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How Do Presence, Flow, and Identification Affect Players' Empathy and Interest in Learning from a Serious Computer Game?

Christine Bachen (Santa Clara University), Pedro Hernandez-Ramos (Santa Clara University), Chad Raphael (Santa Clara University), & Amanda Waldron (Brookings Institution)

Abstract

This study develops and tests an integrated model of how several psychological aspects of serious game play contribute to interest in learning and empathy with people from other cultures. Data are drawn from a study of U.S. college students' experience of playing one of two roles (an American journalist or Haitian survivor) in *Inside the Haiti Earthquake*, a simulation game that allows players to experience the aftermath of a recent disaster in a foreign land. Our results suggest that serious game designers should prioritize inducing empathy and immersive presence in players, giving secondary attention to designing for flow and character identification. To overcome barriers to empathy, educators should supplement games that challenge students to play characters from distant cultures and social backgrounds with additional lesson planning and instructional materials.

Introduction

To better understand the impact of serious games and more effectively design games for learning, we need to know more about how the psychological dynamics of play affect motivation to learn. This study tests a broad array of relationships among multiple variables of interest to educational game researchers by combining them into a single model, contributing to a more integrative understanding of the psychology of engagement in game play. We test this model using data from a study of U.S. students' reaction to *Inside the Haiti Earthquake* (PTV Productions, 2010), which uses actual video footage of survivors and rescue efforts to simulate conditions in the immediate aftermath of the disaster that struck the country in 2010. Figure 1 contains the main variables of the model and the relationships we propose based on the research literature.

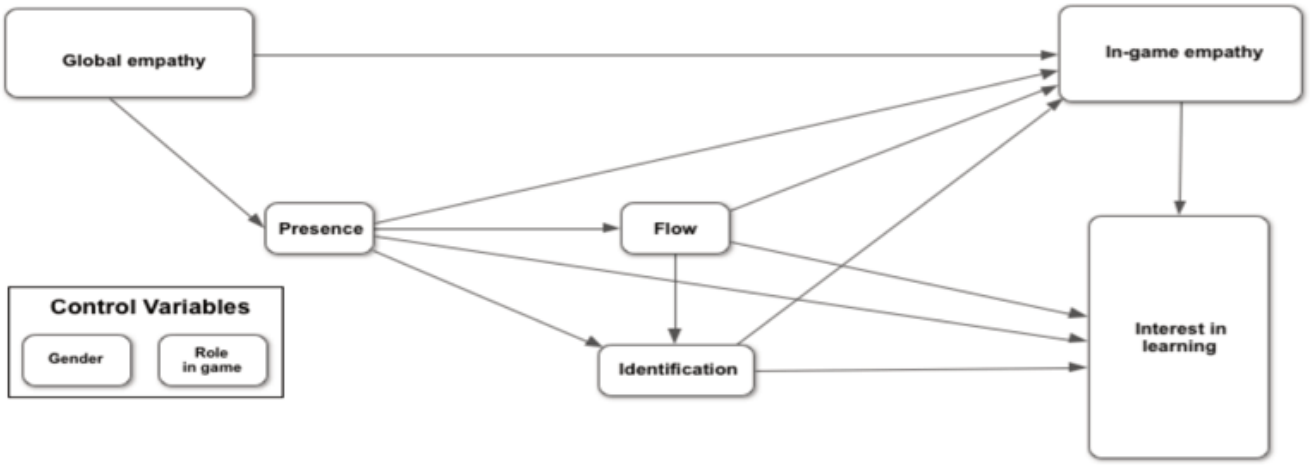

Figure 1. Diagram of the theoretical model.

Presence is "the perceptual illusion of nonmediation" felt by media users when they project themselves into the physical or social space of the medium (Lombard & Ditton, 1997). Although the dimensions of presence have been defined and measured in multiple ways, we focus on one dimension in this study: *immersive* presence.

Flow is the state of profound enjoyment and concentration experienced during activities in which a person's skills match the challenge of the task (Csikszentmihalyi, 1990). According to flow theory, we experience flow when an activity's challenges fully engage our skills, without overwhelming them. Tasks that are too simple to engage our capacities result in boredom; challenges that outstrip our skills produce anxiety. If presence describes immersion in the physical and social relations of the game world, flow accounts for immersion in the tasks required by the game.

