

# IMMERSIVE TRAINING

A Pilot Study on the Use of Immersive Technologies  
in the teaching of Automotive Technology Students

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# IMMERSIVE TRAINING

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- Which possibilities hold **immersive technologies** for educational & training purposes?
- Collaboration between **Thomas More** (Memori & Applied Psychology) & **Howest** (Digital Arts & Entertainment)
- Collaboration with workfield & partners  
→ case-studies in authentic situations

# IMMERSIVE TECHNOLOGIES

## Types

- Virtual Reality = submersion in a complete virtual world
- Augmented Reality = adding digital layers upon reality
- Mixed Reality = mixing elements of VR & AR

## Examples

VR: [Free roam VR games](#)

AR: Pokémon Go!

MR: watching [360° videos](#) with VR headset



# Using immersive technologies in the teaching & training of automotive technology students

A pilot study

# STUDY DESIGN

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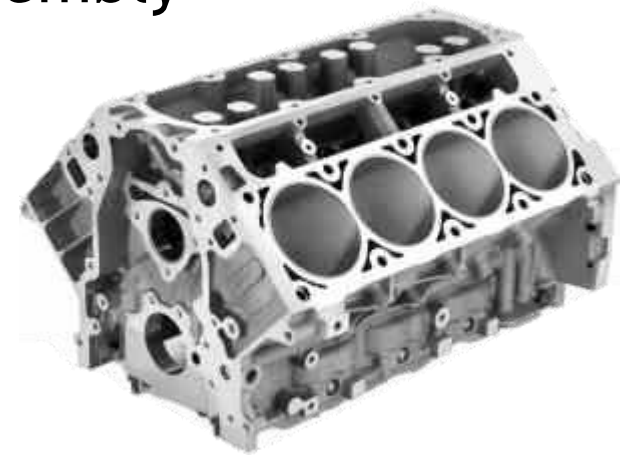
- N = 84 students of Prof. Bachelor Automotive Technology
- 7-step assembly of an engine bottom block

Goals: students know **the parts** of a motor bottom block

students know **the tools** needed to assembly a motor bottom block

students know the (order of) **steps** needed for assembly

→ **knowledge** > skills



# STUDY DESIGN

## Between-subjects conditions

**Traditional**  
PowerPoint with  
*static recordings* of 360°  
video clips  
  
No user interaction  
“play-and-watch”  
  
N = 29

**360° video**  
Oculus Go with  
*360° video clips*  
in *real life* garage  
  
Using eye gaze to interact  
with environment  
  
N = 26

**VR**  
HTC Vive headset  
with video clips  
in *virtual* garage  
  
Using 2 HTC Vive  
controllers to interact  
with environment  
  
N = 29

**Similar content across conditions**  
tools - parts - assembly demonstration

# STUDY DESIGN

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Stap 3  
Zuigers plaatsen

# STUDY DESIGN

## ➤ Knowledge-based test

*Outcome measurements*

- Describe the assembly steps in the correct order
- Is this piece (picture) part of the engine bottom block? If so, name this piece

