Collaborative and individual learning in an augmented reality escape room game

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AR Escape Room Games

- **AR** = Computer-supported extension of the reality (Azuma et al., 2001)
- **Escape Room Games (ERG)** = Narrative-based live-action games where players discover clues and solve puzzles in a limited amount of time to break out of one or more rooms (Nicholson, 2015)

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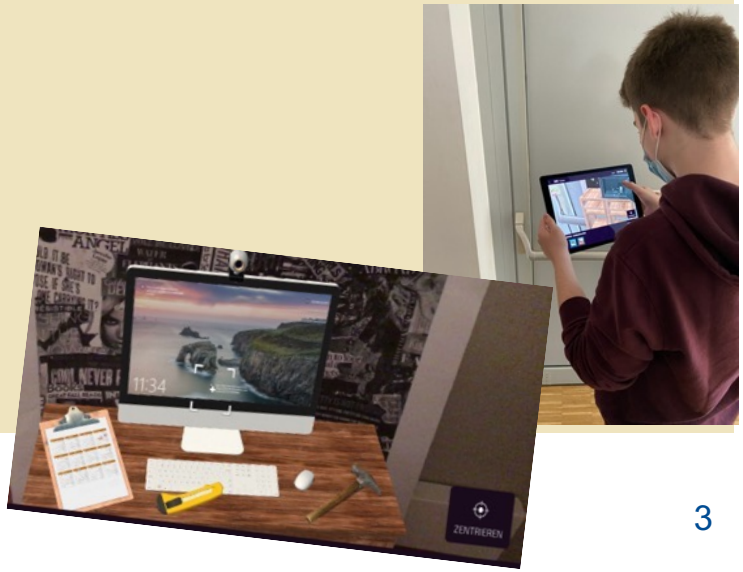
- Combination of **AR** and **ERG**:
  - Immersive-hybrid learning space (Veldkamp et al., 2020)
  - High emotional involvement (Borrego et al., 2017; Eukel et al., 2020)
  - Cognitively demanding (Clauson et al., 2019; Hermanns et al., 2017)



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Immersion

- [..] a multi-level continuum of cognitive and emotional involvement […] (Georgiou & Kyza, 2018, p. 174)
- Three levels: Engagement, Engrossment, Total Immersion (Georgiou & Kyza, 2017)

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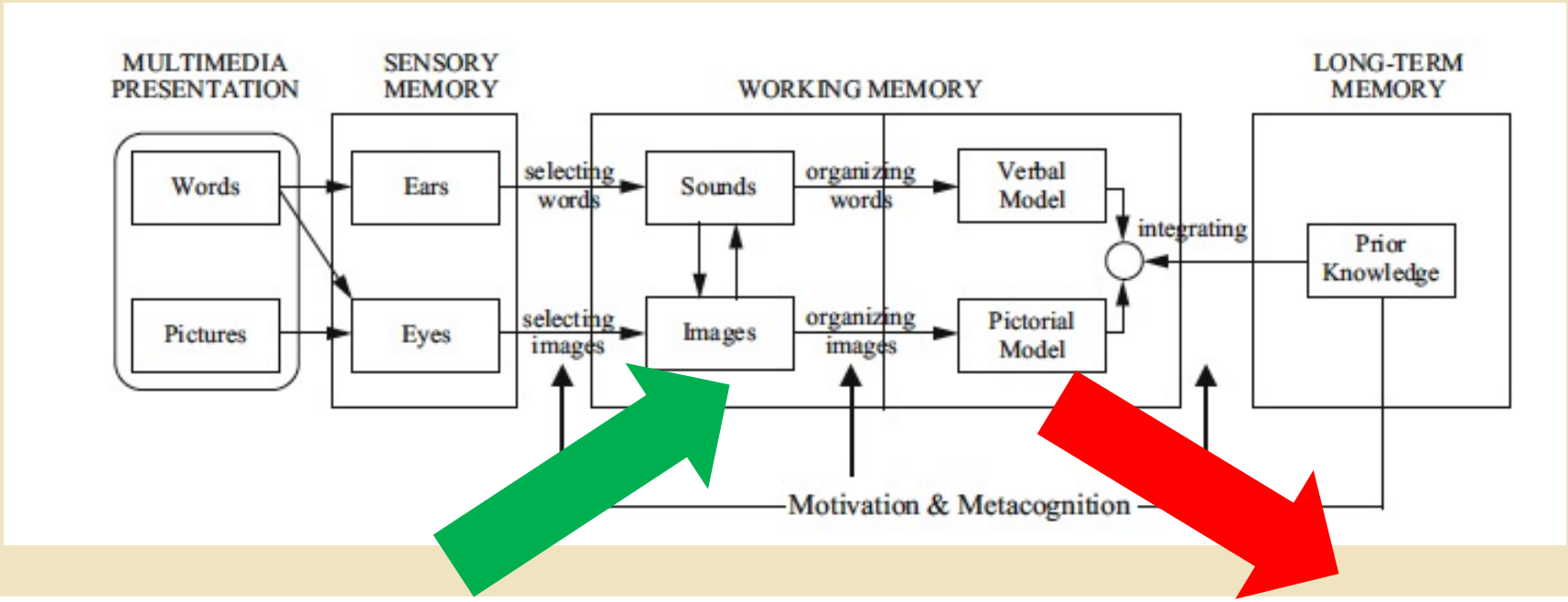
- Three levels: Engagement, Engrossment, Total Immersion (Georgiou & Kyza, 2017)
- Impact on learning?
  - High immersion ↗ (Georgiou & Kyza, 2018)
  - Engagement only ↗ (Cheng et al., 2017)
  - High immersion ↘ (Mayer, 2020; Parong & Mayer, 2018)

