




Gaming for Graduates
What can Higher Education Students Learn
from Commercial Video Games?

Matthew Barr
@hatii_matt

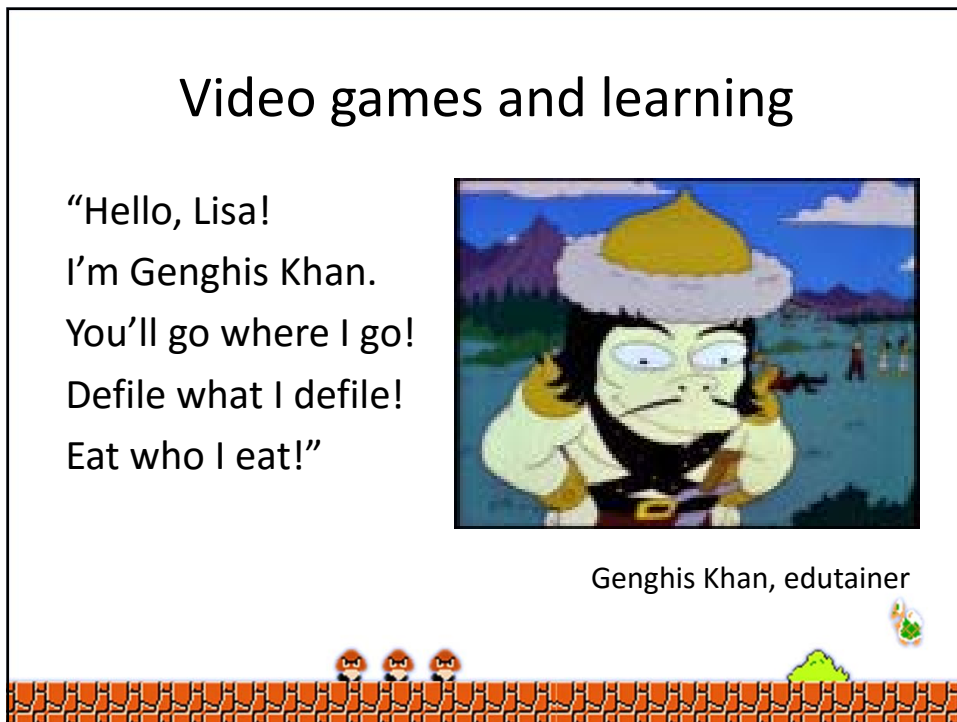
Three question mark blocks are on the left, and one is on the right. Three Goombas are on the brick floor, and a Koopa is on the right.

Video games and learning

“Hello, Lisa!
I’m Genghis Khan.
You’ll go where I go!
Defile what I defile!
Eat who I eat!”

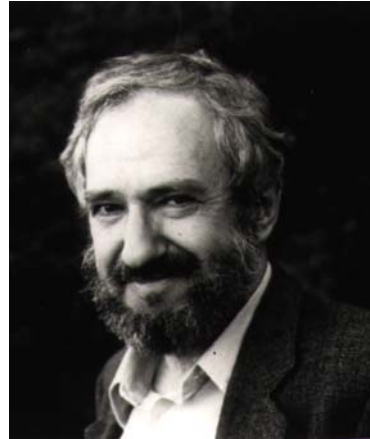


Genghis Khan, edutainer



Three Goombas are on the brick floor, and a Koopa is on the right.

“The mating of education and entertainment has resulted in offspring that keep the bad features of each parent and lose the good ones”



– Seymour Papert



“The
mot
twit
are
teac
ratio
men
cun



ey
e no
may
l.”



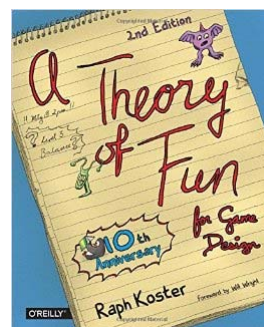
“Learning is a deep human need, like mating and eating, and like all such needs it is meant to be deeply pleasurable to human beings.”

—James Paul Gee



Game design supports learning

1. Games must feature a “variable feedback system”
2. The “Mastery Problem” must be addressed
3. “Failure must have a cost”



**Zone of proximal development
(Learner can do with guidance)**

Learner can do unaided

Learner cannot do

From *Flow: The Psychology of Optimal Experience*
by Mihaly Csikszentmihalyi (page 74)

Also constructivism, mastery learning, scaffolding, experiential learning, social learning...

	Sanji Level 80	Anor Londo Play Time 723 : 48 : 04
	Scar Level 125	Oolacile Township Play Time 899 : 51 : 09
	Ricard Level 62	Undead Parish Play Time 999 : 59 : 59

Select Enter Back Toggle Display Delete

Games for graduates?



"I would rather hire a high-level *World of Warcraft* player than an MBA from Harvard."

– John Seely Brown (Deloitte, Amazon, Xerox etc.)

- So, can playing commercial video games help develop useful skills or 'graduate attributes'?



