Player problem-solving strategies in co-located play of a single-player video game

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Keywords
Problem-solving strategies, video games, co-located, collaboration

INTRODUCTION
Video games often involve problem-solving and are designed to be challenging yet engaging experiences. This study uses exploratory qualitative methods to investigate problem-solving strategies used by players in *The Witness* (Thekla Inc 2016). This study explores a gap in previous research by looking at how the in-room social context impacts problem-solving strategies used in a single-player game. Co-located play of *The Witness* resulted in players using the same problem-solving strategies as those used in cooperative multiplayer games.

Previous work by Iacovides et al. (2014) identified five single-player problem-solving strategies and three cooperative multiplayer strategies. Single-player strategies include – *Trial & error, Experiment, Stop & think, Practice/Repetition* and *Take the hint* (Iacovides et al. 2014). Co-operative multiplayer strategies include - *Knowledge exchange, Guidance* and *Surrender/take control* (Iacovides et al. 2014). This study explores how these strategies apply to co-located play of a single-player game.

Who is in the room and the conversations between those people can make a big difference to the gameplay experience (Anderson et al. 2018; Stevens et al. 2008). Research on *World of Warcraft* (Blizzard Entertainment 2004) found players were able to accomplish more together "with the aid of experienced peers than they could on their own" (Nardi et al. 2007). Anderson et al. (2018) found collaborative discourse helped players learn, with successful players sharing effective strategies with struggling players. Anderson et al. (2018) suggest that the effect of group dynamics on learning from games needs further exploration. This study looks at how the social context affects problem-solving strategy use.

METHOD
Participants were recorded playing *The Witness* by recording their screen with Open Broadcast Software (OBS) and their microphone. Some participants were also selected for a short interview. In total twenty-two (N=22) participants were recruited with ten adolescents (12 – 17 years old) (F=4; Mean age = 13.7) and twelve undergraduate students (≥18 years old) (F=3; Mean age = 22.3). Two different age groups were used to observe the problem-solving strategies of novice and expert video game players. Data from aolescents was collected at after-school clubs held in

Proceedings of DiGRA Australia 2021

libraries and community centres. Data from undergraduate students was collected at a gaming computer lab on campus. All participants signed consent forms before participating, parents/guardians of adolescents also signed consent forms before the sessions. All participant names have been replaced with pseudonyms. None of the participants had played *The Witness* before. *The Witness* was chosen as it is accessible to people who do not have much experience playing video games.

Gameplay recordings and interviews were analysed and coded for types of problem-solving strategies. Problem-solving strategy categories from Iacovides et al. (2014) were used as a starting point.

RESULTS/DISCUSSION

In this study all of the problem-solving strategies, except for *Practice/Repetition*, were observed. *Practice/Repetition* involves gaining proficiency with the game controls. The controls in *The Witness* are simple and do not rely on time-sensitive inputs. Because players did not need to practice skills related to the game's controls they did not need or use the *Practice/Repetition* strategy to solve problems.

Problem-solving strategies Iacovides et al. (2014) describe as only being used in multiplayer games, were all observed in this study. Even though participants were playing a single-player game, being in the same room at the same time, trying to solve the same problems saw players using *Knowledge exchange*, *Guidance* and *Surrender/take control*. Participants were regularly observed socialising, asking for help and sharing their success and failures. Interestingly, more-knowledgeable players were reluctant to share answers with less-knowledgeable players, often only providing hints. They recognised that solving difficult puzzles was satisfying and engaging and, they did not want to ruin that experience for others. In this example, Jessie is offering advice to Ashe who is struggling in an area they have recently completed:

> "Mmm, well it's hard to explain it without giving away the answer. So... I dunno, look at the other puzzles. Look at all the other ones and... kinda see what kind of coloured squares are with each other."

However, some of the undergraduate participants were reluctant to ask for help. When asked in an interview about this, Peach said "because I wanted to play the game, you know, completely no help. Maybe like a little tip here and there if I'm really stuck. But I wanted to face it." This could be linked to adult learners being more self-directed and having an internal motivation to learn (Knowles, 1984). The differences between younger and older participants could be investigated further.

CONCLUSION

The social context of video game play can make a difference to the player's experience of the game. Participants playing a single-player game in the same physical space used the same problem-solving strategies as those used in cooperative multiplayer games. It would be interesting to see if these behaviours carried over to other social contexts such as classrooms.

BIO

Megan Pusey is a PhD candidate at Murdoch University investigating if puzzle games can help players develop resilience. Her research interests include game-based learning, productive failure and resilience. Previously Megan has worked as a secondary teacher using games such as *Portal 2*, *Minecraft* and *Universe Sandbox* to teach science.

ACKNOWLEDGMENTS

Thank you to Thekla Inc for providing copies of *The Witness* for this research. This research has been supported by an Australian Government Research Training Scholarship.

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