Theoretical Background

CTML / CATLM (Mayer, 2014; Moreno & Mayer, 2007)



fosters… **Immersion** hinders…

Aim of the study

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Contribute to the research base

- ***Can collaborative learning influence the experience of immersion to foster learning in an immersive learning environment?***
- Collaborative learning as a scaffold (Kirschner et al., 2014, 2018)
  - Higher knowledge acquisition
  - Better on solving application tasks
  - Lower experience of immersion

Method

Randomized field experiment

- 60 students, 33 girls, M_{age} = 15.6 (*SD* = 1.7)
- Learning how to detect fake news on the Internet
- AR Escape Game: *Escape Fake* (Paraschivoiu et al., in press)

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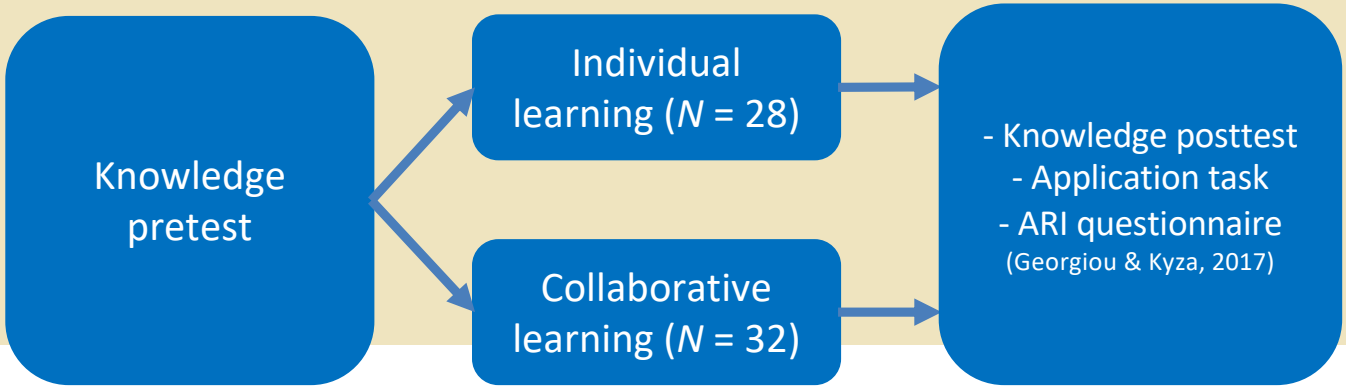

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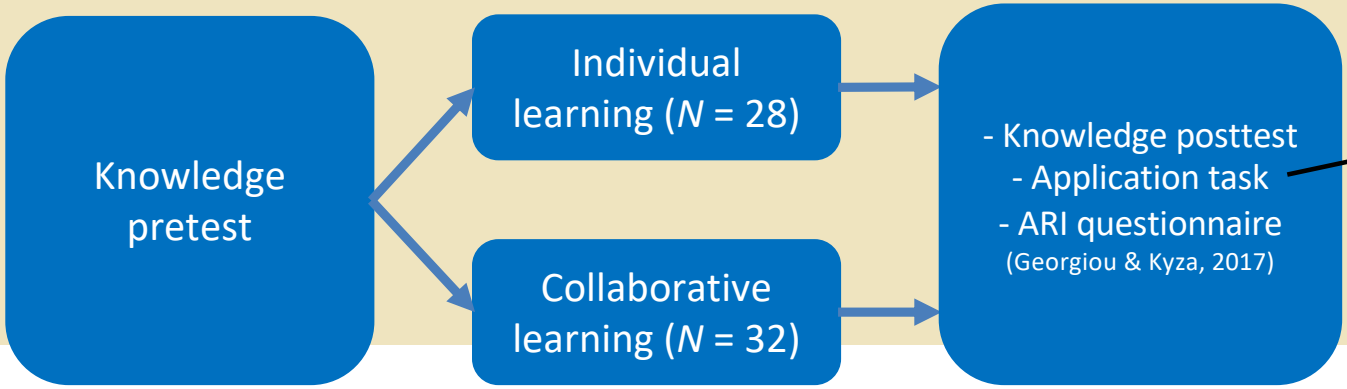

Evaluation of simulated social media postings

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Learning outcomes

	Individual learning		Collaborative learning		*t*(58)	*p*	*d*
	M	SD	M	SD			
Knowledge pretest	3.61	2.10	4.19	1.53	-1.23	0.22	-
Knowledge posttest	6.04	2.12	7.09	0.96	2.55	**0.014**	0.66
Application task	5.84	0.59	5.73	0.47	0.82	0.42	-

Results

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Immersion

	Individual learning		Collaborative learning		*t*(58)	*p*	*d*
	M	*SD*	*M*	*SD*			
Engagement	5.70	0.78	5.30	0.97	-0.41	0.09	-
Engrossment	5.59	1.14	4.60	1.00	-3.61	**0.001**	0.94
Total Immersion	4.45	1.36	3.51	0.89	-3.22	**0.002**	0.83

Results

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Immersion

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Discussion, limitations & future research

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- Support for *the immersion principle* in multimedia learning (Mayer, 2020)
- Collaboration as a form of guidance in immersive learning environments
  (e.g., like a generative learning strategy in Parong & Mayer, 2018)
- Application task to easy? (F. Kirschner et al., 2011)
- Focus on individual learning outcomes vs. group learning outcomes
  (F. Kirschner et al., 2009; Plass et al., 2013)
- How is immersion related to learning objectives? (Makransky & Petersen, 2021)

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