

The effect of a more knowledgeable other on resilience while playing single-player puzzle video games

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Abstract: Resilience refers to a person's mental ability to adaptively deal with challenges in life. Video games (both commercial games and serious games) have been used as effective resilience interventions. There is some evidence that commercial puzzle video games could increase resilience as they involve overcoming frustration to succeed. This research explores if single-player commercial puzzle video games can be used as an effective intervention to improve resilience.

Participants were adolescents who attended an after-school club for 8-10 weeks. This paper presents the case studies of two club participants and their gameplay experiences. Data was collected through surveys, interviews, gameplay recordings and journals. In both case studies the participants both give and receive guidance and support from others. Having a 'more knowledgeable other' present while playing a challenging game helped participants deal with frustration and persevere. This paper provides a first step towards exploring the relationship between puzzle video game play, resilience and social support from others.

Keywords: resilience, video games, zone of proximal development, more knowledgeable other, social support

1. Introduction

Resilience is a person's mental ability to adaptively deal with challenging situations (Masten, 2015; Pusey, Wong, & Rappa, 2020; Yeager & Dweck, 2012). Cassidy (2016) found resilience in the context of education/learning consists of three constructs - perseverance, adaptive help-seeking and the ability to deal with negative affect. Resilience is a trait that can be improved through interventions (Khanlou & Wray, 2014; Neill & Dias, 2001; Yeager & Dweck, 2012). Video games, both serious games and commercial off-the-shelf (COTS) games, have successfully been used as interventions to improve resilience across different contexts (Pusey et al., 2020). However, most of this research is aimed at either crisis response professions (e.g. paramedics) or people with existing conditions (e.g. depression) (Pusey et al., 2020). There is little research on using video games as a pre-emptive tool to increase resilience especially in the context of education.

There is some evidence that suggests COTS puzzle video games could be used as a pre-emptive tool to develop resilience (Scholten, Malmberg, Lobel, Engels, & Granic, 2016; Schoneveld et al., 2016; Tichon & Mavin, 2016). Schoneveld et al. (2016) suggests COTS puzzle games could train players in "resilience in the face of failure" and increase self-efficacy. This research seeks to intentionally explore the link between COTS puzzle video games and resilience.

Well-designed video games, especially puzzle games, are designed to be rich learning experiences allowing players "to operate at the outer edge of their regime of competence" (Gee, 2003, p. 70). While single-player games are designed for individuals to play alone, they are rarely completed in isolation. Gameplay is shaped "by people and material resources present in the room but invisible 'in-game'" (Stevens, Satwicz, & McCarthy, 2008, p. 44). Social aspects of play are important to consider because they impact learning and resilience. In the Zone of Proximal Development (ZPD) a task is beyond a person's ability to do alone and can only be completed with help from others (Vygotsky, 1980). A More Knowledgeable Other (MKO) provides guidance and encouragement to help a person complete a task in their ZPD. Neill and Dias (2001) found social support was a significant

factor in increased resilience in outdoor adventure education. In education, research has found cooperative learning, peer tutoring and social support can help increase resilience (Downey, 2008; Wilks, 2008). This research explores the role of the MKO in learning while playing single-player puzzle video games and how this relates to resilience.

There is little research on the role of a MKO in learning from video games. Luckin and Du Boulay (1999) used the serious video game *EcoLab* to help students learn about food webs in science. In a review of *EcoLab* research Luckin and du Boulay (2016) suggest “there is an increasingly important role for a More-Able Partner, whether in the form of software, people or some combination of the two” (p. 429). However, the *EcoLab* research focused on learning as the outcome, not resilience. Nardi, Ly, and Harris (2007) looked at learning conversations in *World of Warcraft*. They found “learners accomplish more with the aid of experienced peers than they could on their own” (Nardi et al., 2007, p. 8). The research found players offered each other positive encouragement, helped avoid frustration and gave a sense of moving forward. The research on *EcoLab* and *World of Warcraft* does not focus on resilience but hints that a MKO could impact the factors that contribute to resilience.