Identification is "an imaginative process through which an audience member assumes the identity, goals, and perspective of a character" (Cohen, 2001, p. 261). This is distinct from *empathy*, which is an "other-oriented emotional response elicited by and congruent with the perceived welfare of someone else" (Batson, Ahman, & Lishner, 2009, p. 418). While most measures of empathy have been quite general, Wang et al. (2003) developed a pioneering measure of *ethnocultural* empathy to account for empathetic responses directed toward people from racial and ethnic cultural groups different from one's own group. This form of empathy is particularly relevant to the present study, which focuses on U.S. students' responses to a game about the experiences of Haitians.

Interest in learning is probably the most consensually-accepted and well-supported outcome of educational game play in the literature (Young et al., 2012). Interest is also strongly predictive of other learning outcomes (Hidi & Ainley, 2008). We focus on *post-game* interest in learning as one way of testing whether game-based learning transfers to the world beyond.

Gender has often been a subject of research on several aspects of our proposed model but because results are inconclusive, we include gender as a control. For example, while females sometimes report that game-based learning is less interesting and enjoyable than males do (e.g., Bonanno & Kommers, 2008), these differences may be explained by other factors, especially amount of prior experience with game play and whether games are perceived as easy to use (Bourgonjon et al, 2010). Because participants played two different roles in the game used in this study, *game role* was also included as a control.

While the research has produced some mixed findings about certain relationships (e.g., between flow and learning) or has varied in its explication and measurement of key constructs (e.g., presence and empathy), the hypothesized relationships within the model shown in Figure 1 have received some support or can be extrapolated from theory.

- H1: Pre-game levels of empathy will positively influence presence and in-game empathy for the Haitian people. Research has documented the importance of prior empathy's impact on presence (e.g., Nicovich, Boller, & Cornwell, 2005), and it is reasonable to expect that more empathetic people will continue to be so during game play
- H2: Presence will positively contribute to flow, identification, in-game empathy, and interest in learning. The more that participants feel immersed in the simulation experience, the greater the likelihood that they will enter a state of flow as they complete game tasks (e.g., Jin, 2011). As players feel more involved and absorbed, it follows that they will identify more with their character (e.g., Jin, 2011), express greater empathy for the people represented in the game after playing (Greitemeyer et al., 2012), and be more interested in learning about the issues these people face (Weibel & Wissmath, 2011).
- H3: Flow will positively influence identification (Jin, 2011), in-game empathy (Raphael et al., 2012), and interest in learning (Fu et al., 2009; Raphael et al., 2012).
- H4: Identification will positively contribute to in-game empathy and interest in learning (Bachen et al., 2012).

In addition to these hypothesized relationships among individual variables, we propose that taken together they will significantly contribute to a model explaining in-game empathy and interest in learning more about the subject matter of the game. In that model we will be able to see more clearly the relationships among independent variables and identify the relative contributions of each in explaining in-game empathy and interest in learning. Within that model, we also examine the following research questions:

- R1: What is the effect of players' gender on the relationships in the model?
- R2: What is the effect of the role played in the game on the relationships in the model?

Method

Data were collected at a private California university from 146 undergraduates (54 male, 92 female) ranging in age from 18 to 24 (*Median* = 20), with the exception of one older student. Participants were recruited voluntarily from 13 different sections of five different communication courses.

Participants played *Inside the Haiti Earthquake*, in which players performed the roles of an American journalist (a white, male professional from the developed world) or a survivor (Haitian, low-income, and female) of the real-world tragedy that struck the country in 2010. Thus, these two roles offered opportunities to test whether players could identify with one character who was culturally distant from their experience (the survivor) and another that was more similar (the journalist, especially because the participants were enrolled in communication courses). In each role, players traverse a branching narrative in which they must decide how to cover the story accurately and from multiple perspectives (journalist) or find medical attention and food (survivor).

Haiti is a simulation game (Warren et al, 2012). Like a simulation, it models a set of conditions and rules, in this case for journalists and survivors of a natural disaster in the developing world. Like a game, it has specific win/loss conditions. For example, as the journalist, if you file stories that are framed inconsistently, you get fired. *Haiti* is also a documentary game (or docugame), which provides a historical record of an event and those who experienced it. Docugames aim to create a sense of social realism by representing real-world environments and narratives, and affording player actions that seem true to life (Bogost, Ferrari, & Schweizer, 2010). Unlike many previous docugames, the *Haiti* interface represents events entirely through news photographs and especially through journalistic video footage, not computer graphics.