Glasgow's Graduate Attributes

- Investigative
- Independent and Critical Thinkers
- **Resourceful** and Responsible
- **Effective Communicators**
- Confident
- **Adaptable**
- Experienced Collaborators
- Ethically and Socially Aware
- Reflective Learners
- Subject Specialists



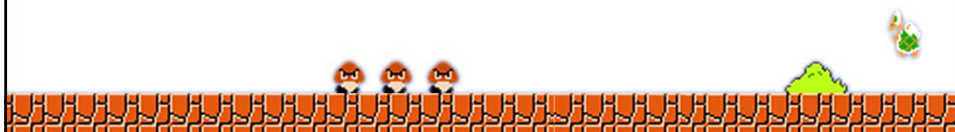
Measures

- Effective Communicators
 - The **Communicative Adaptability Scale** (Duran, 1992)
 - **Self-Perceived Communication Competence Scale** (McCroskey and McCroskey, 1988)
- Adaptable
 - **I-ADAPT-M** (Ployhart & Bliese, 2006)
- Resourceful and Responsible
 - **Resourcefulness Scale** (Zauszniewski *et al.*, 2006)



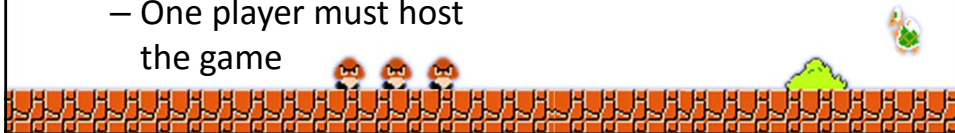
Games

- *Minecraft*
 - Procedurally-generated sandbox game with construction, exploration and survival elements
 - Played in split-screen multiplayer mode



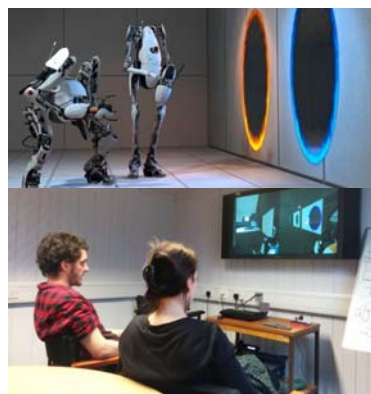
Games

- *Borderlands 2*
 - Co-operative role-playing first-person shooter game
 - LAN-based multiplayer
 - Permits players to drop in and drop out as required (story?)
 - One player must host the game



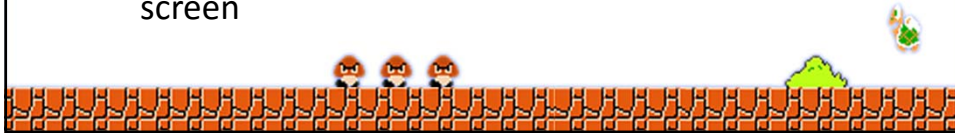
Games

- *Portal 2*
 - “A hilariously mind-bending adventure that challenges you to use wits over weaponry in a funhouse of diabolical science.”
- Often described as a ‘physics-based puzzler’ or similar.
- Features a robust two-player cooperative mode.



Games

- *Lara Croft and the Guardian of Light*
 - Isometric co-operative adventure
 - Emphasis on puzzle-solving
 - Co-operative players share the same screen



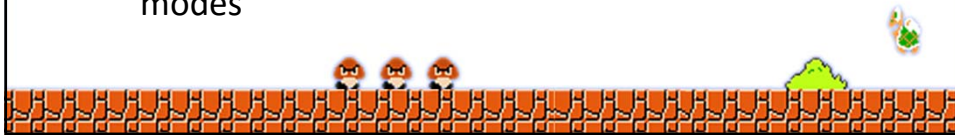
Games

- *Warcraft III*
 - Real-Time Strategy (RTS) game with team-based play
 - Supports many different multiplayer configurations



Games

- *Team Fortress 2*
 - Team-based multiplayer-only shooter
 - Server-based configuration possible
 - Multiple game modes



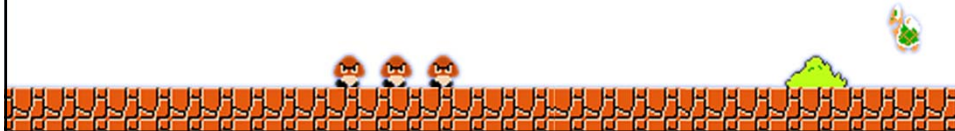
Games

- *Gone Home*
 - First-person interactive story/adventure
 - Single-player game
 - Possible to 'complete' the game in two hours



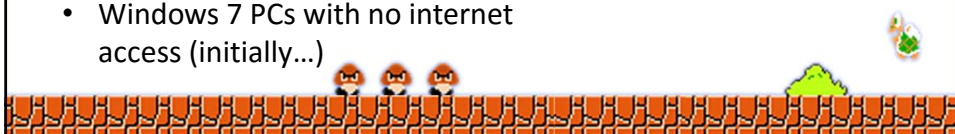
Games

- *Papers, Please*
 - A “dystopian document thriller”
 - Work as an immigration officer, deciding whom to let in and whom to exclude from entering the fictional country of Arstotzka



Set-up

- Drop-in structure:
 - 3 days/week over 8 weeks
 - Asked to play 120 minutes in total for most games, survey after each game
 - Log book, timers, log script
 - Better ecological validity?
- Recruited from level one and two, mainly CoA
 - Amazon vouchers offered as prizes
- Windows 7 PCs with no internet access (initially...)