2. Research Aims

1. Does a MKO affect a person’s perseverance?
2. Does having a MKO in the room lead to more adaptive help-seeking?
3. Does a MKO help a person deal better with negative affect (frustration)?

3. Methodology

Participants were high school students (13 – 18 years old) who attended a weekly after-school club for one school term (8-10 weeks). The sessions involved playing a range of COTS single-player puzzle video games including *The Witness*, *Baba Is You* and *Untitled Goose Game*. This intervention was run over several weeks as longer interventions have been found to be more effective at increasing resilience with longer lasting effects (Khanlou & Wray, 2014; Yeager & Dweck, 2012). Venues included public libraries and community centres. This research was designed to capture “much better descriptions of what people actually do and learn playing video games under as naturally occurring conditions as possible” (Stevens et al., 2008, p. 42).

Single-player games were chosen to avoid competition and encourage participants to help each other. The games were chosen to be accessible to people who do not have much experience playing video games. All the games used are rated G by the Australian Classification Board.

Data was collected through surveys, journals, interviews and gameplay recordings. Gameplay recordings captured the participant’s laptop screen and voice. This exploratory research is presented as two case studies (Yin, 2014). Participant names have been replaced with pseudonyms.

4. Results

4.1 Case Study 1: Lena

Lena plays video games at home weekly, usually on console, smartphone, or tablet. Lena enjoys games such as *Mario Kart* and *Minecraft*. She had never played any of the games used at the club before. Lena would often comment on how difficult the puzzles were, muttering quietly to herself “this is so hard.” Additionally, she often celebrated her success by loudly exclaiming “I did it!” Lena frequently asked for help from either the first author or other participants in the room.

In the example seen in Table 1 Lena is attempting a sequence of puzzles where the player must figure out the ‘rule’ for black and white square symbols. The transcript shows the first author acting as a MKO for Lena who is struggling with the black/white square puzzles.

Excerpt of transcript from gameplay recording of Lena

Speaker	Time	Transcript	Context
Lena	14:15	[whispers to herself] What?? (sounding frustrated)	Lena attempting black/white puzzle
	14:18	How do you do this one?	
	14:20	[whispers to herself] This is so hard.	
	14:34	[to Researcher] I don't know how to do this one this is so confusing.	
Researcher	14:51	How'd you go?	Researcher walks over to Lena's computer
Lena	14:52	I can't do this one it's really hard.	
Researcher	14:54	So maybe the rule is not you have to go around all of them (the squares), maybe it's something else.	
	15:06	Keep going.	
	15:19	Good job.	Lena solves black/white puzzle

Even though Lena had correctly solved four black/white square puzzles prior to this transcript she still did not understand the puzzle mechanic. The first author is careful not to correct Lena's incorrect hypothesis of the rule, instead encouraging her to keep going and figure it out for herself. When Lena gets stuck on a puzzle she takes the initiative to ask for help. In later sessions Lena is often seen offering other participants support either by giving clues to puzzles she has solved or offering encouragement.

Table 2

Lena's journal entry for one of The Witness sessions

Session 2	I felt frustrated at this game because alot of these puzzles were really hard and I needed some help with it. We played for an hour for about 4-5pm. It was fun but hard at the same time. When I needed help I got Megan to help me solve them. I would tell my friends about this game to see how well they can do and how far they can get in it. I enjoyed it alot. 😊
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Lena's journal entry in Table 2 show how frustrated she felt during the session but her choice to keep playing demonstrates her perseverance. Lena recognises when she needs help and readily asks for it from a MKO, showing adaptive help-seeking.

4.2 Case Study 2: Jessie

Jessie came to the club with Gabe, a friend from school, and his sister Ashe. Jessie plays video games at home weekly, usually on a computer or tablet. Jessie's favourite video games are *Minecraft*, *Roblox* and *Five Nights at Freddy's*.