## ➤ Previous experience?

- with technology
- with topic

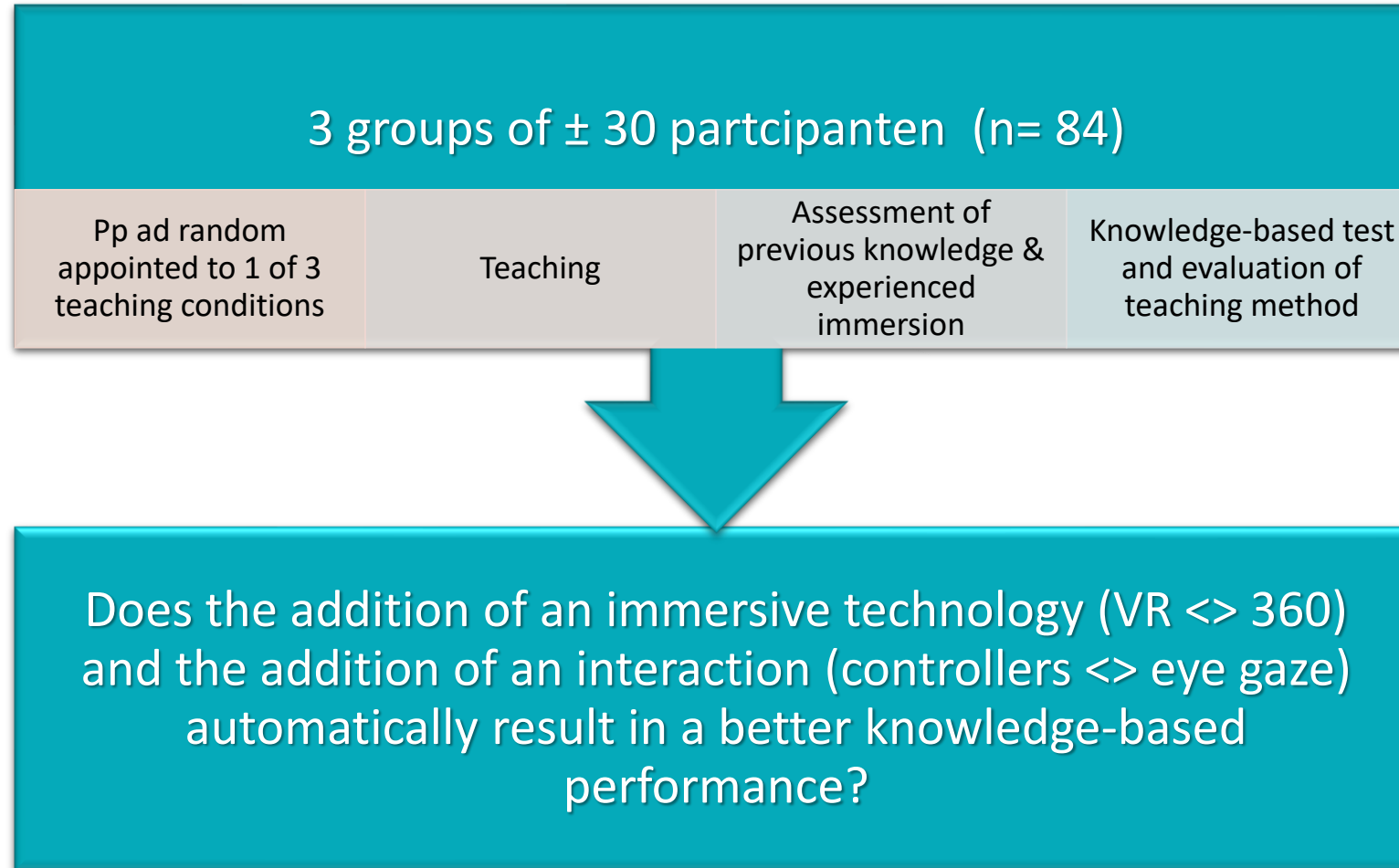
## ➤ IPQ (NL) - subjective sense of being in virtual environment

