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The VR Classroom

A Hands-On Experience for Learning and Teaching in Immersive Virtual Reality

Prof. Dr. Matthias Wölfel & Daniel Hepperle

INGENIUM Alliance of European Universities - ERASMUS-EDU-2022-EUR-UNIV-2 | Project number: 101090042

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About me

Head of the Institute for Intelligent Interaction and Immersive Experience

Professor for Intuitiv and Perceptive Interfaces at the Faculty of Computer Science, University of Applied Sciences Karlsruhe

Associated Professor at the Faculty of Natural Sciences at the University of Hohenheim

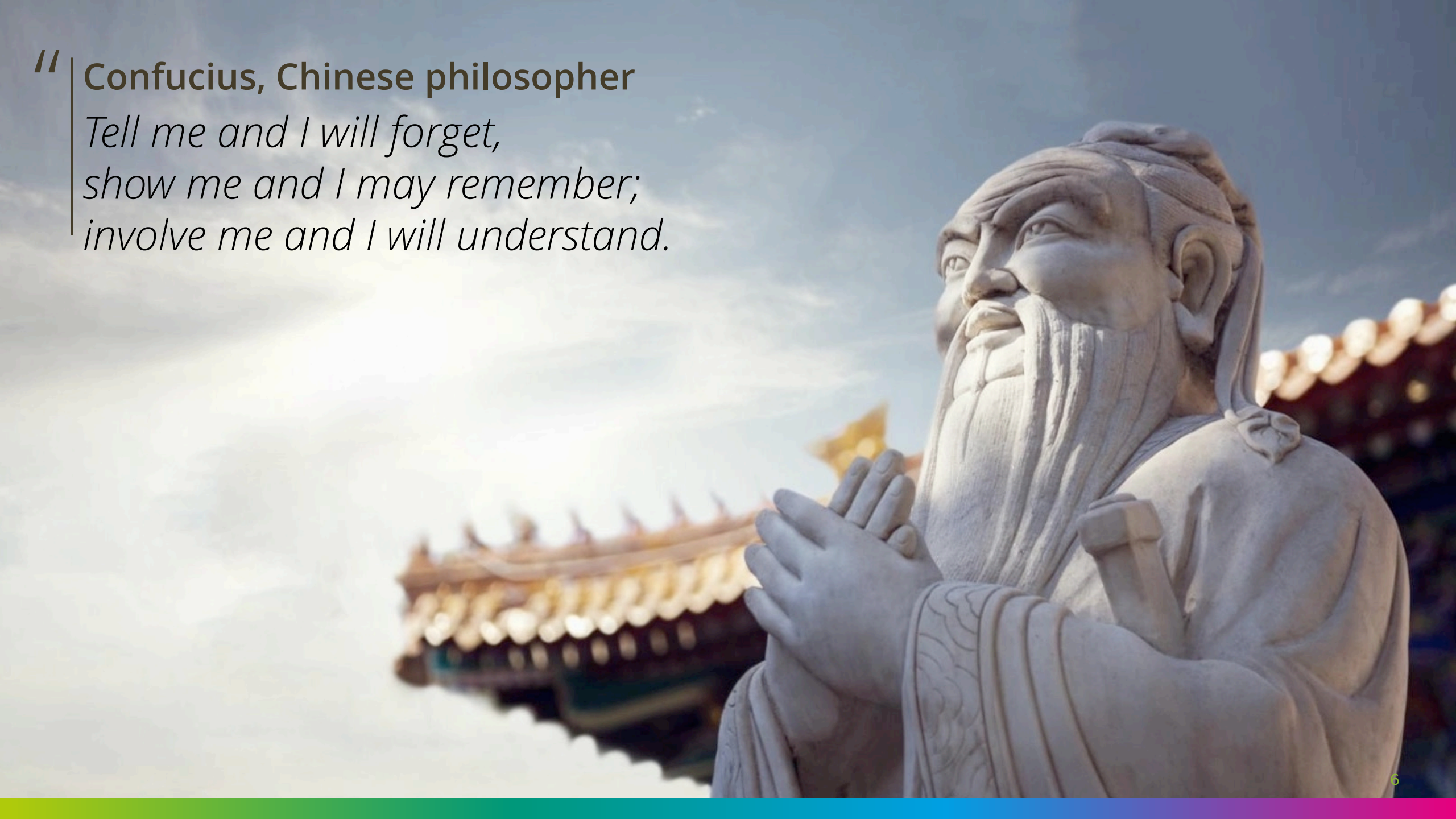
More Information:
https://www.h-ka.de/iiix/profile

iXperience Lab

Experience a virtual balloon flight over Karlsruhe in 1834.

The installation "Super Nubibus" was on display at the ////////I<III.

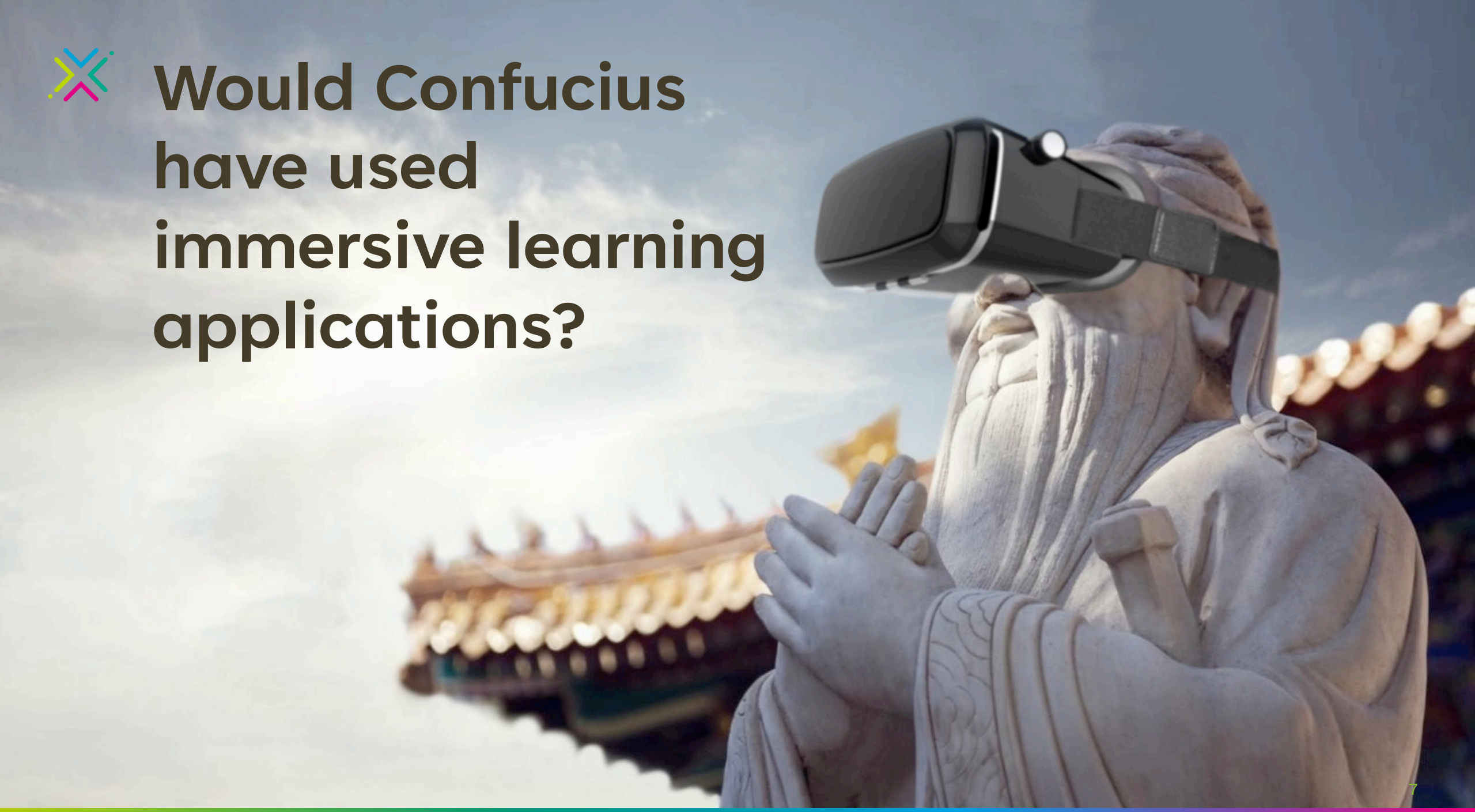
Exhibition in Venice



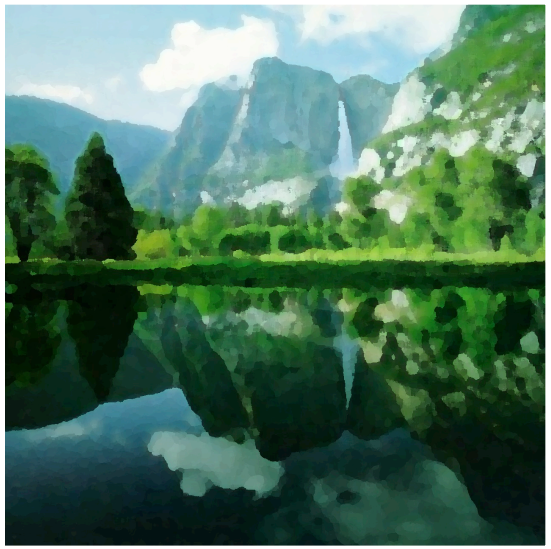
Confucius, Chinese philosopher

Tell me and I will forget,
show me and I may remember;
involve me and I will understand.