The game was chosen because of its potential to induce the psychological states relevant to the study. We anticipated that the realism of the game genre, subject, and interface would inspire a sense of presence. The video footage of recognizable, individual people, including many who are struggling to survive the aftermath of the quake or to help its victims, suggests the game may provoke empathy. The challenges posed seemed appropriate to college students, favoring flow. The game affords character identification and interest in learning because players are confronted with morally-charged dilemmas in each role, such as whether to focus on the sometimes chaotic and ineffective nature of the aid effort even if this might dampen donations (journalist), or to join others in "salvaging" food from a ruined grocery or shun "looting" from the store (survivor).

The study was introduced as a research project about games and learning. As incentives, students were offered a $20 gift card and the satisfaction of assisting senior thesis students (with whom the data were gathered) with their research. Thus, there was a self-interested and an altruistic incentive. A pre-game survey to measure global empathy and demographic variables was administered via computer in a lab about a week prior to playing the game. Two guest professors, one male and one female, administered the initial survey and game play sessions to about half of the sample apiece. Game play occurred in students' regular classrooms during class time. Males and females in each course were randomly assigned to the journalist role (N=71) or survivor role (N=75). Participants were briefed on how to navigate the game, and then played it using headphones. All participants were able to reach the game's conclusion at least once; most students played more than once, exploring different choices in the same role. The post-game survey, which measured presence, flow, identification, in-game empathy, and interest in learning was administered via computer in the classroom immediately after game play.

To strengthen internal validity of the study, all game play occurred in the same classroom and all students played on computers with similar-sized screens, resolution, and mice. Students played for 20 to 25 minutes. The fact that students played in their own classroom as part of a regular course strengthened the external validity of the study's conclusions about effects on interest in learning.

Presence was measured using all six items from the engagement (mental immersion) subscale from the Temple Presence Inventory (Cronbach's α = .919), developed by Lombard, Ditton, and Weinstein (2004). The 15-item scale measuring all eight dimensions of flow originated in Fu, Su, and Yu (2009) and was adapted and validated in Bachen et al. (2012) and Raphael et al. (2012) (Cronbach's α = .815). Identification with the character played in the simulation was measured using a six-item scale developed and validated in Bachen et al. (2012) (Cronbach's α = .843). Because the game used in this study challenged U.S. college students to empathize with people in a less developed country, the initial survey measured empathy using a 10-item version of the scale of global empathy adapted and validated in Bachen et al. (2012) and Raphael et al. (2012), based on Wang et al. (2003) (Cronbach's α = .778).

This scale was modified for the post-game survey to measure players' in-game empathy with Haitian people (Cronbach's α = .820). On the post-game survey, a five-item scale measured interest in learning more about game topics, including "how aid organizations help survivors of natural disasters," "how disasters are reported in the media," "how disaster survivors cope," and "what's happening in Haiti after the earthquake" (Cronbach's α = .907).

Results

Table 1 presents the means, standard deviations, and correlations among all key variables included in our analyses. These data show that the game successfully induced high levels of flow, presence, and identification (with means generally well above the midpoints on each scale for these variables), although there was a good deal of variation in the sample. The means also show that the sample had high initial levels of global empathy and expressed almost equally high levels of empathy for the Haitian people after playing the game, as well as moderately high interest in learning more about the game topics, despite substantial variation among players.

Variable	Mean	*S.D.*	Range	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Gender [1=M 2=F]	1.63	.48	–	–						
(2) Role [0=Survivor 1=Journalist]	.49	.50	–	.036	–					
(3) Flow	66.40	10.83	15 - 90	.042	.013	–				
(4) Presence	31.26	6.66	6 - 42	.105	.038	.530***	–			
(5) Identification	26.95	5.97	6 - 36	.051	-.133	.428***	.692***	–		
(6) Global empathy	44.17	7.16	10 - 60	.011	-.028	.245**	.354***	.323***	–	
(7) In-game empathy	44.32	8.05	10 - 60	-.012	-.063	.440***	.653***	.496***	.548***	–
(8) Interest in learning	18.14	5.12	5 - 30	.079	.049	.129	.298***	.298***	.210*	.348***

Note: * = p < .05; **= p < .01; ***= p < .001

Table 1. Means, standard deviations (S.D.), and correlations for key variables.