- Spatial presence
- Involvement
- Experienced realism

*covariates*

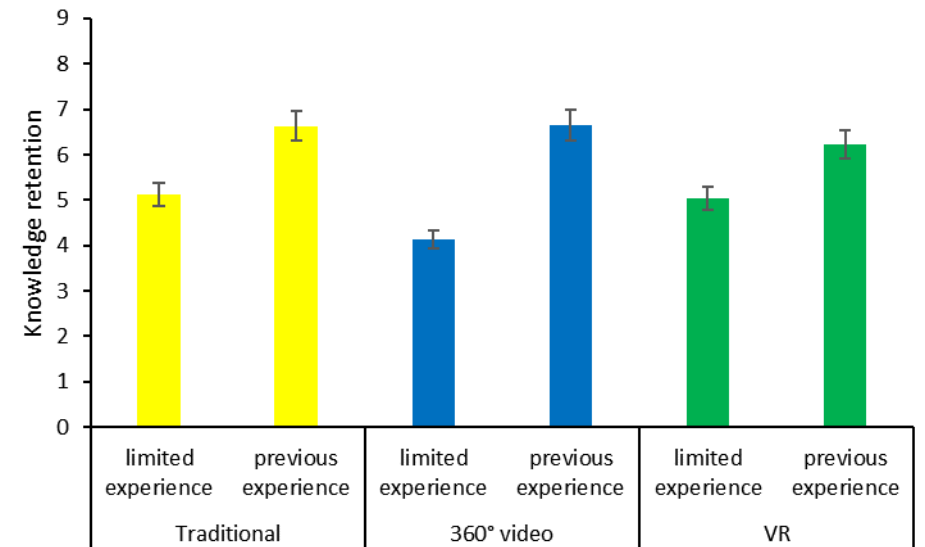
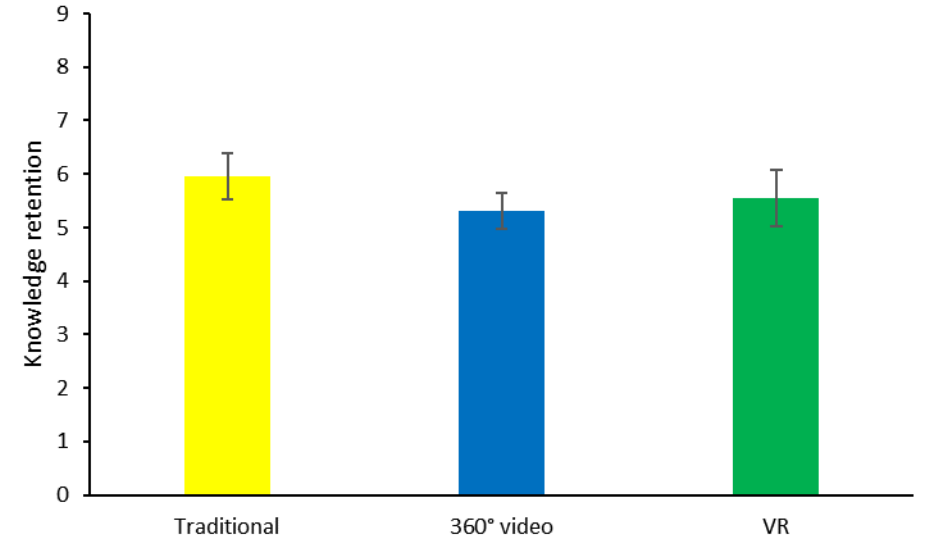