Would Confucius have used immersive learning applications?



Dimensions of Reality



physical reality

mixed reality

virtual reality

mental reality

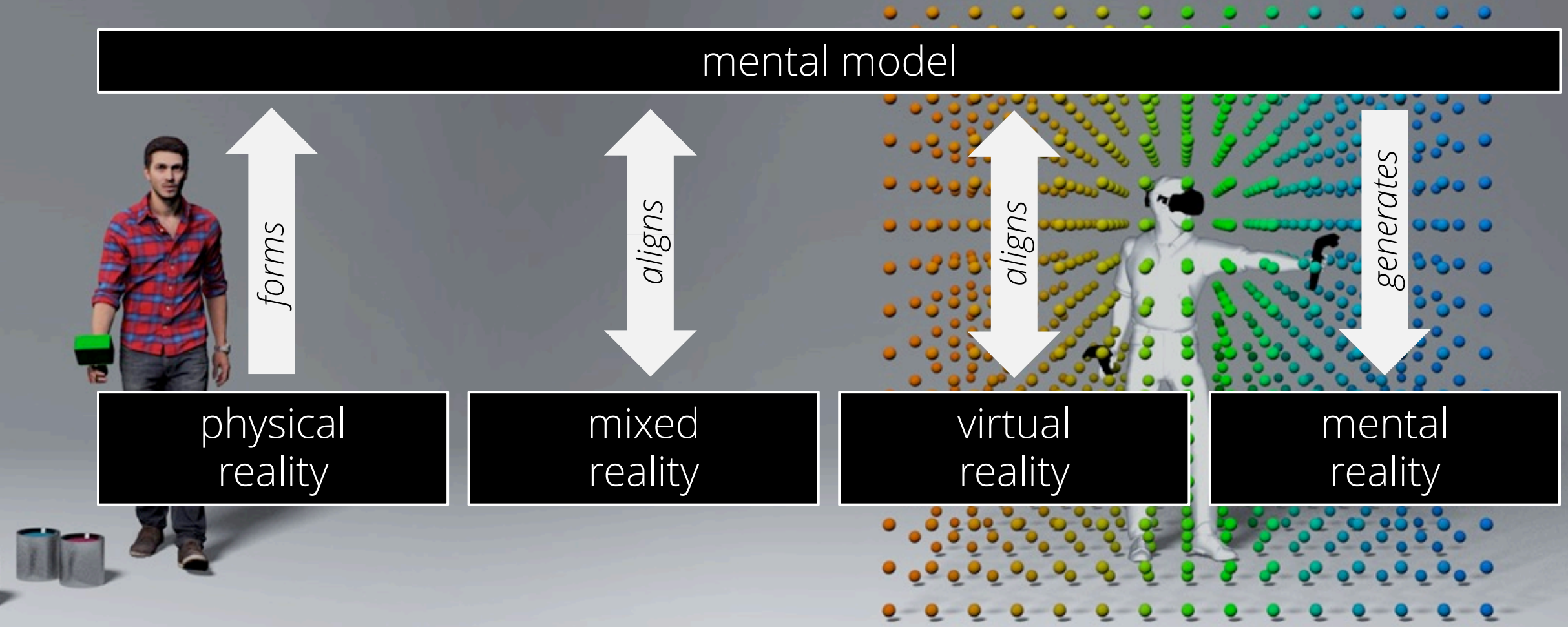
Mental Model

mental model

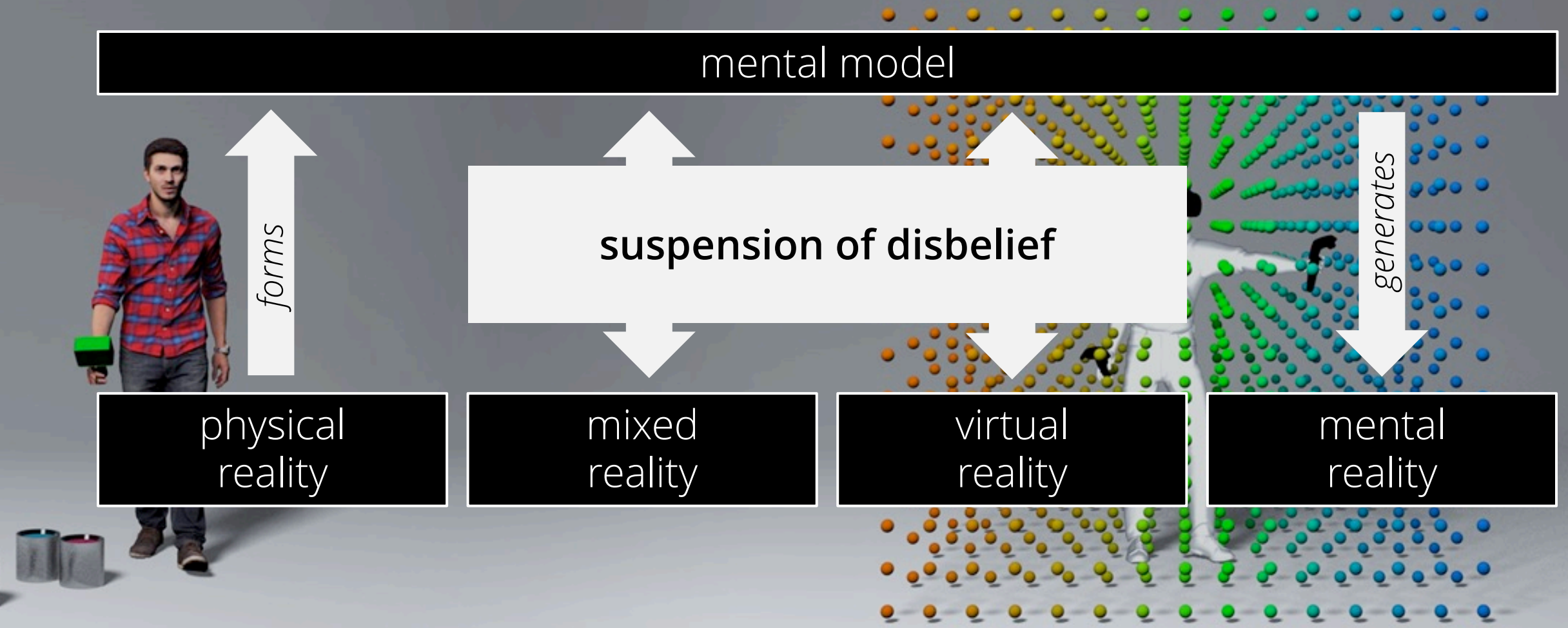
A mental model is a simplified model of the environment.
Only the relevant aspects of the environment (physical reality) are represented in the mental model.