Summary of week 1 test scores and demographic information by control/intervention group

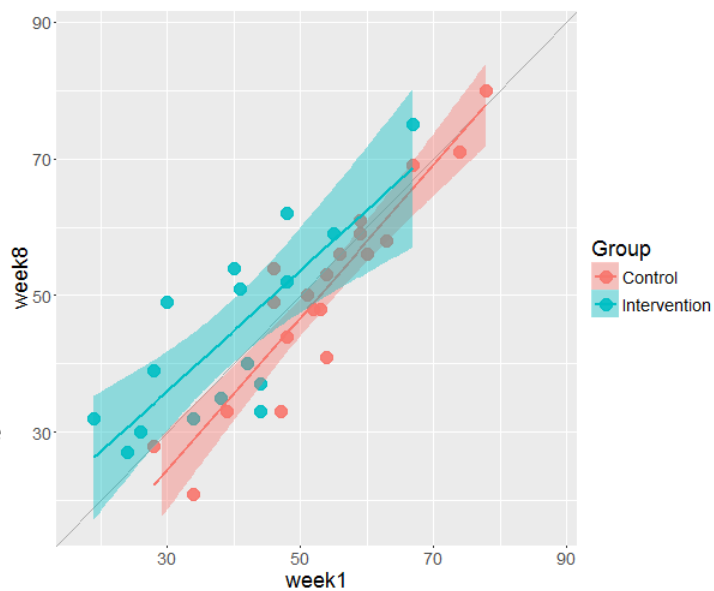
		Control	Intervention	<i>p</i>
N		36	36	
Measures				
Communicative Adaptability Scale (mean (SD))		100.14 (8.92)	99.06 (17.88)	0.746
Self-Perceived Communication Competence Scale (mean (SD))		885.44 (202.36)	873.69 (224.72)	0.816
I-ADAPT-M (mean (SD))		202.69 (19.70)	200.36 (37.65)	0.743
Resourcefulness Scale (mean (SD))		82.75 (19.75)	81.44 (23.33)	0.798
Demographic information				
Note that one participant in both groups failed to complete the demographic survey, so N = 35 for these data.				
Year (%)	Level 1	22 (62.9)	24 (68.6)	0.801
	Level 2	13 (37.1)	11 (31.4)	
Age (mean (SD))		19.80 (3.41)	21.09 (5.95)	0.271
Gender (%)	Female	18 (51.4)	20 (57.1)	0.346
	Male	14 (40.0)	15 (42.9)	
	Other	3 (8.6)	0 (0.0)	
Hours spent playing video games per week (%)	0	10 (28.6)	9 (25.7)	0.973
	1-4	12 (34.3)	14 (40.0)	
	4-8	6 (17.1)	6 (17.1)	
	>8	7 (20.0)	6 (17.1)	
Retention (%)	Completed	20 (55.6)	16 (44.4)	0.48
	Lost to follow up	16 (44.4)	20 (55.6)	

Summary of week 1 test scores and demographic information by completed/lost to follow-up

		Completed	Lost to follow-up	<i>P</i>
N		36	36	
Group (%)	Control	20 (55.6)	16 (44.4)	0.48
	Intervention	16 (44.4)	20 (55.6)	
Measures				
Communicative Adaptability Scale (mean (SD))		97.72 (8.41)	101.47 (17.94)	0.26
Self-Perceived Communication Competence Scale (mean (SD))		824.50 (216.79)	934.64 (195.66)	0.027
I-ADAPT-M (mean (SD))		200.22 (19.06)	202.83 (37.97)	0.713
Resourcefulness Scale (mean (SD))		80.94 (18.09)	83.25 (24.60)	0.652
Demographic information				
Note that one participant in both groups failed to complete the demographic survey, so N = 35 for these data.				
Year (%)	Level 1	19 (54.3)	27 (77.1)	0.078
	Level 2	16 (45.7)	8 (22.9)	
Age (mean (SD))		21.06 (4.28)	19.83 (5.36)	0.293
Gender (%)	Female	20 (57.1)	18 (51.4)	0.714
	Male	13 (37.1)	16 (45.7)	
	Other	2 (5.7)	1 (2.9)	
Hours spent playing video games per week (%)	0	7 (20.0)	12 (34.3)	0.32
	1-4	14 (40.0)	12 (34.3)	
	4-8	5 (14.3)	7 (20.0)	
	>8	9 (25.7)	4 (11.4)	