# STUDY DESIGN: SUMMARY



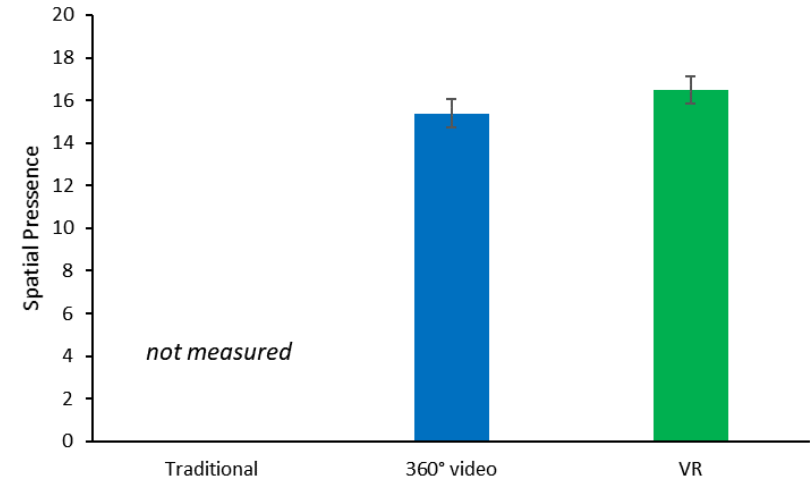
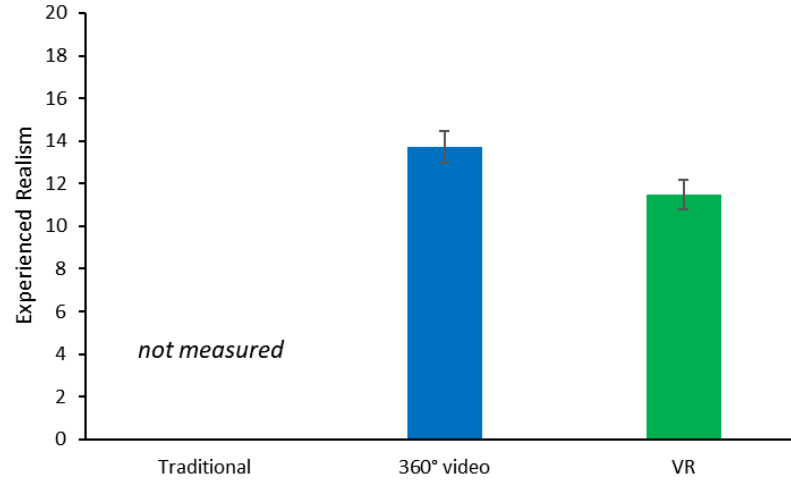
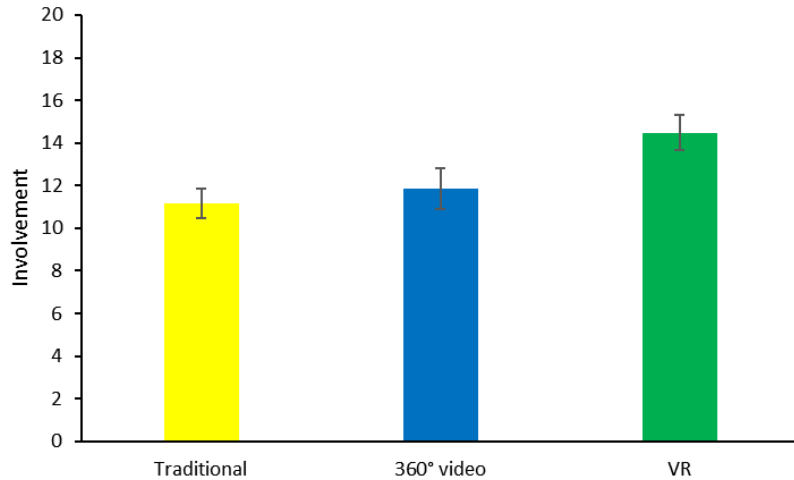
# RESULTS

- No significant differences between teaching methods  
→ similar knowledge retention scores
- Previous experiences?
  - Previous experience with technology: no impact (!! limited number of students n = 10)
  - Previous experience with topic: significant impact, but no interaction