physical reality	mixed reality	virtual reality	mental reality

Mental Model



Mental Model

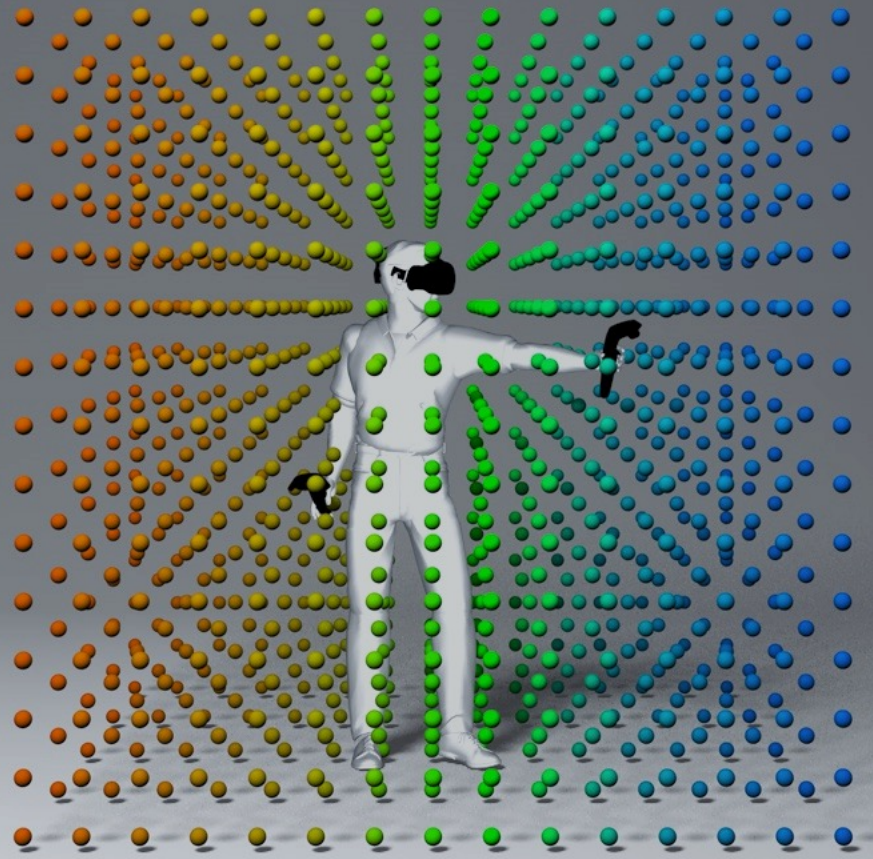


G

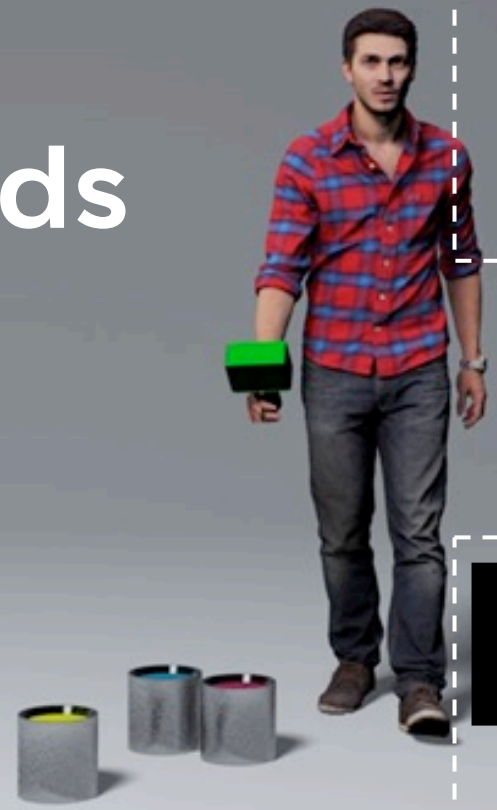
A

P

There are still many differences!



Link between the Worlds



mental model
of the real application

mental model of the application

deduces

adapts

apply

mental model
of the virtual application

apply

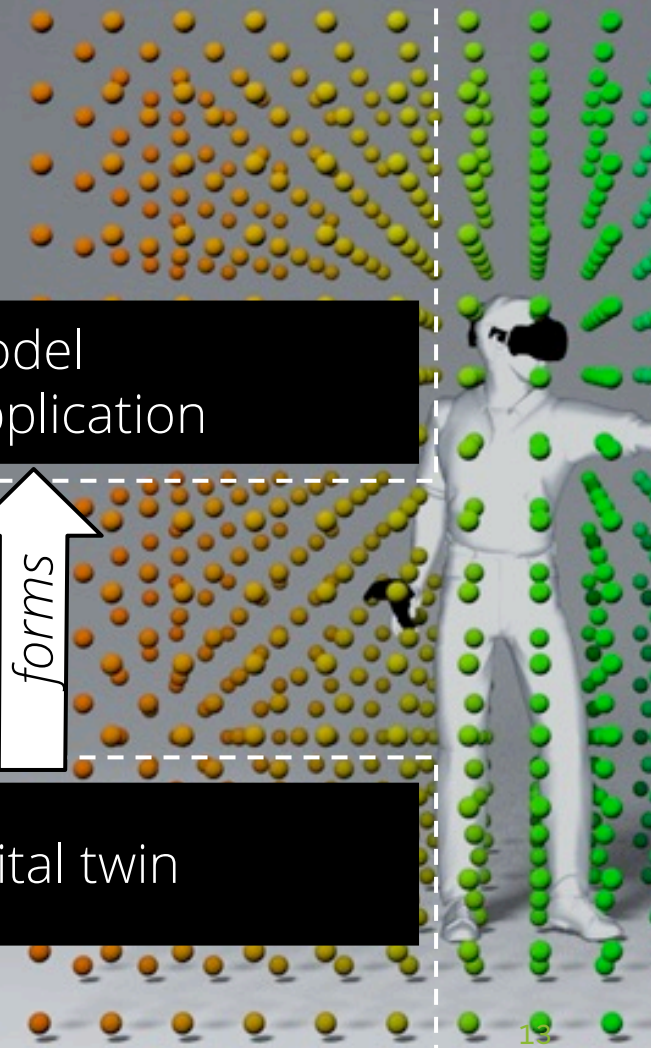
apply

forms

application

digital twin

Application



Internal and External Validity

It cannot be assumed that what is learned, or findings gained (e.g., in the social sciences), are directly applicable to the real world.

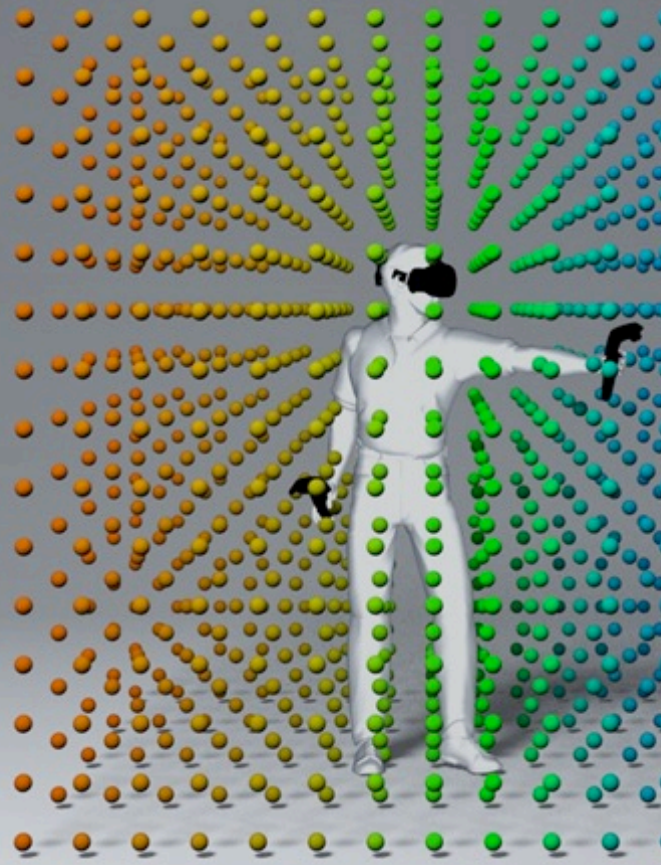
Examples:

- Skills can improve within a VR learning task, but skills decrease in real task.
- Behaviour is different as the VR is not perceived as beeing real.

Differences: Reality and Virtuality

These can be divided into:

- technology-related differences
- conceptual differences
- didactic differences



Technological Differences

In the near future, neither tactile perception nor self-perception can be established without considerable effort.

Examples:

- mismatch between sensory information can cause cyber sickness
- lack of physical replication reduces physical constrains and weight representation
- use of hand-hold controllers instead of free-hand interaction

Conceptual Differences

Interaction in virtual environments requires strategies that are either not needed or not possible in reality.

