants and evaluate their decision making performance, and to explore the learners' flow state, game acceptance, and game design elements, and to extend the study by evaluating the initial results of the game to explore the issues that can be studied later in this study.



Figure 1. Game cover of “The case of the missing Xiaozhu”

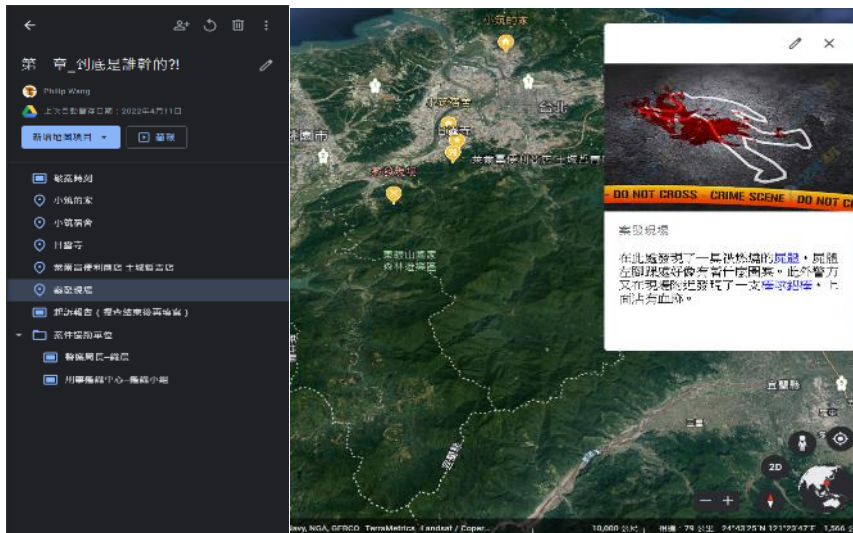


Figure 2. Game surface in “The case of the missing Xiaozhu”

Methods

The game in this study is called “The case of the missing Xiaozhu”, which is an online collaborative decision making game for training decision making and evaluating decision making performance. The game is designed using Google Earth, Google Jamboard, Gather Town, and Google Meet for game explanation. In addition, we added the RNPC mechanism to enhance the game's realism and the provision of related scaffolding.

The game allows them to use the internet to get any information and tips, and the process allows the learners to discuss and communicate with each other. And use their analytical, planning and decision making skills to investigate the case and finally find the Suspect. Surface in game is shown in Figure 1~2.

A total of 6 participants were recruited online and divided into 2 groups for this game. All participants were over 20 years old, and none of them had been exposed to the game before the test. However, one player was not able to play the game completely due to the hardware device, so the results of this player will not be included in the analysis.

Results and Discussions

The initial study of this game was designed to assess learners' flow, game acceptance and game design elements in the game. Based on the descriptive analysis and one-sample t-test of learners' flow scales, game acceptance scales, game design elements, we know that learners actively participated in this game. The overall flow score ($M = 4.073$, $SD = 0.052$) was significantly higher than the median3 ($t = 46.283$, $p < 0.000$). On the Flow antecedents, the challenge-skill balance and Goals of an activity were both higher than 3.5 points. In addition, in Flow experience, "The Case of the Missing Xiaozhu" provides attention, time cognitive change, and self-contained goals. Even the scores of Concentration, Time distortion and Autotelic experience have reached a high score of 4.7 or more.

Also, overall game design element scores ($M = 4.4$, $SD = 0.141$) were significantly higher than the median 3 ($t = 22.136$, $p < 0.000$) and even close to 4.5, indicating that learners found the game interesting and agreed with the design elements in the game.

Table 1. *Independent sample t test of Gameplay flow, Game acceptance, Game design elements*

Dimension	M	SD	t	p
Flow antecedents	3.56	0.25	4.989**	0.01
Challenge-skill balance	3.70	0.45	3.500*	0.03
Goals of an activity	4.30	0.67	4.333*	0.01
Unambiguous Feedback	3.20	0.67	0.67	0.54
Control	3.20	0.91	0.49	0.65
Action–awareness merging	3.40	0.55	1.63	0.18
Flow experience	4.50	0.24	13.805***	0.00
Concentration	4.75	0.56	7.000**	0.00
Time distortion	4.80	0.45	9.000**	0.00
Autotelic experience	4.70	0.33	11.662***	0.00
Loss of self-consciousness	3.30	1.20	0.58	0.61
Overall Flow	4.07	0.05	46.283**	0.00
Game acceptance	3.51	0.45	2.55	0.06
Game design elements	4.40	0.14	22.136***	0.00

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Conclusion and limitations

“The case of the missing Xiaozhu” is a contextual collaborative decision-making game that combines contextual learning, cognitive design and RNPC mechanism. The theme of the game shapes the situation from finding the missing girl at the beginning to finding the murderer and the evidence after the girl is killed, which greatly enhances the motivation and mental flow of the test subjects. In addition, because the game is adapted from a real social case, it can also directly and naturally enhance the authenticity of the situation. The preliminary results of this study showed that the subjects had active participation and most of the evaluations were positive. In addition, there was a significant difference between the median 3 and the median 3 in terms of high flow and high acceptance of the game, both of which scored above 4. In addition, perhaps because of the difference from previous studies, this study is mainly oriented to ability training rather than domain-specific knowledge learning. In the future, if further research is needed, we can investigate the design and effectiveness of this game in cognitive scaffolding, as well as the differences between the high and low groups in the decision-making process.

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