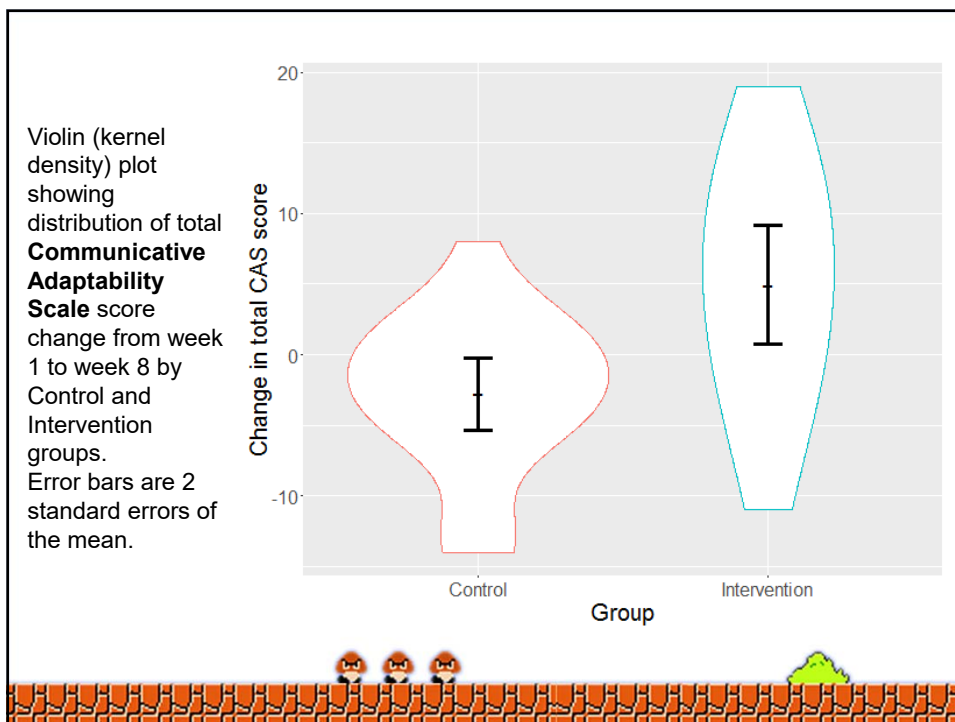
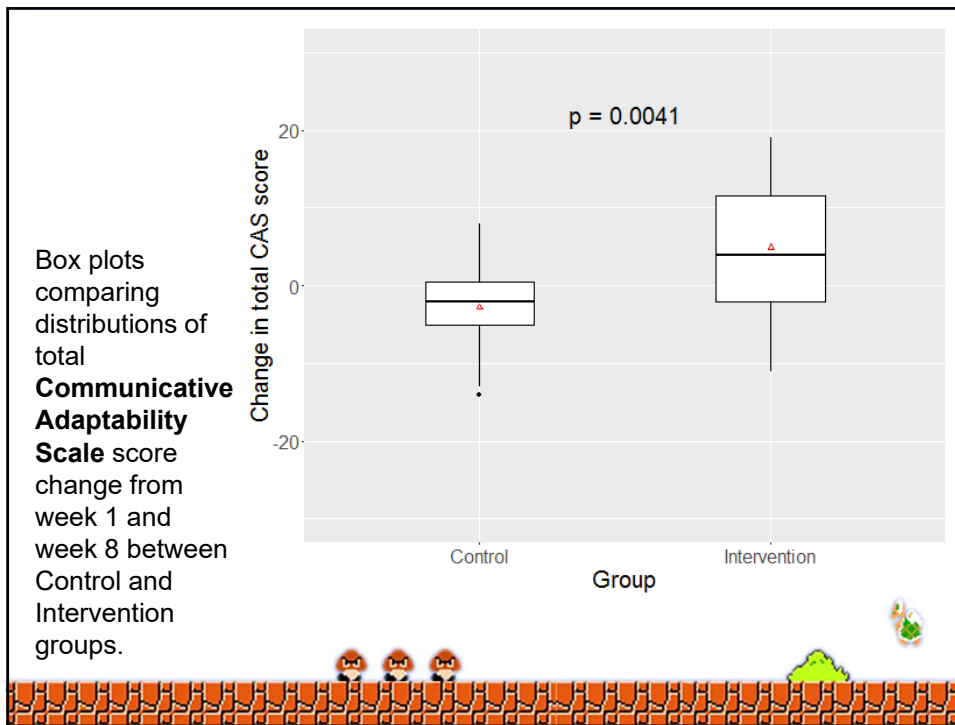
Results

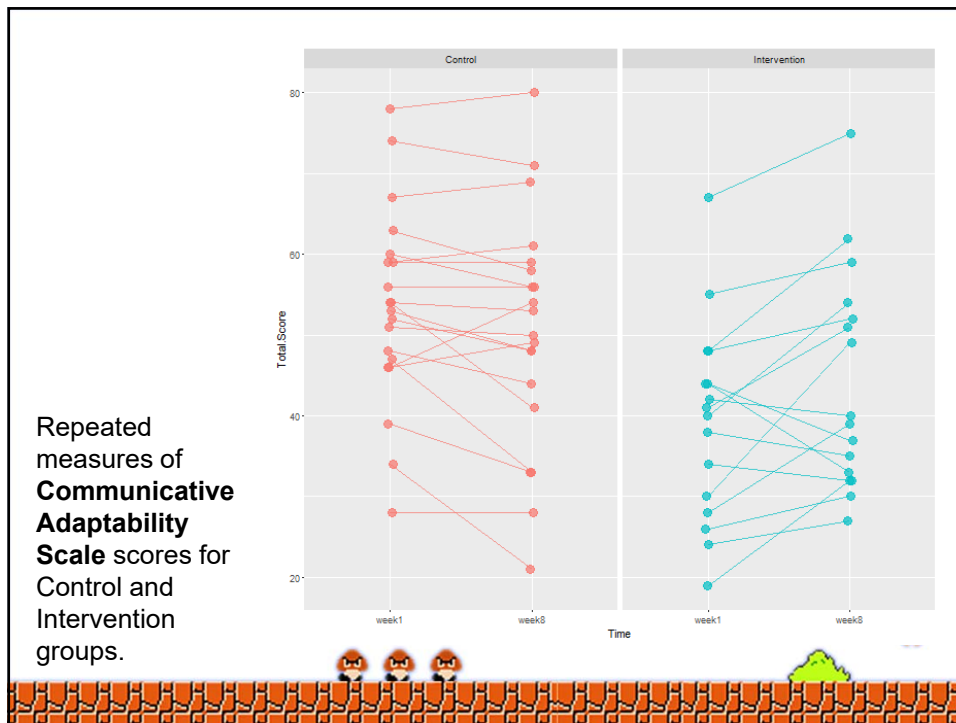
	Control		Intervention		Difference in means		Normalized by SD (Cohen's d)	p-value
	Mean	SD	Mean	SD	Absolute	95% CI		
CAS	-2.8	5.65	4.94	8.41	7.74	-12.79 to -2.69	1.1	0.004
SCCS	71.4	243.69	135.19	189.65	63.79	-210.58 to 83.01	0.29	0.383
I-ADAPT-M	-8.25	15.99	11.31	18.07	19.56	-31.32 to -7.8	1.15	0.002
Resourcefulness	0.25	9.71	9.69	11.42	9.44	-16.77 to -2.11	0.9	0.013