Strategies that are not possible but facilitate operation in virtual environments includes e.g. superhuman skills such as:

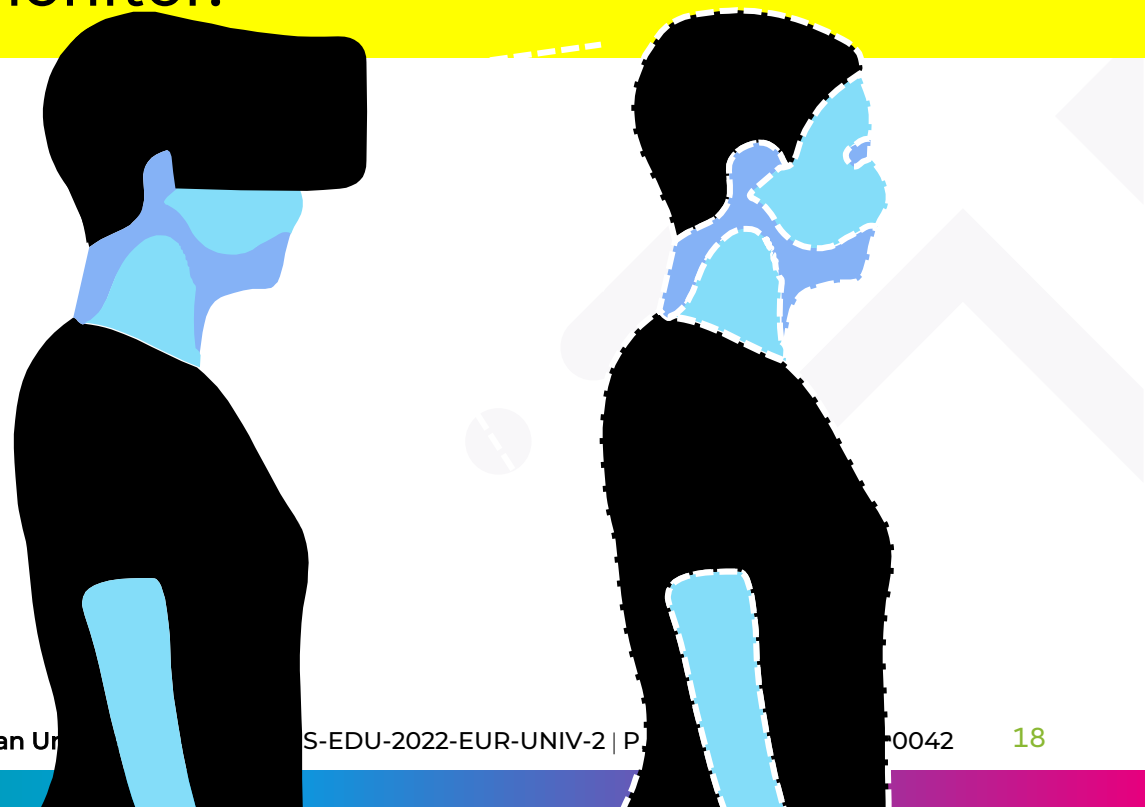
- Teleportation,
- Flying, or
- Manipulation of objects outside arm reach

Didactical Differences

Mixed reality enables the implementation of didactic concepts that cannot be realized in other forms of analog or computer-supported learning using a 2D monitor.

Examples

- the superimposition of information in real space,
- changes of perspective through "body ownership illusion"



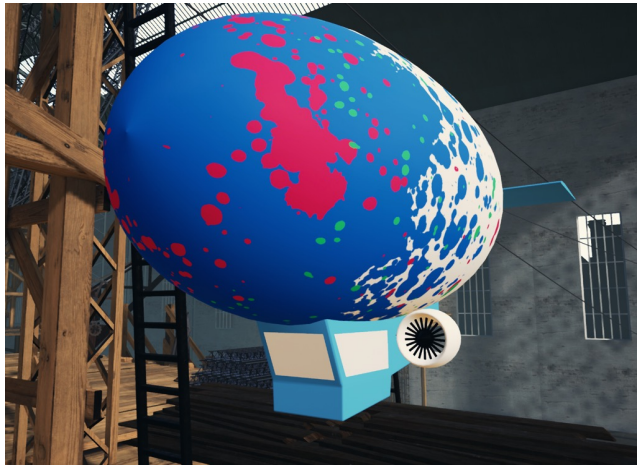
Agent-Mediated Communication

VR offers a variety of representation of embodied agents

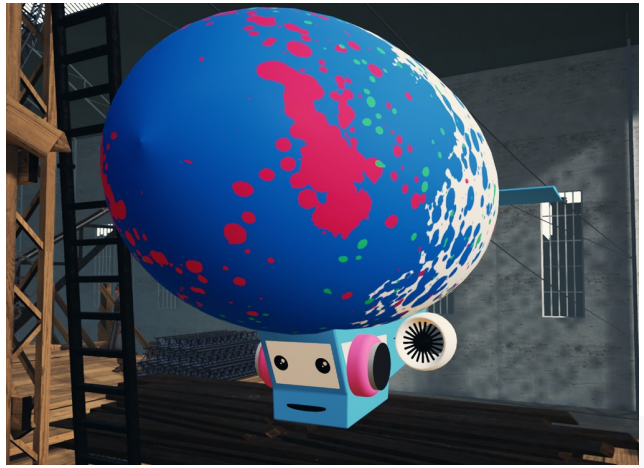
Customized agents depending on situation or narrative

Interaction concepts possible that only work in virtual world

Disembodied



Object



Anthropomorphic Object

Human

Live Facial Tracking

In Game Footage

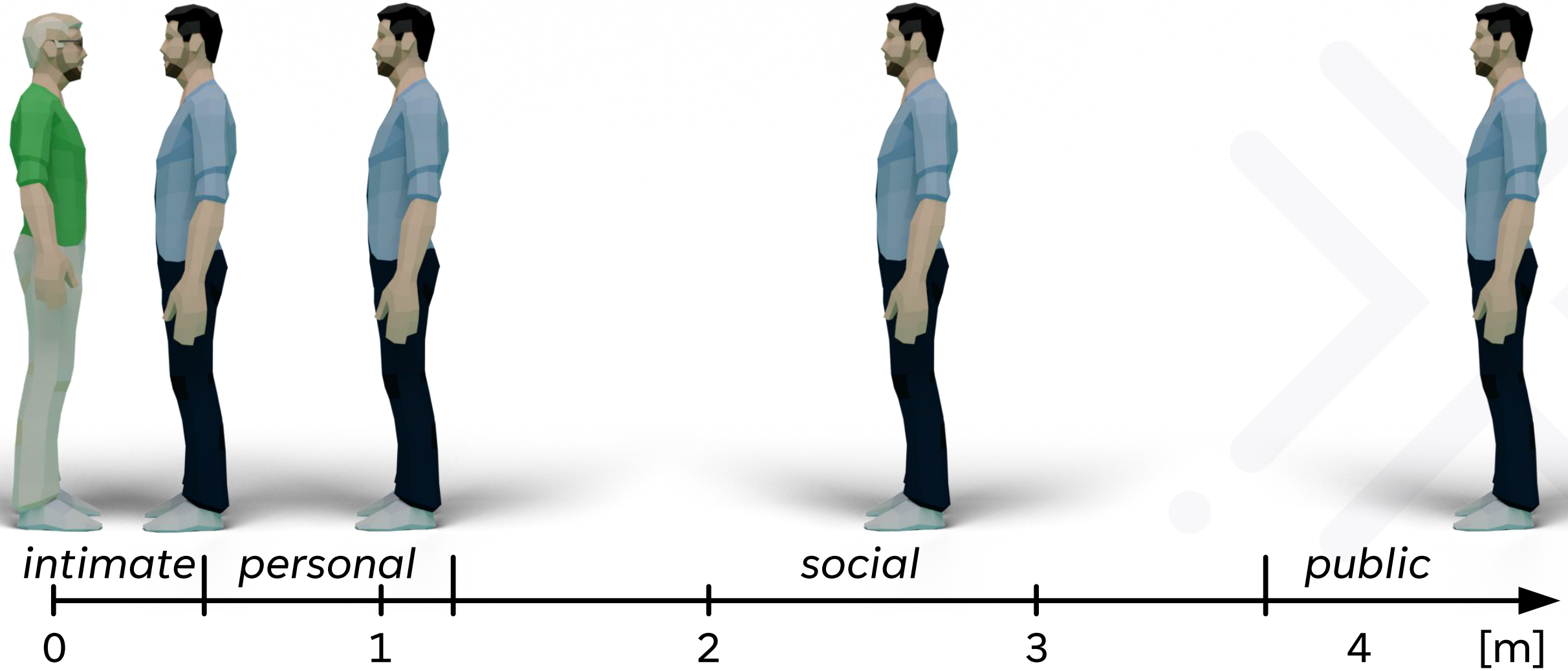
Agent-Mediated Communication

Presence is **not influenced** by the type of visual appearance of the agent.

Attractiveness is **partly influenced** by the type of visual appearance of the agent.

Sense of agency is **not influenced** by the type of visual appearance of the agent.