First, we will provide results for each of our hypotheses and research questions using correlations and linear regression, and then report the structural equation modeling (SEM) analyses that considered the model as a whole, including the control variables of gender and role in the simulation.

H1: Pre-game levels of global empathy will positively influence presence and levels of in-game empathy. Participants' levels of global empathy correlated strongly with presence (r=.354, *p*=.000; *R2* from linear regression =.1253) and with in-game empathy (r=.548. *p*=.000; *R2* from linear regression =.3005). *H2: Presence will positively contribute to flow, identification, in-game empathy, and interest in learning*. There was a strong positive correlation between presence and flow (r=.530, *p*=.000); presence explained 28.09% of the variance in flow. Presence and identification were positively correlated (r=.692, *p*=.000), with presence explaining 47.84% of the variance in identification. The relationship of presence to in-game empathy was also strong (r=.653, *p*=.000, 42.59% of variance explained), but much weaker (although still positive) to interest in learning (r=.298, *p*=.000, 8.9% of variance explained). *H3: Flow will positively influence identification, in-game empathy, and interest in learning*. Flow is significantly correlated with identification (r=.428, *p*=.000, 18.27% of the variance explained) and in-game empathy (r=.440, *p*=.000, 19.38% of variance explained) but not with interest in learning (r=.129, n.s., 1.66% of variance explained). *H4: Identification will positively contribute to in-game empathy and interest in learning*. Identification was significantly related to in-game empathy (r=.496, *p*=.000, 24.56% of variance explained) and to interest in learning (r=.298, *p*=.000, 8.9% of variance explained).

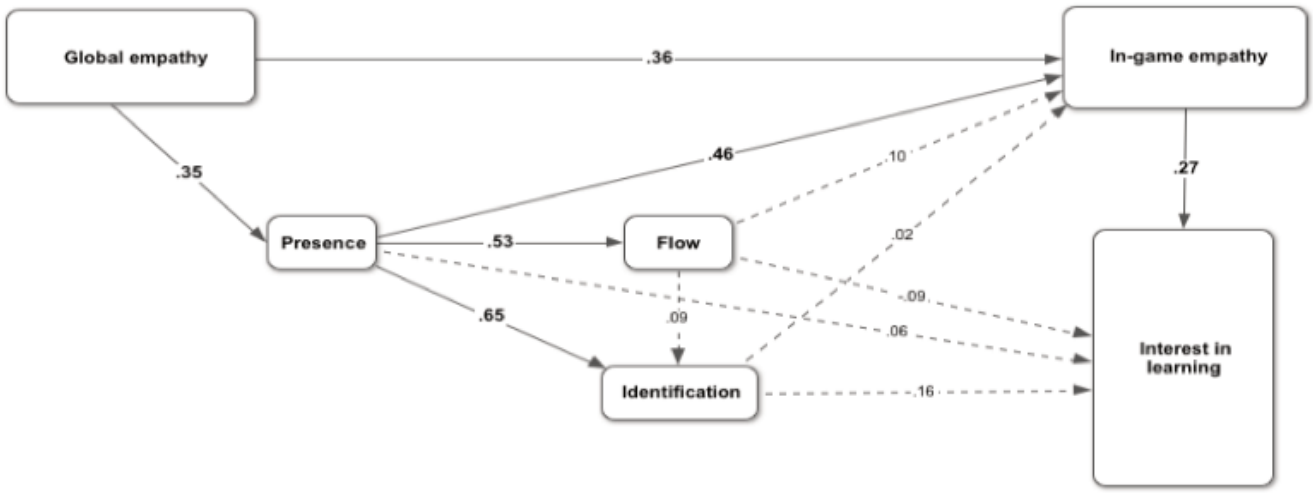

Figure 2. SEM results testing the model with the full sample (N=146).
(Note: In this and other figures, solid lines indicate coefficient is significant at the .05 level or higher, while dashed lines indicate non-significance.)