# RESULTS

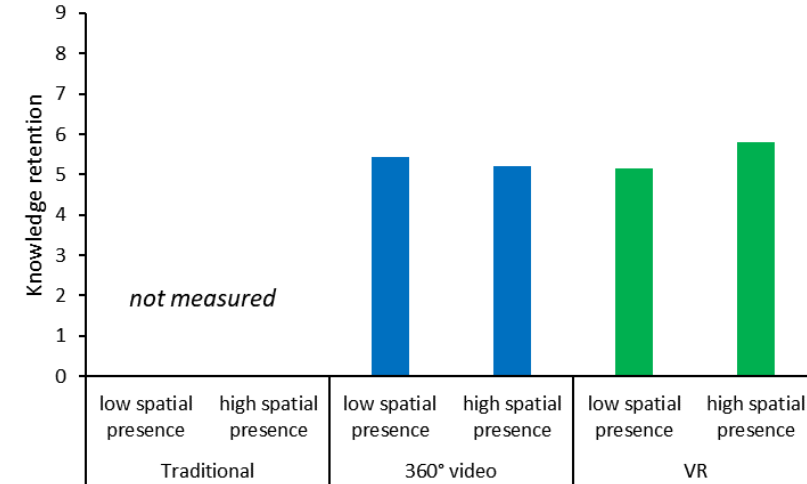
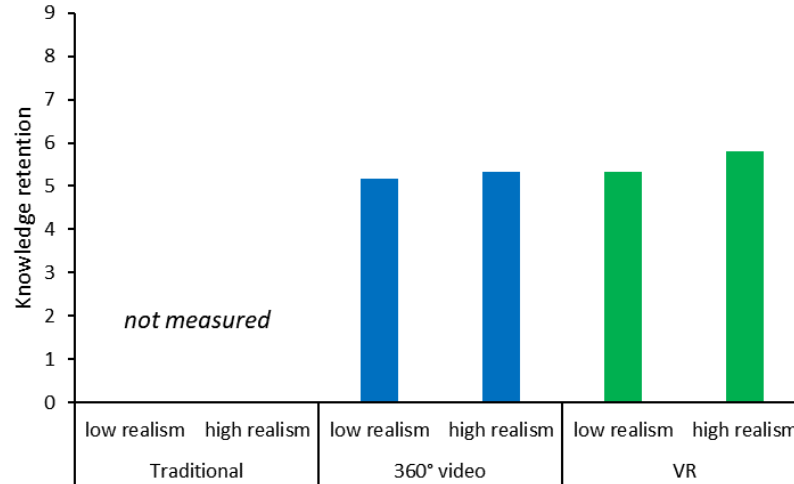
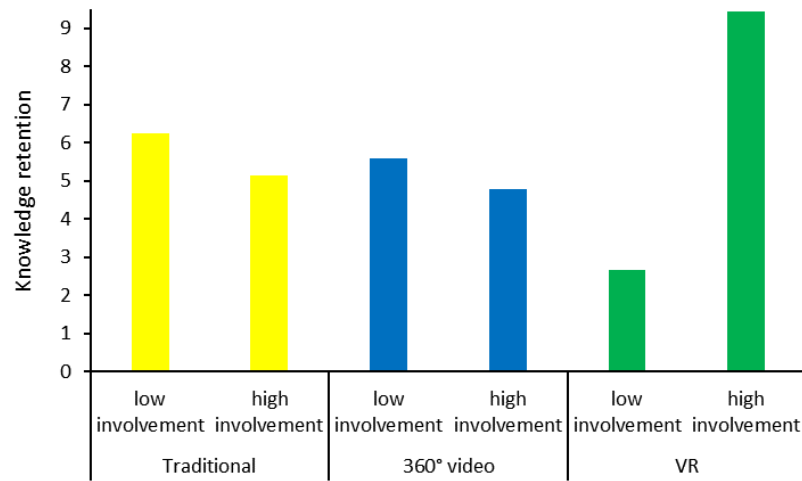
- Subjective feeling of being in virtual environment (IPQ)?



- Stronger **involvement** for VR > other methods
- 360 videos experienced as more **realistic** than VR
- No difference between VR & 360 videos for **spatial presence**

# RESULTS

- Impact of IPQ on knowledge retention?



- For VR-condition only: involvement required for (better) knowledge retention
- Experienced realism had no impact on knowledge retention
- Spatial awareness had no impact on knowledge retention

# RESULTS: SUMMARY

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- No difference in knowledge retention for the three methods
- Adding an immersive component or adding interaction does not automatically lead to better knowledge retention
- Experienced realism & spatial awareness had no impact on knowledge retention
- Getting your students involved in the virtual world, seems to be a requirement for getting knowledge retention results
- Individual differences in IPQ  
= necessity of teaching differentiation (especially for VR)

“We can rebuild him;  
we have the technology”

*Oscar Goldman,  
“Six Million Dollar Man”*

# IMMERSIVE TECHNOLOGIES IN EDUCATION

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## Switching over to a fully digitized educational/training system?

- Could we?     Yes
- Should we?
  - Immersive technologies are *tools*
  - Goal: transferring meaningful skills & knowledge
  - ***Authentic learning with immersive technologies***
    - Involvement (especially for VR)
    - Experienced realism
    - Spatial presence