Proximity



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How embodied agents should respond to nonverbal behavior

head
shoulder right
shoulder left
elbow right
elbow left
torso
hand right
hand left
hip right
hip left
knee right
knee left
foot right
foot left

Individual Body Part Weights

Absolut Overall Weight

Record Gesture
Delete Gesture
Paste Gesture
Swap Gesture
Select Gesture
Paste Weights
Select Weights

motion speed:
not available

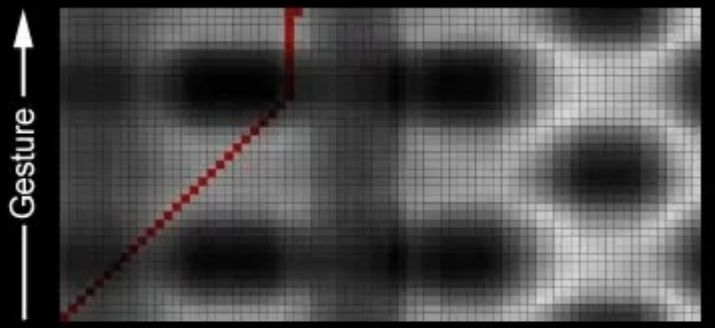
Frame Selection

Name: boxing

Normalize Orientation

kinetic lab

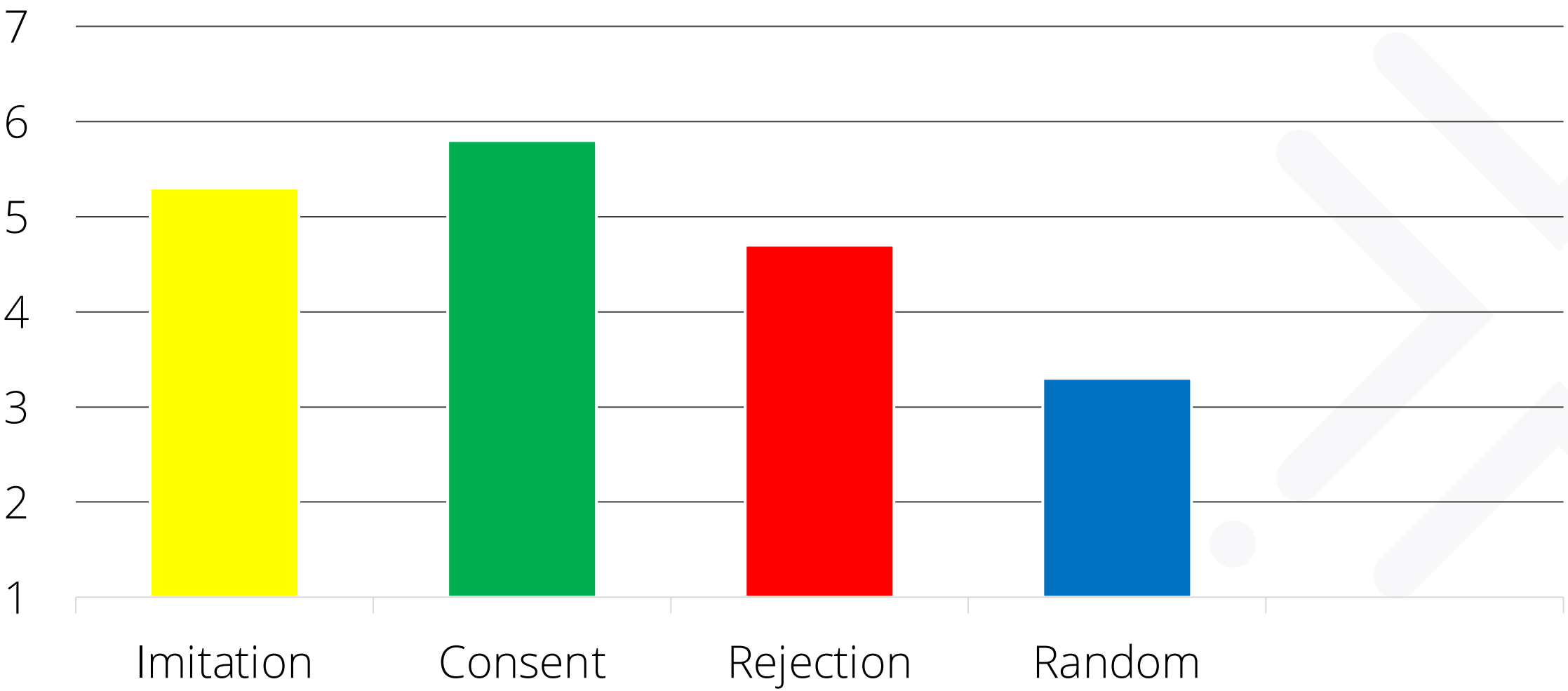
Current Persons



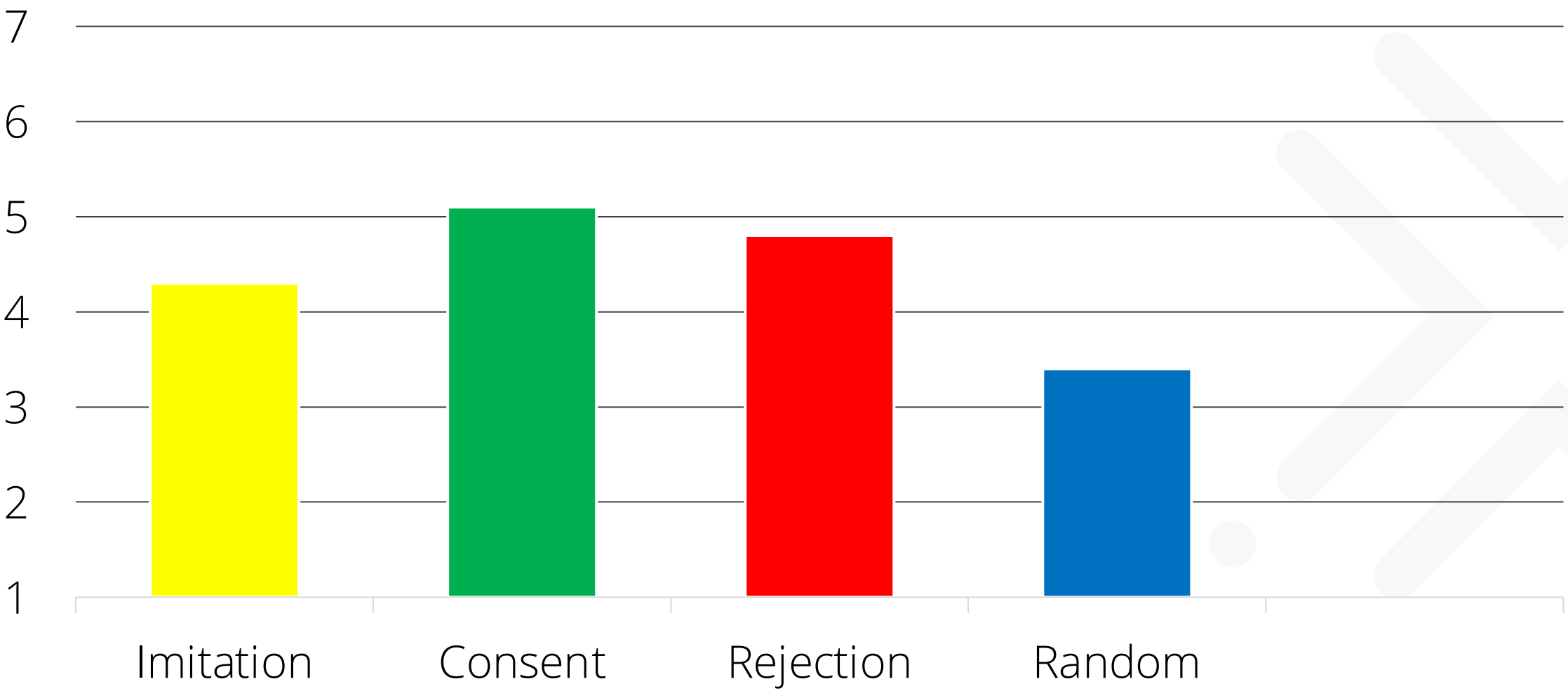