We now turn to structural equation modeling to analyze the impact of all variables together in the model and address the research questions. First, considering the entire sample (n=146), the data were a good fit for the model (?2(3) = 2.53, *p*=.469, RMSEA =.000, SRMR=.020). Results (see Figure 2) showed that only in-game empathy for Haitians had a significant effect on interest in learning (Std. Coeff. = .27, *p*=.007). Flow, identification, and presence had no significant direct effect on interest in learning, although the hypothesized positive influence of presence on both flow (Std. Coeff. = .53, *p*=.000) and identification (Std. Coeff. = .65, *p*=.000) was confirmed (see results for H2 and H3, above). Presence also had a significant effect on in-game empathy (Std. Coeff. = .46, *p*=.000). Thus, for the sample as a whole, any influence of presence on interest in learning was mediated mainly by in-game empathy. Post-hoc analysis of direct and indirect effects confirmed this: While the total effect of presence on interest in learning was .2459, the direct effect was only .0529 (*p*=.651) but the indirect effect was .193 (*p*=.000).

While males and females, and players of the journalist and survivor, ended with indistinguishable levels of in-game empathy and interest in learning (as shown by t-tests), we wanted to know whether they arrived at these similar levels through the same combination of psychological influences. These next analyses allow us to see whether our model accounts equally well for the experiences of players of each gender and role when all variables are looked at simultaneously.

R1: What is the effect of player's gender on the relationships in the model? Overall, the data were a good fit for the model (males n=54, ?2 (3)=3.78, *p*=.286, SRMR=.052; females n=92, ?2 (3)=1.732, *p*=.630, SRMR=.018). Four major differences are worth noting when comparing these analyses (see Figures 3a and 3b). First, in both groups presence is a significant predictor of both flow and identification, but only for females did flow significantly predict identification (Std. Coeff.=.17, *p*=.038). Second, for females, in-game empathy was significantly influenced by presence (Std. Coeff.=.63, *p*=.000), but not for males (Std. Coeff.=.16, n.s.). Third, for males, flow (Std. Coeff.=.35, *p*=.003) influenced in-game empathy, but not for females (Std. Coeff.=-.01, n.s.). Fourth, none of the hypothesized influences on interest in learning were significant for males, whereas for females both in-game empathy (Std. Coeff.=.36,

p=.000) and identification (Std. Coeff.=.29, *p*=.042) were significant predictors. Post-hoc tests for group invariance of parameters confirmed that the influence of presence (?2 (1) = 6.621, *p*=.010) and flow (?2 (1) = 6.046, *p*=.014) on in-game empathy operated in significantly different ways for males and females in this study.

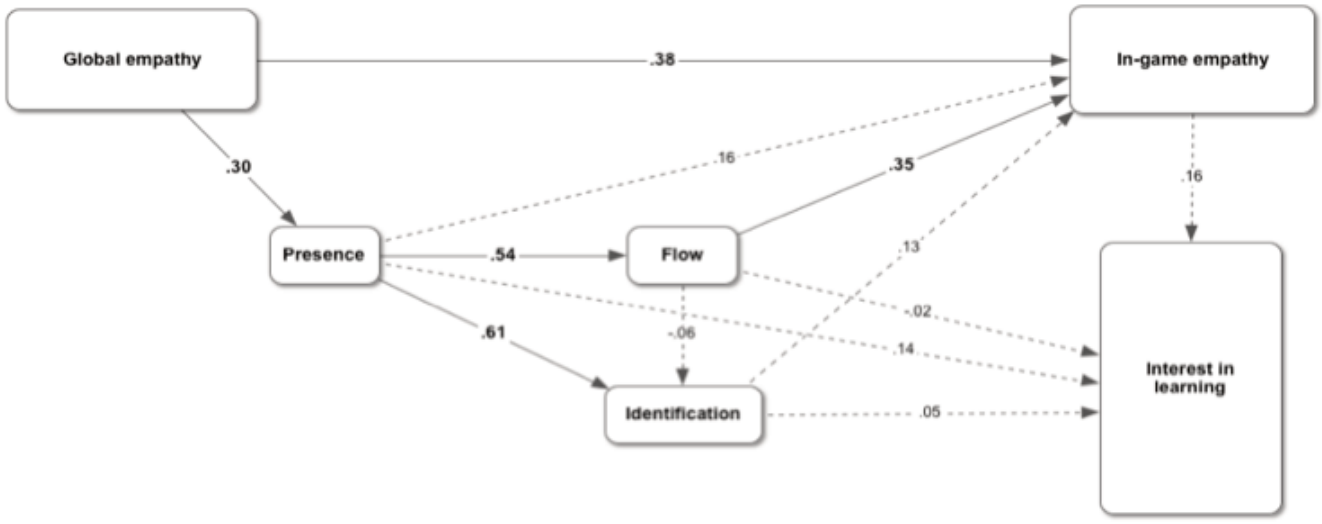

Figure 3a. SEM results for males (n=54).