In this example Jessie is trying to solve a difficult puzzle involving two mechanics, the black/white squares (seen in Case Study 1) and the stars. Following the transcript in Table 3 Jessie spends the rest of the session (another 20 mins) attempting this same puzzle.

Table 3

Excerpt of transcript from gameplay recording of Jessie

Speaker	Time	Transcript	Context
Jessie	11:40	This is hard. Why did life have to give me lemons?	Jessie sitting next to Gabe.
	11:46	Argh. Oh my goodness.	Jessie solves a puzzle.
	11:53	I dunno does this work? No, I need help.	Submits incorrect solution.
	12:04	What if I just went straight through the middle?	Submits incorrect solution, all symbols flash red.

	12:08	They're all incorrect.	
	12:11	Hmmm, now let's see.	
Gabe	12:16	I can't do this.	
Jessie	12:18	Why do we like playing this game yet it annoys us so much?	
Gabe	12:22	I wanna punch it but I wanna play it.	
Jessie	12:24	Yeah.	
Gabe	12:46	What is it Jessie, what is it?	
Jessie	12:50	Gabe, I said if you help me, I'll help you. And I'll give you the answer straight up.	
Gabe	12:56	I can't help you, because I don't know what any of your things (symbols) mean	Gabe has not seen the star symbols before.
Jessie	13:00	Alright. [to Researcher] Do you have a possible answer to this?	

Jessie shows adaptive help-seeking as he first asks Gabe for help. Unfortunately, Gabe has not done this section of the game (so is not a MKO) and tells Jessie he cannot help. Jessie then asks the first author for help. This gameplay recording highlights Jessie's perseverance as he spends 25 minutes trying to solve one puzzle without giving up. The first author offered guidance and support throughout the session but did not tell Jessie the answer. Jessie's self-talk at the beginning of the transcript shows how frustrated he is at not being able to solve the puzzle. Gabe and Jessie both admit *The Witness* makes them feel frustrated, yet they still want to play. Being able to share his frustration with someone who understands, even though they are not a MKO, seems to help Jessie deal with his frustration. Why are Jessie and Gabe motivated to persevere? Perhaps, because there is a MKO in the room to help them. Or, maybe it is the feeling of achievement after solving a difficult puzzle, mentioned in the interview in Table 4.

Table 4

Excerpt from interview with Jessie and Ashe

Researcher: How did you feel when you got really stuck on one of the puzzles in *The Witness*?

Jessie: Quite annoyed, irritated.

Ashe: Frustrated as well.

Researcher: And how did it feel when you finally got the answer to that puzzle?

Jessie: Quite relieving.

Ashe: Yeah it made you feel motivated to complete more puzzles.

Jessie: Or disappointed if you find out you have to do another harder one [laughs].

Researcher: If you got really stuck what were some of the things you did to help you solve that really frustrating puzzle?

Jessie: Well you could go ask someone else for help like Gabe who was there (at the club). Or maybe you. Or probably just go to another puzzle somewhere else.

Ashe: Or look around for clues around the area that you're in to help you figure out the puzzle.

Researcher: Why would you give someone a clue and not just tell them the answer for this game?

Jessie: So instead of just them not using any brainpower they use some at least.

Ashe: And like if you're telling them the answers then they struggle to figure out other puzzles because they haven't had to use their brain they've just been told the answer, so they just expect the answer all the time.

Jessie and Ashe mention wanting to understand puzzles instead of just being told the answer. In the survey Jessie mentions his favourite game from the club was *The Witness* writing, "it felt more fulfilling when I completed a challenge or puzzle in *The Witness*."

The last few sessions of the club were interrupted by COVID-19 restrictions meaning Jessie played *Untitled Goose Game* at home. In the interview Jessie mentions quitting *Untitled Goose Game* before finishing the first area as he struggled with the controls saying "it was quite annoying trying to get the keys off the gardener. It was a little hard to sort of manoeuvre the little goose around." He did not

have a MKO available to him at home. In comparison, all participants who played *Untitled Goose Game* during the club got past this first area. Perhaps, with support from a MKO he could have overcome this difficulty.