Current Gesture Match

Interaction on 180° screen

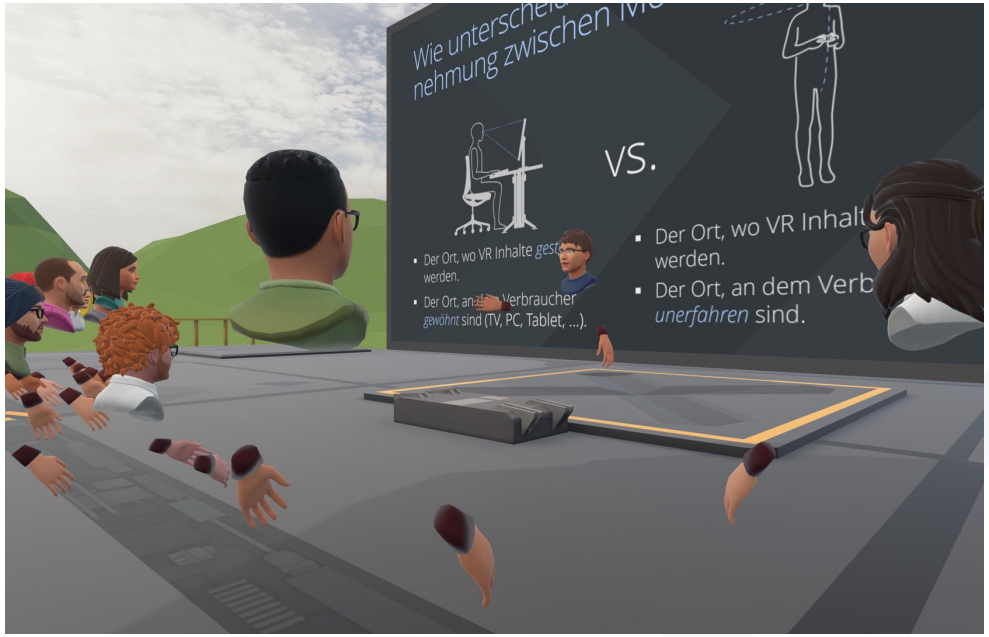
Perceived Sympathy



Perceived Social Competence



VR-Classroom



Social-VR application for lectures

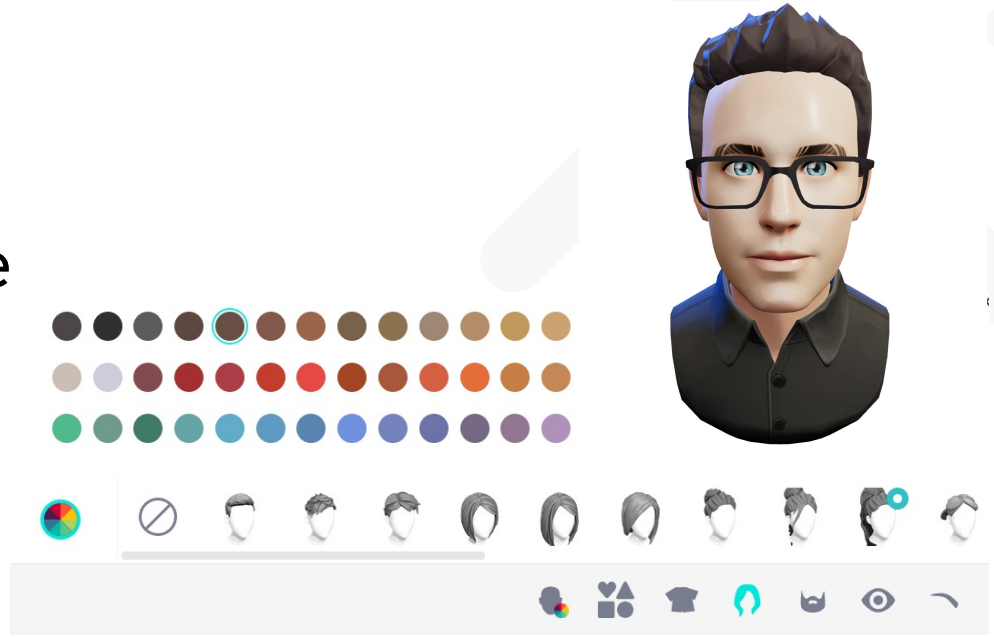
In-house development in Unity3D

DSGVO compliant, hosted on the state service bwCloud

PDF and OBJ interfaces

Personalized avatars via Ready Player Me

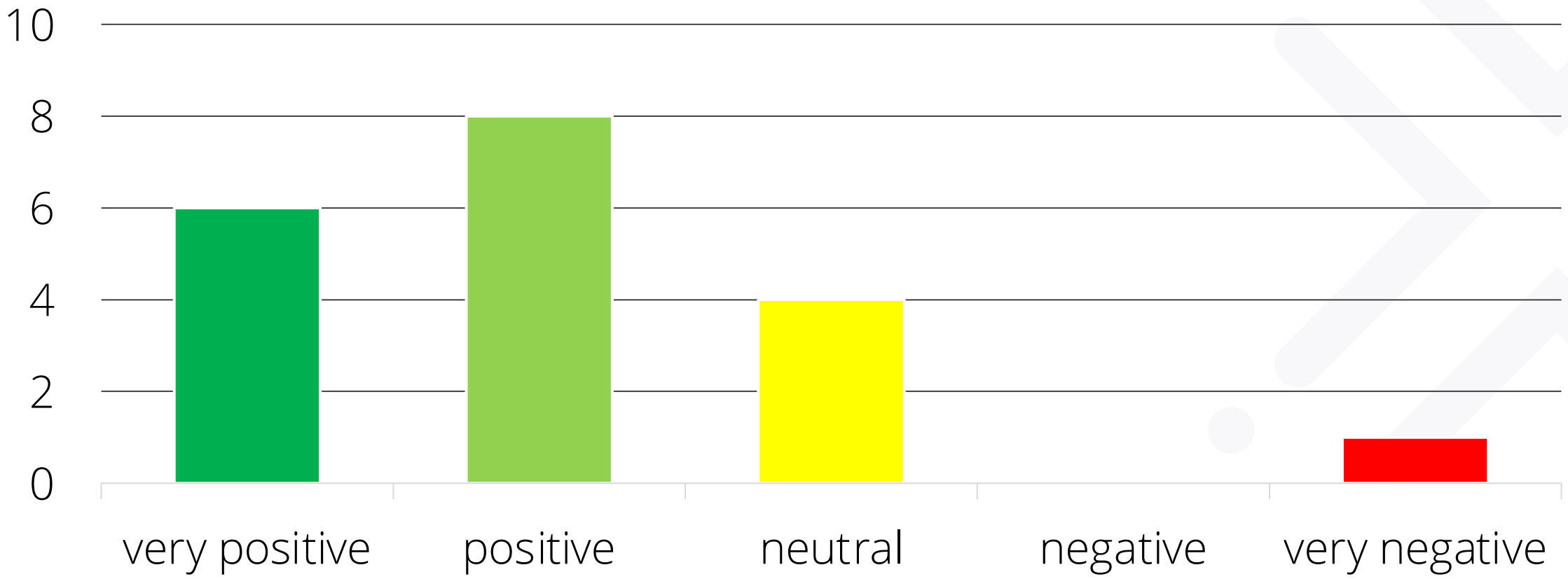
60 Meta Quest 2 are provided to the students to be used remotely



VR-Classroom


Remedy 01
The usage of static reference frames like a hat or a "nasum virtualis" was found to reduce cyber-sickness in some cases.