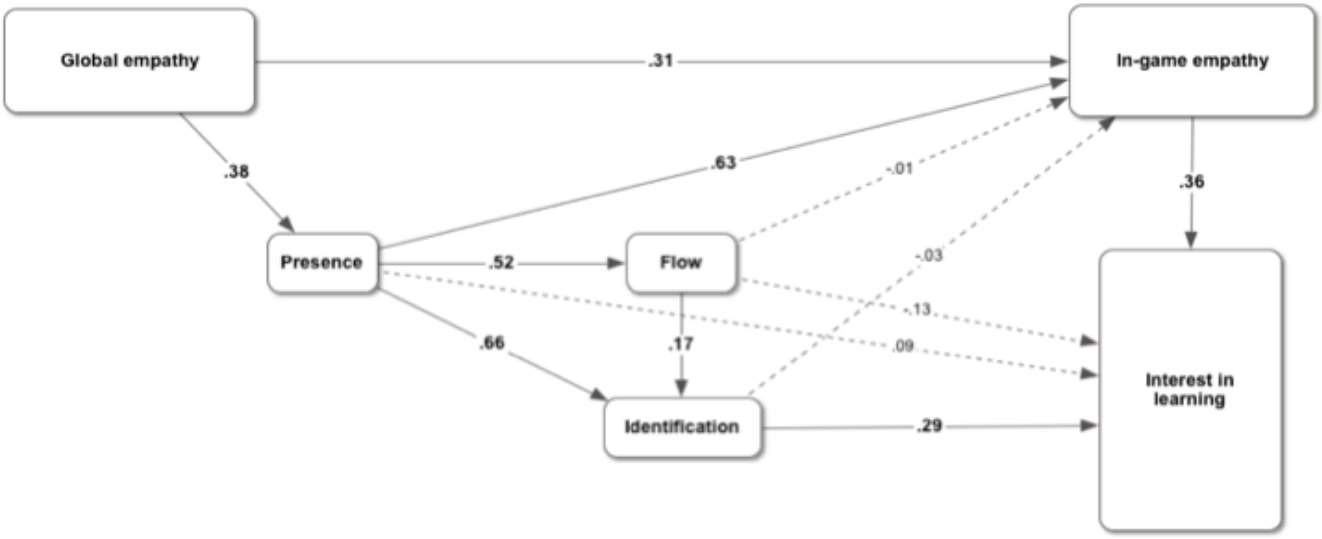

Figure 3b. SEM results for females (n=92).

In sum, these models showed notable gender differences. For males, experiencing flow in the game influenced in-game empathy toward the people affected by the Haiti earthquake, but did not influence their interest to learn more about the situation. In contrast, females' in-game empathy was not influenced by a sense of flow in the game, but identification affected their interest in learning more about the situation after the disaster along with in-game empathy. It is worth remembering here that individual t-tests showed no significant differences by gender on any of the variables in the model tested in this study, so one benefit of SEM in this case is that it allows us to better understand the subtle differences in how males and females experienced the game.

R2: What is the effect of the role played in the game on the relationships in the model? As was the case with gender, overall the data were a good fit for the model for both roles (see Figure 4a for journalist, ?2 (3)=1.315, *p*=.725, SRMR=.025; see Figure 4b for Haitian survivor, ?2 (3) = 4.991, *p*=.172, SRMR=.037). However, among Haitian survivors, global empathy (Std. Coeff.=.55, *p*=.000) was a significant influence on presence, but not among those playing the journalist (Std. Coeff.=.08, n.s.). Additionally, among participants who played as a survivor none of the predictors of interest in learning (in-game empathy, flow, identification, or presence) were significant, whereas for players in the journalist role both in-game empathy (Std. Coeff.=.48, *p*=.000) and identification (Std. Coeff.=.27, *p*=.029) were significant predictors. Post-hoc tests for group invariance of parameters confirmed that those who played as the journalist (Std. Coeff.=.077, n.s.) and those who played as the survivor (Std. Coeff.=.55, *p*=.000) differed significantly on how global empathy affected presence (?2 (1) = 16.344, *p*=.000).