Scatterplot of **Communicative Adaptability Scale** scores for week 1 and week 8 for both Control and Intervention groups.



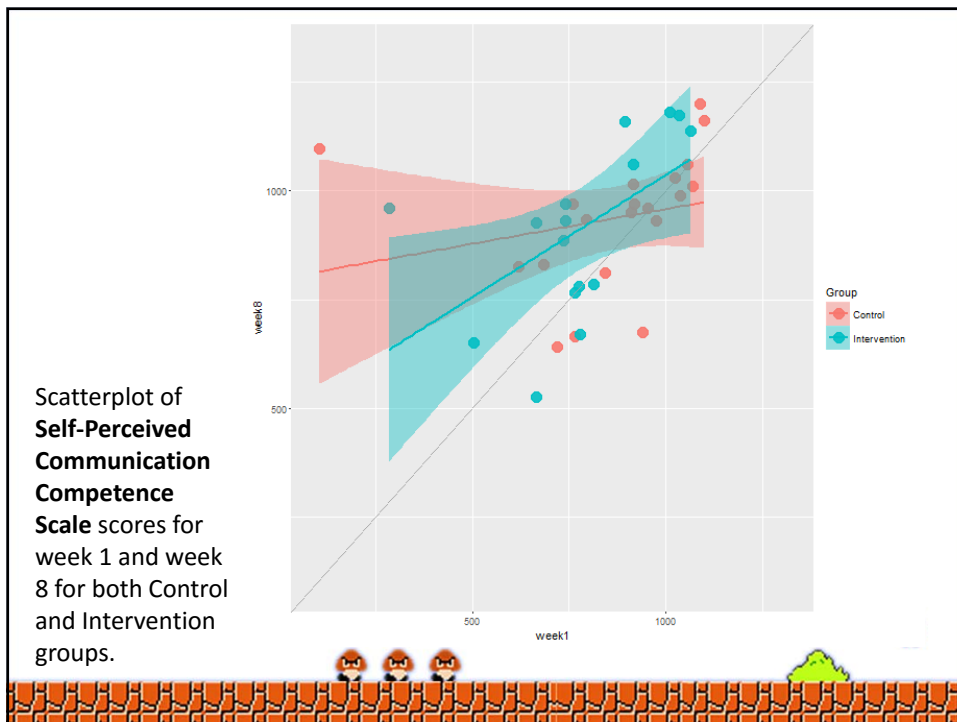
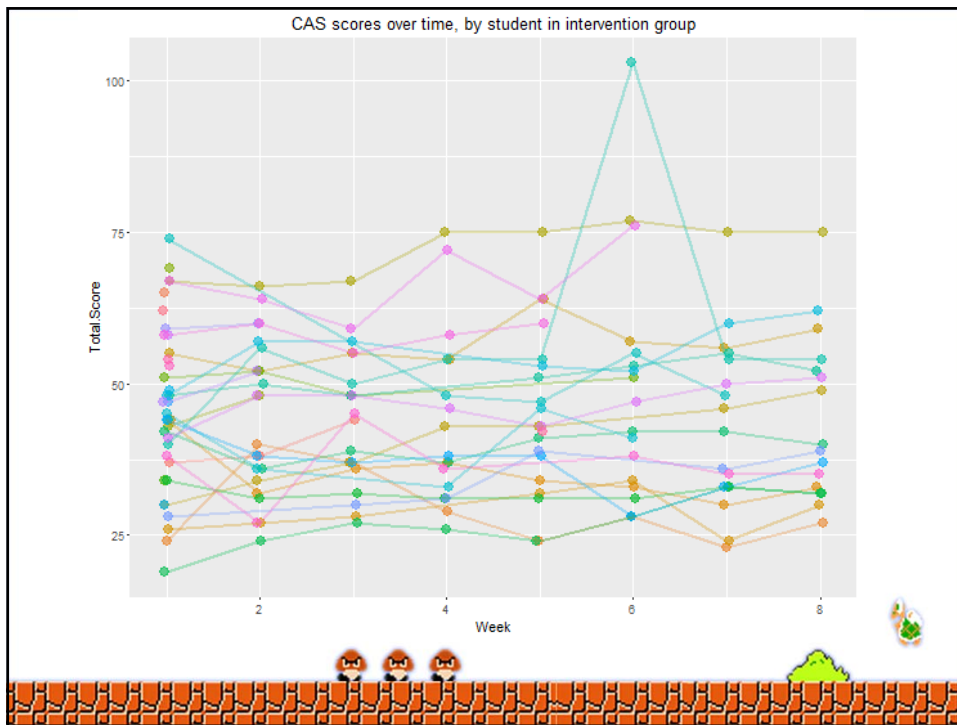