Learning in the VR-Classroom Provides Added Value for Me



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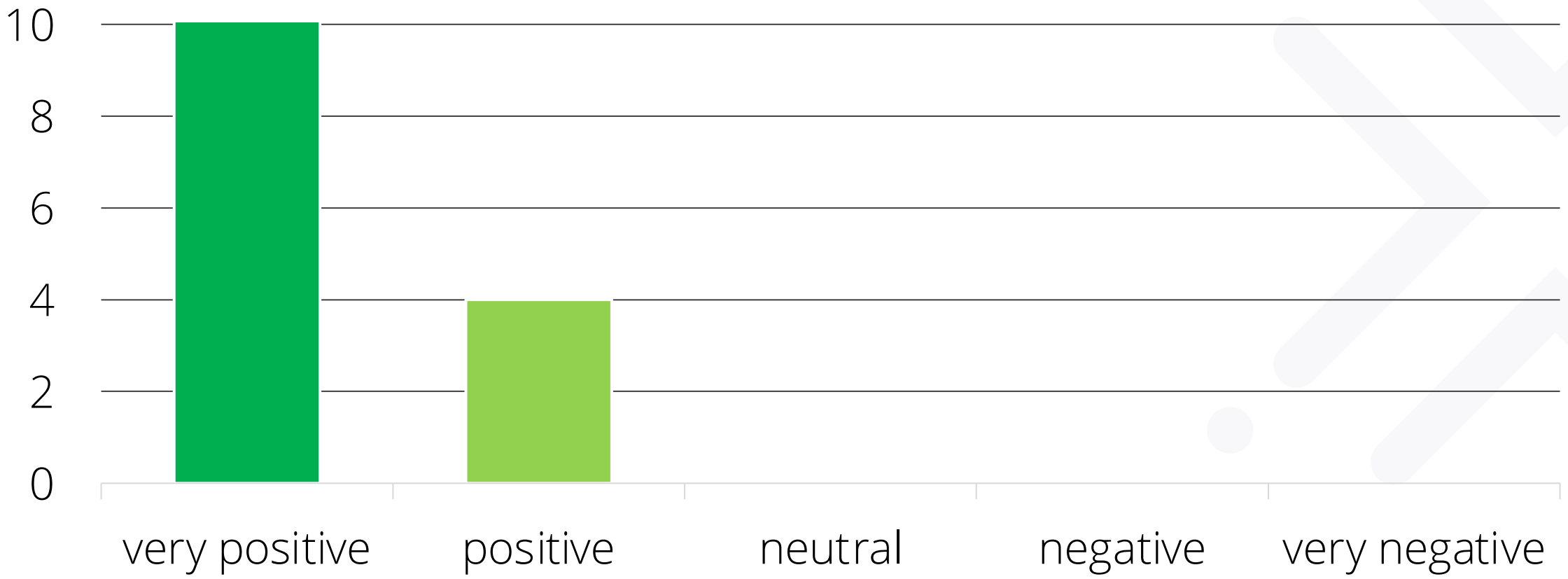
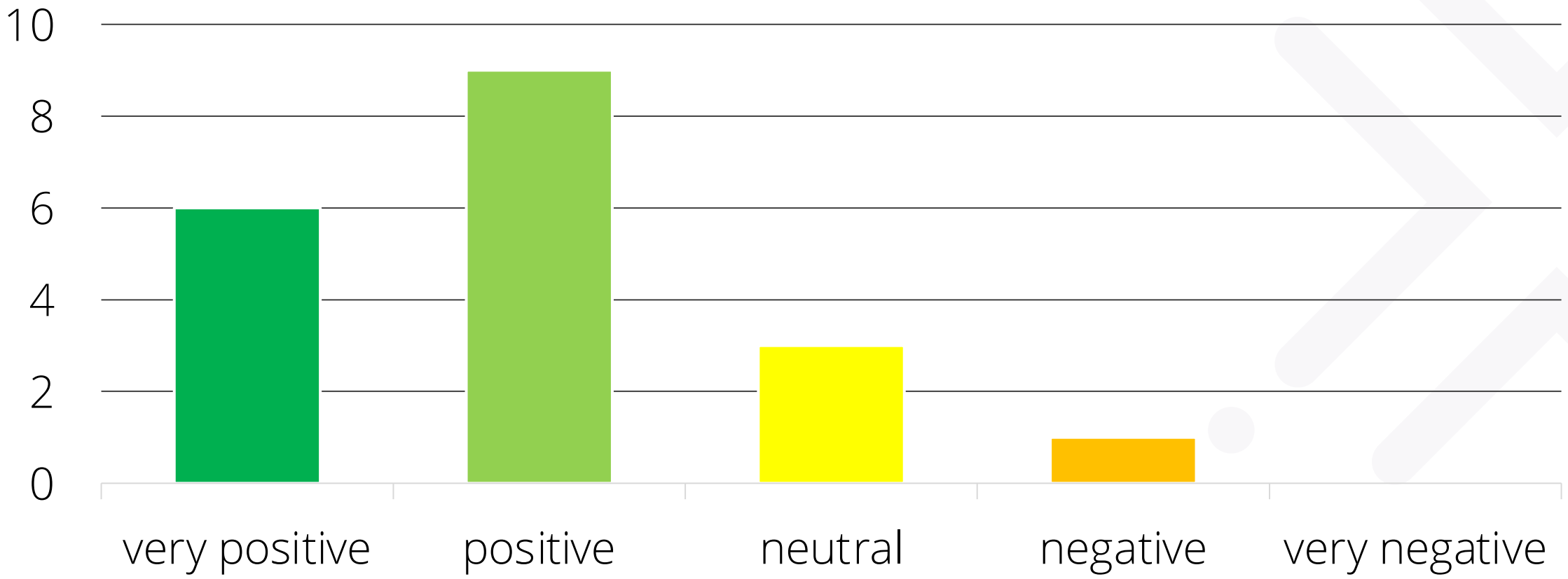
Presentation and Interaction in VR-Classroom Helps Me Understand Easier



The Teaching Content Shown in the VR-Classroom is Well Chosen



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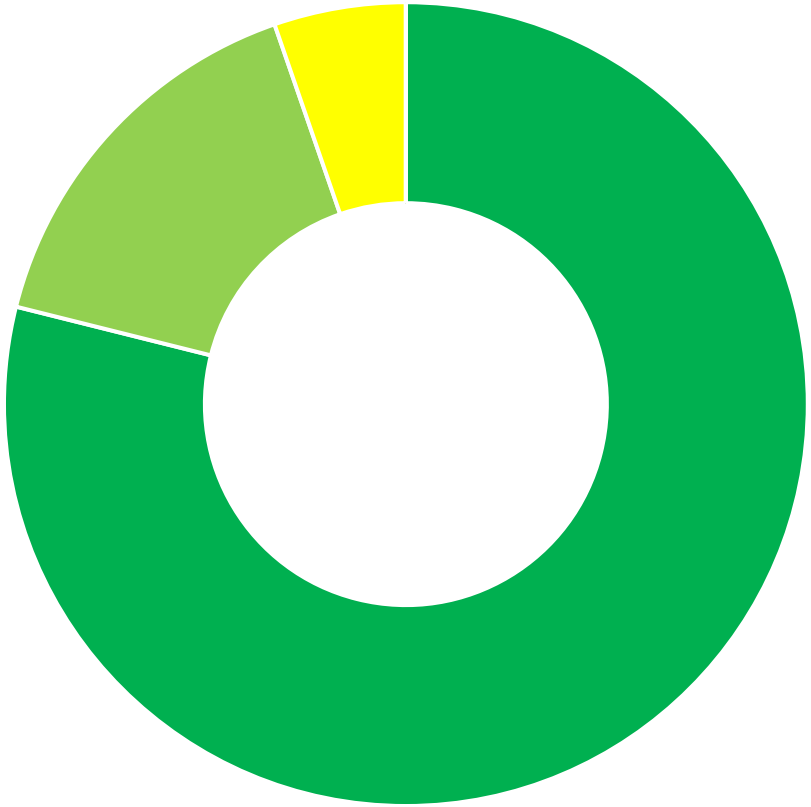

- Media (VR-Classes)
- Combination of theoretical and practical approach
- Social interaction
- Presence (being there)

Book Recommendation

Check out our new book for detailed information (in German) about Immersive Virtual Reality.

SCAN ME

Try it out

Matthias Wölfel

If you have further questions don’t hesitate to contact me: matthias.woelfel@h-ka.de

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Putting on the VR-Headset

1. Fold down the bracket
2. Tighten the wheel
3. Adjust Velcro

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Interacting in the VR-Classroom