5. Discussion

Having other people physically present in the same room as the player makes a big difference to the gameplay experience, even with single-player games, mirroring findings from Stevens et al. (2008). As seen in the above case studies participants regularly asked a MKO for help when they were stuck. Games do offer good feedback as it is just-in-time and instant. However, it is possible for players to misinterpret this feedback. When acting as a MKO the first author tried not to tell participants the puzzle mechanics but to give hints based on the players existing level of understanding. The benefit of a MKO is their ability to offer personalised feedback and support based on the current level of understanding of the player.

Jessie and Lena were both recorded regularly persevering on difficult puzzles for up to 10 mins before asking for help. In comparison easier puzzles took between 20 secs – 4 mins. Does this mean regardless of if a MKO is present people will persevere? Not necessarily. Jessie showed great perseverance in *The Witness* but quit *Untitled Goose Game* in the first area even though the puzzles in *Untitled Goose Game* are easier. The difference was that Jessie played *Untitled Goose Game* exclusively at home (due to COVID-19 restrictions) without access to a MKO. All other participants who played *Untitled Goose Game* at the club (with access to a MKO) got past the first area. In Case Study 2 social support and empathy from a friend seemed to help Jessie persevere, spending up to 25 minutes on one puzzle. This aligns with existing literature on the positive impact of social support on resilience (Downey, 2008; Neill & Dias, 2001; Wilks, 2008). The presented case studies suggest that social support and just-in-time personalised support from a MKO could help players persevere for longer before quitting. The key difference between a friend and a MKO is the type of support they can offer. Someone who is not a MKO can only offer encouragement. But, a MKO can offer encouragement and guidance on what to do next. If a player is on the verge of giving up a MKO can offer a hint and guide the player to success in order to motivate them to continue playing.

The gameplay recordings show that Lena and Jessie would try a few different strategies to solve puzzles before asking for help. Common MKOs included friends or siblings who had played game already or the first author. Surprisingly, the surveys and interviews indicated online sources such as YouTube were not commonly accessed for help. Perhaps it is the MKOs ability to offer personalised support that makes them the preferred choice compared to online sources. Lena, Jessie and Ashe all mention wanting to understand the puzzles, not just know the answers. Alternatively, it could be the existing relationship between the MKO and player that makes them the first point of contact for help.

Lena, Jessie and Ashe all mention finding the puzzles challenging and feeling frustrated yet they all continue playing the games. The participants also recognise there is a feeling of satisfaction after solving a puzzle because of the level of challenge. Luckin and du Boulay (2016) mention that *EcoLab* could not avoid students feeling frustrated, but perhaps avoiding frustration is not necessary. One possibility is that it is important to help learners overcome frustration and feel the rewarding satisfaction of completing a challenge. Even sharing the frustration with a friend who understands, seemed to help Jessie deal with his frustration. Maybe it is just a sense of social support, rather than a MKO, that is needed to help people deal with negative affect such as frustration.

6. Conclusions, Limitations and Future Work

This exploratory study investigated the role of a MKO in developing resilience while playing single-player puzzle COTS video games. Social support from a friend (not necessarily a MKO) helped improve perseverance and dealing with negative affect. A MKO was able to offer guidance as well as encouragement. Well timed guidance from a MKO can help players on the verge of quitting experience success and feel motivated to continue playing. These findings suggest that having a MKO present in the room can help improve a player's resilience. The results match existing literature showing that

social support increases resilience and that the social aspect of games makes a big difference to the gameplay experience (Downey, 2008; Neill & Dias, 2001; Stevens et al., 2008; Wilks, 2008). The data collected is rich and goes some way to understanding the thought processes of players as they solve difficult puzzles. However, there is only a small number of participants. Future research into resilience and gameplay cannot focus only on individuals but also needs to incorporate the social and in-room context. Designers of single-player games need to consider the social context when creating games, particularly serious educational games.

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