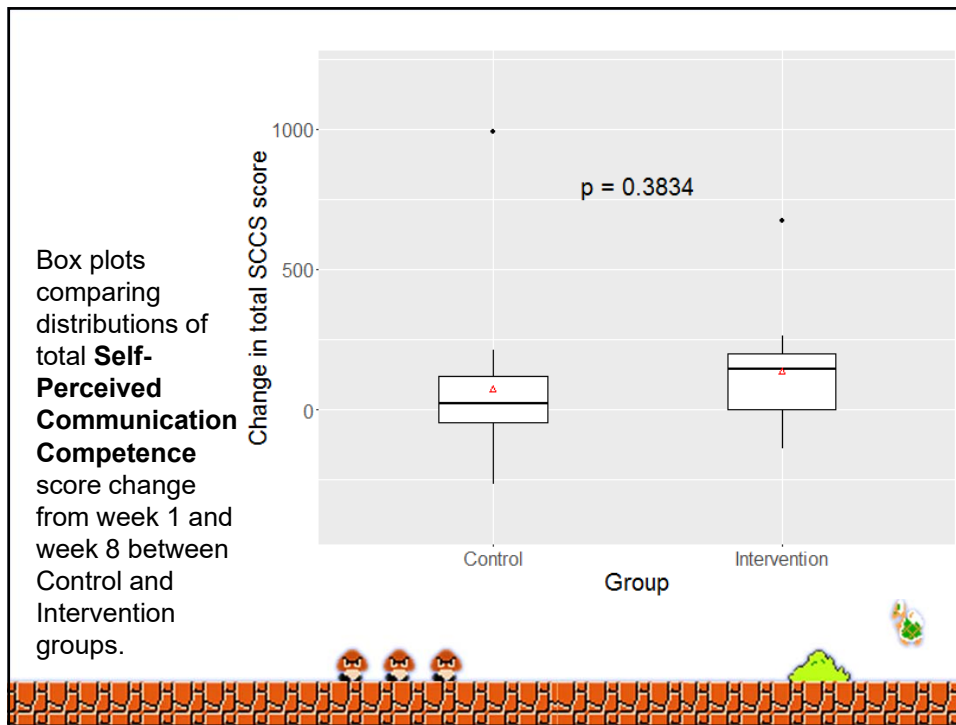


Summary of changes in Communicative Adaptability Scale scores for Control and Intervention groups

Change	Group		Row Total
	Control	Intervention	
positive (N)	5	11	16 (44%)
positive (N / row total)	0.31	0.69	
positive (N / column total)	0.25	0.69	
Column Total	20 (56%)	16 (44%)	36 (100%)

The percentage of participants in the intervention group (69%, 11 of 16) with improved CAS scores was greater than the percentage of participants in the control group (25%, 5 of 20) with improved CAS scores ($p = 0.016$, Fisher's exact test)