TRIGGER

control interactions

e.g. selection of an element

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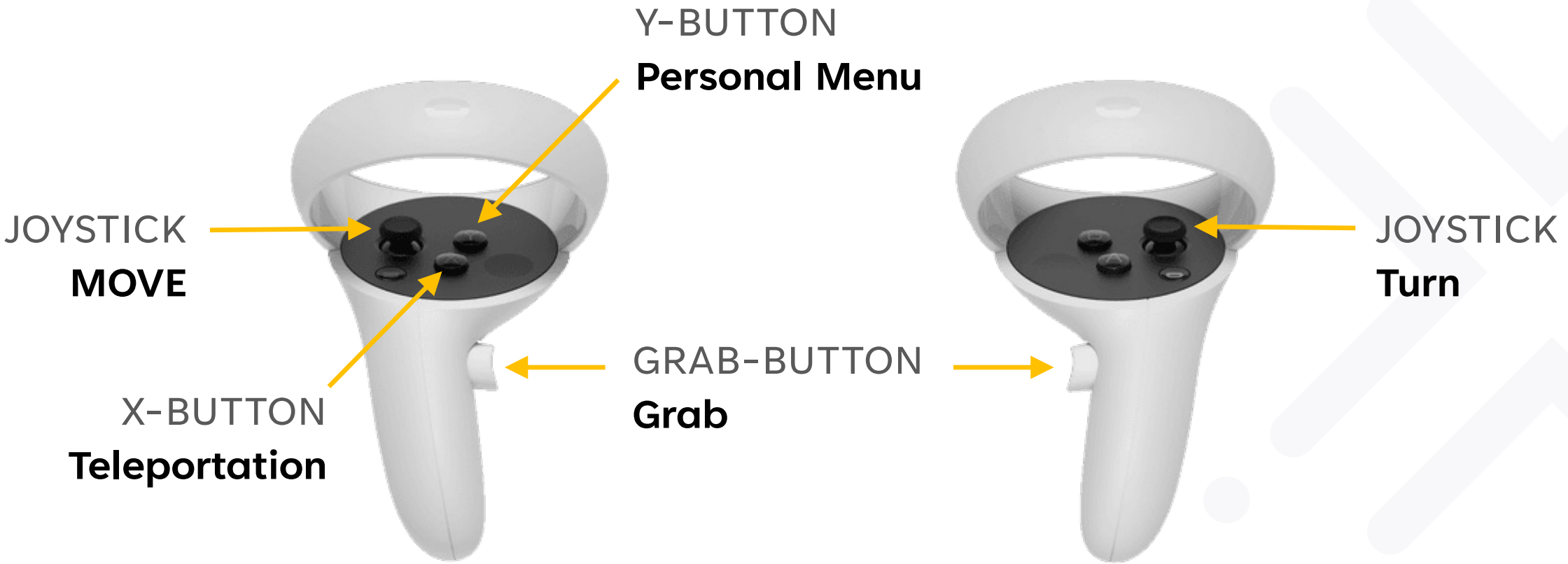
Interacting in the VR-Classroom



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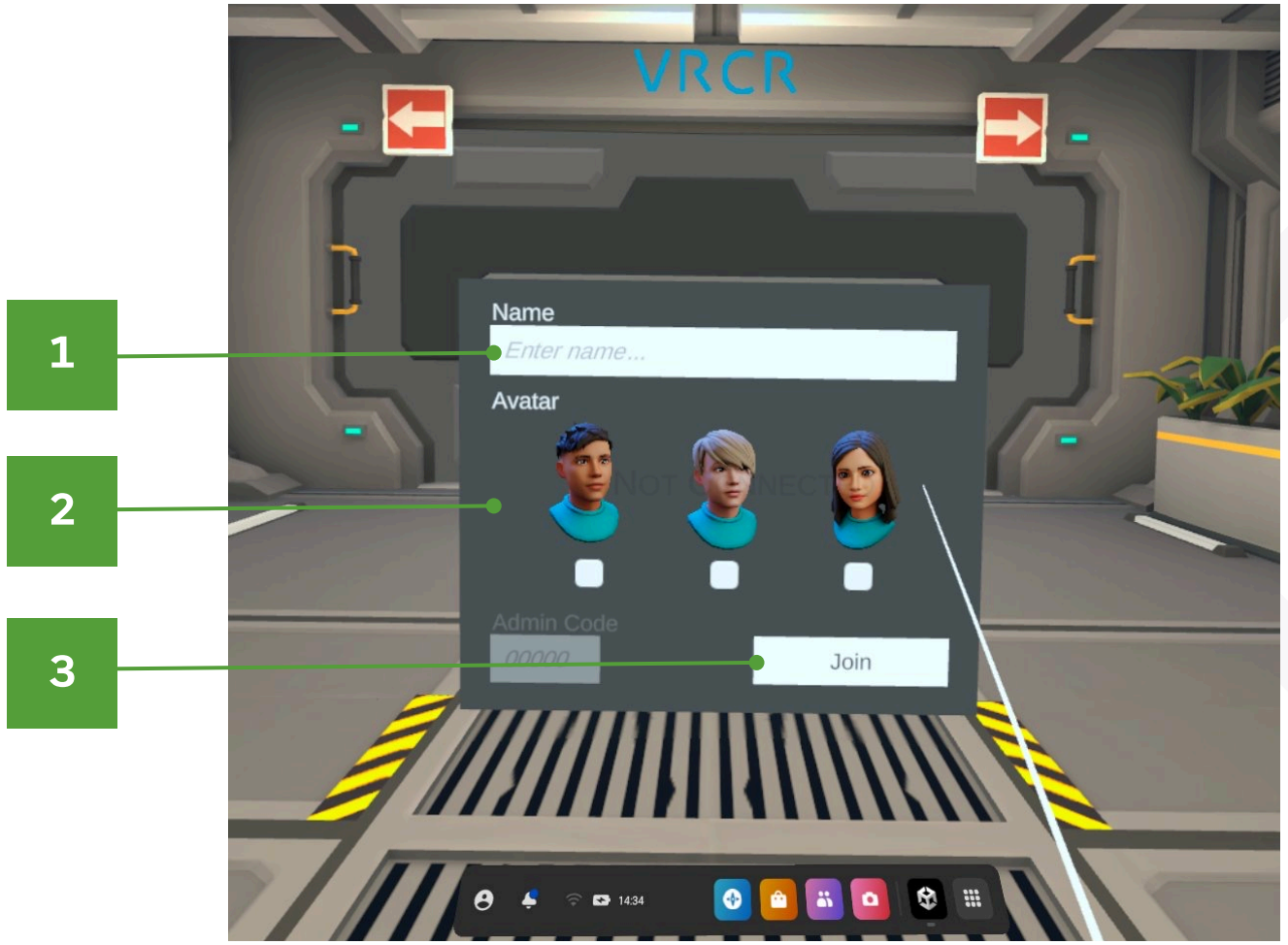
Joining the VR-Classroom

1. Enter name
2. Choose avatar
3. Select »Join«



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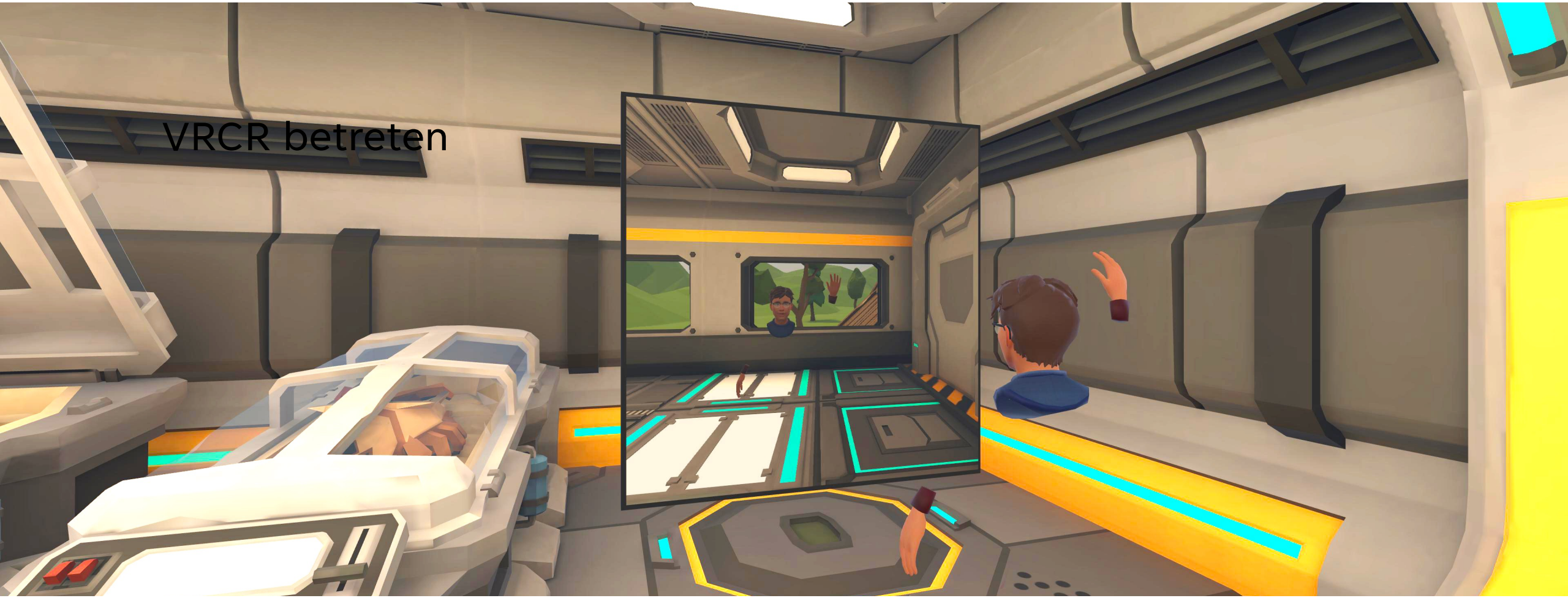
Seeing Yourself in the CR-Classroom



- Eigene Abbildung

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