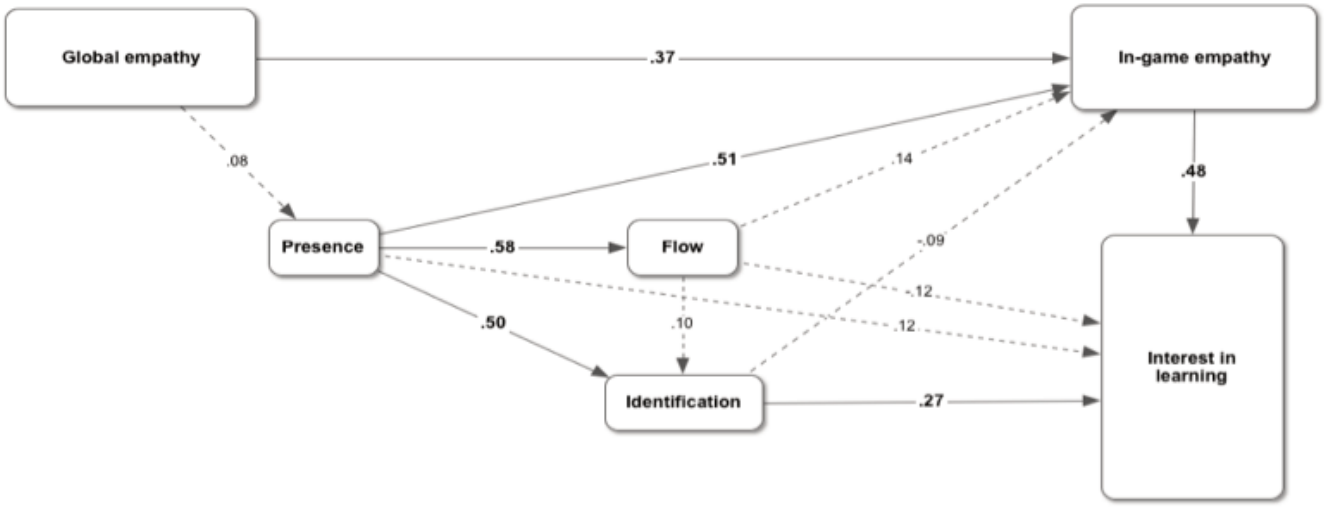

Figure 4a. SEM analysis for participants who played as journalist (n=71).