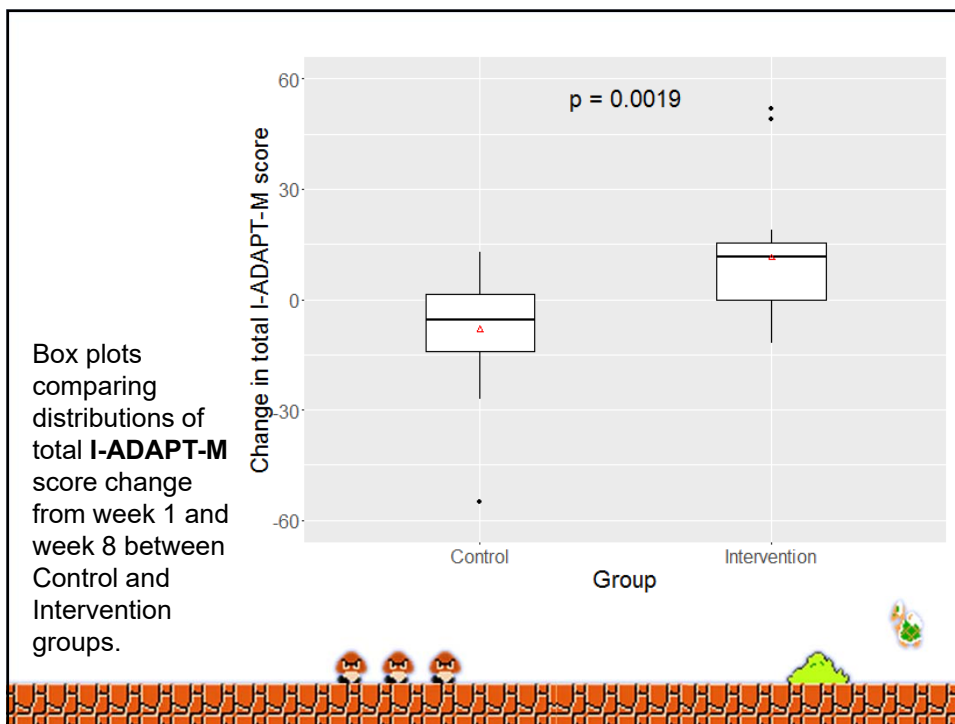
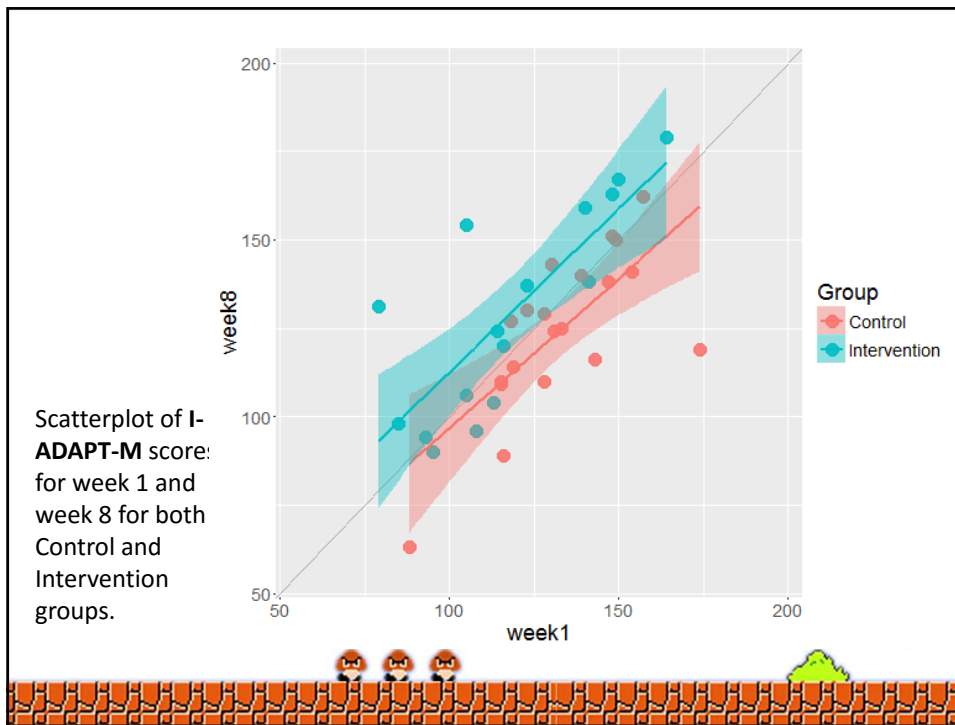




Summary of changes in Self-Perceived Communication Competence Scale scores for Control and Intervention groups

	Group		
Change	Control	Intervention	Row Total
positive (N)	13	13	26 (72%)
positive (N / row total)	0.50	0.50	
positive (N / column total)	0.65	0.81	
Column Total	20 (56%)	16 (44%)	36 (100%)

The percentage of participants in the intervention group (81%, 13 of 16) with improved SCCS scores was greater than the percentage of participants in the control group (65%, 13 of 20) with improved SCCS scores ($p = 0.24$, Fisher's exact test)



Summary of changes in I-ADAPT-M scores for Control and Intervention groups

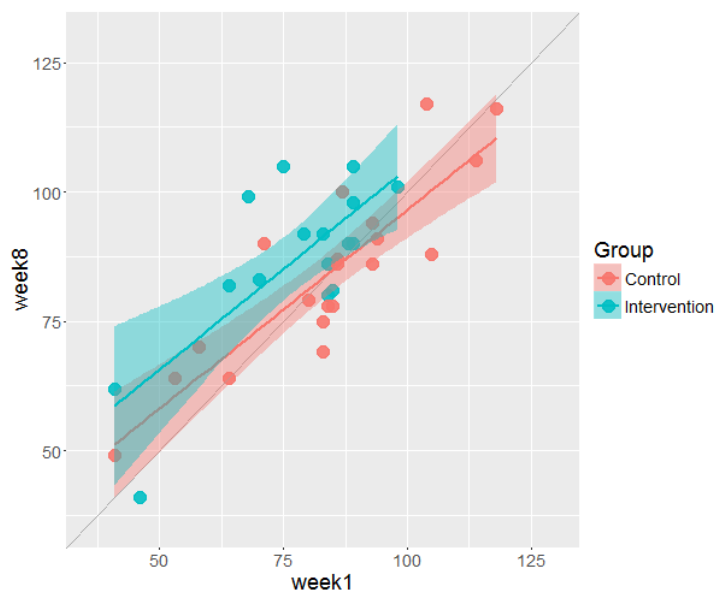
	Group		
--	-------	--	--

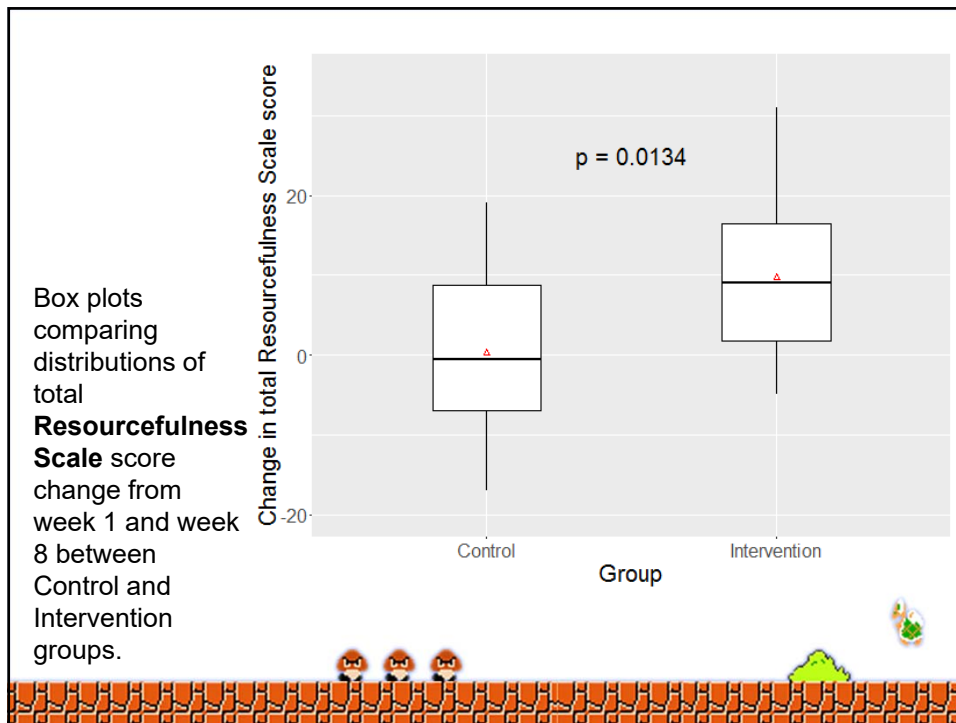
The percentage of participants in the intervention group (75%, 12 of 16) with improved I-ADAPT-M scores was greater than the percentage of participants in the control group (40%, 8 of 20) with improved I-ADAPT-M scores ($p = 0.03$, Fisher's exact test)

positive (N / row total)	0.40	0.60	
positive (N / column total)	0.40	0.75	
Column Total	20 (56%)	16 (44%)	36 (100%)



Scatterplot of **Resourcefulness Scale** scores for week 1 and week 8 for both Control and Intervention groups.





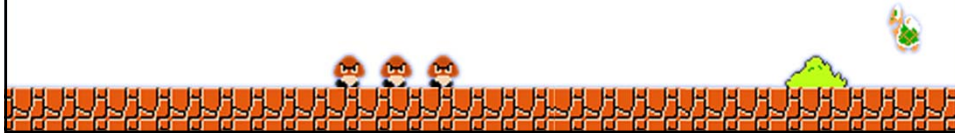
Summary of changes in Resourcefulness Scale scores for Control and Intervention groups

	Group		
	Control	Intervention	Total
positive (N / row total)	8 (40%)	13 (81%)	21 (58%)
Column Total	20 (56%)	16 (44%)	36 (100%)

The percentage of participants in the intervention group (81%, 13 of 16) with improved Resourcefulness Scale scores was greater than the percentage of participants in the control group (40%, 8 of 20) with improved Resourcefulness Scale scores ($p = 0.014$, Fisher's exact test)

Interviews

- Asked questions including:
 - Did you enjoy the sessions? Was two hours per week too much or too little, or about right?
 - Do you think the games we played might have helped develop any skills or competencies?
 - Could you see games being played more widely at university? Would there be any value in this?
- Currently being analysed...



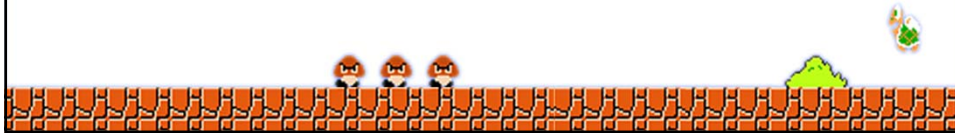
Challenges

- Hawthorne effect?
- Effect of me playing along?
- Repeated testing?
 - Fall in control group scores?
- PC gaming literacy
- Internet access
- Recruitment and retention
 - 50 -> 36 -> 20 (control); 50 -> 36 -> 16 (intervention)



Summary

- Pre- and post-test results indicate significantly improved gains on three of four measures for the intervention group versus the control, with differences of between 0.9 and 1.15 standard deviations in test scores. 95% confidence intervals calculated for the difference between mean scores for the control and intervention groups did not cross zero, further supporting the idea that playing video games may be beneficial to students.



Future Work

- Qualitative analysis of interview material
- Follow-up study: large-scale observational survey of student game-playing habits plus graduate attribute tests
- Future (future) work: replicate the experiment, ideally with larger and more diverse cohort



Thanks!

- Any questions?
@hatii_matt