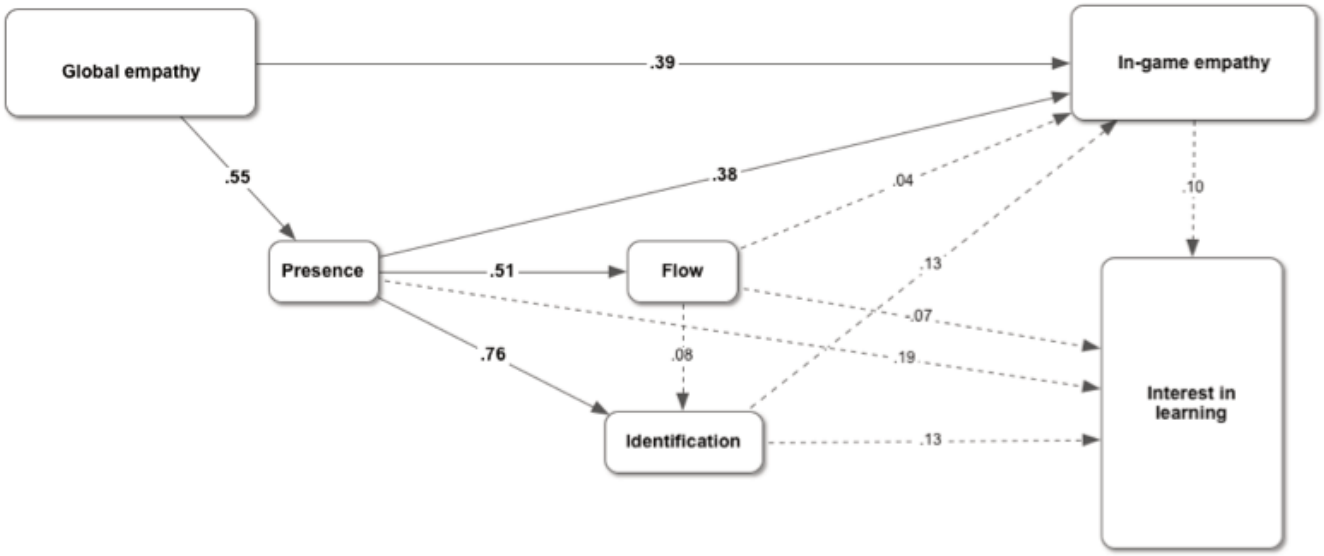

Figure 4b. SEM analysis for participants who played as Haitian survivor (n=75).

In summary, there were also notable differences in the results by role played in the game. While presence and global empathy influenced in-game empathy for both groups, their pathways to interest in learning differed. For those who played as the journalist, identification and in-game empathy positively influenced interest in learning, whereas for those who played as the survivor none of the predictors were significant.

Discussion and Conclusion

This study set out to explore the inter-relationships among a set of factors that can influence empathy and interest in learning more about a topic of study. Our analyses of sets of pairs of relationships confirmed some patterns we had seen in previous research cited above. Presence, flow, and identification were significantly related and were linked to two outcomes: empathy for people represented in the game and interest in learning.

Structural equation modeling allowed for comparing the relative power of a unique set of variables, showing that some factors played a more important role in explaining game outcomes than others. When testing the model with the whole sample, we found that interest in learning was only directly influenced by in-game empathy and not directly by any of the other game play variables (presence, flow, identification). This suggests that designers of serious games would be wise to prioritize creating interfaces and game play that encourage players to engage with the cognitive, emotional, and communicative experiences of peoples from other cultures. In this light, empathy for others is not just a worthy disposition for global citizens, but a powerful key for unlocking interest in other cultures.

Immersive presence emerged as an important state that is both influenced by a player's base level of global empathy but that also enhances empathy for people from other cultures in a game. Both findings align with prior research (Greitemeyer et al., 2010; Nicovich et al., 2005). The fact that immersive presence also had a strong positive influence on both flow and identification regardless of player gender or game role reinforces that presence is also a crucial dimension of serious game design. Deep immersion in the game world seems to have allowed players to experience Haitians' lives as real and achieve empathy with them. Presence may be especially helpful to female players, given our finding that this state had a direct positive effect on females' experience of in-game empathy for Haitians. The use of video footage of actual historical events in this game may be particularly effective at inspiring perceptual and psychological immersion in the game environment.

The fact that flow and identification made secondary contributions to our outcome variables, both of which varied by players' gender, suggests that fostering these states may be valuable but insufficient goals for educational game design. For males, flow mediated the contribution of presence to in-game empathy, while for females identification emerged as a positive influence on both flow and interest in learning. It may be that males are somewhat more likely than females to develop cognitive and emotional connections to people represented in games by engaging in tasks posed by game play. Females may be more likely than males to have their interest in other peoples piqued by inhabiting a game character from another culture, which jibes with many females' greater interest in role-playing fantasy games than in first-person shooter games that largely appeal to males (Bourgonjon et al., 2010). If so, the goal of designing gender-inclusive educational games and simulations might be served well by striving to induce both flow (especially to engage males empathetically with other cultures) and identification (to interest females in other peoples).

However, the students in our study related better to the virtual experience of the American journalist covering the disaster: the combined effects of identification with the journalist role and in-game empathy for the Haitian people made a significant contribution to interest in learning more about the game topics, which was not the case for those who played as the survivor. We suspect that the cultural barriers to empathy identified by Rasoal, Eklund, & Hansen (2011) may also help to account for the diminished role of identification among players of the survivor role. Lack of knowledge and experience of a different culture, and inability to perceive similarities and differences between another culture and one's own, may be obstacles to identifying with a character from another country, ethnicity, or social class. One implication is that game designers and educators may need to acknowledge that developing identification with people who are perceived as psychologically or geographically distant requires more extended interventions in surrounding lesson plans and supplementary materials that prepare students to immerse themselves in a different culture.

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