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Developments in XR, VR and Immersive Technologies



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Agenda

- Welcome
- Introduction to XR – AR, VR, MR
- Use Cases and Examples of VR in Teaching Practice
- Practical Applications of XR and Immersive Technologies
- Things to think about when using VR
- Q&A
- References / End of Session

A Quick Bio

Tim Jackson BEng (Hons), Cert.Ed., MBCS, CITP, MCP



I am a, award-winning Senior Lecturer and Course Director in Computing (Software Engineering) at Canterbury Christ Church University. I have been employed as an educator for over 22 years and have been an active advocate of the use of XR and immersive technologies within education for a number of years. I have been involved in a number of XR projects, including the design, development, and implementation of VR Labs and Immersive Rooms, and using photogrammetry technologies to support transitioning students.

I have recently moved from EKC Broadstairs College to Canterbury Christ Church University and have co-written the university's strategy on the use of XR and immersive technologies, now known as the *Immersive Centre*.

I am currently studying for my post-graduate qualifications which encompass the use of XR technologies within the educational sector, specifically the range of pedagogical applications and the impact of these XR technologies and immersive technologies on learners.

What is XR? (VR / AR / MR)



What is eXtended Reality (XR)?

- XR is an umbrella term, that includes VR, AR and MR
- VR – Virtual Reality
VR is like stepping into a whole new world that isn't real. It's when you wear a special headset that covers your eyes and ears, transporting you to a completely different place. In VR, you can look around and interact with this new environment as if you're really there, even though it's all created by a computer. This will be our main focus of attention today.
- AR – Augmented Reality
AR is like adding digital layers to the real world. It's when computer-generated images or information are overlaid onto what you see in the real world. For example, you might use AR to see how furniture looks in your room before buying it, or to play games where virtual objects appear in your environment.

- **MR – Mixed Reality**

MR combines elements of both AR and VR. It blends the real world with virtual objects or environments in a way that makes them seem like they're really there. MR lets you interact with these virtual objects as if they're part of your real surroundings. It's like bringing virtual things into your world and being able to touch, move, and interact with them, such as within a medical environment.

- **Immersive Technologies**

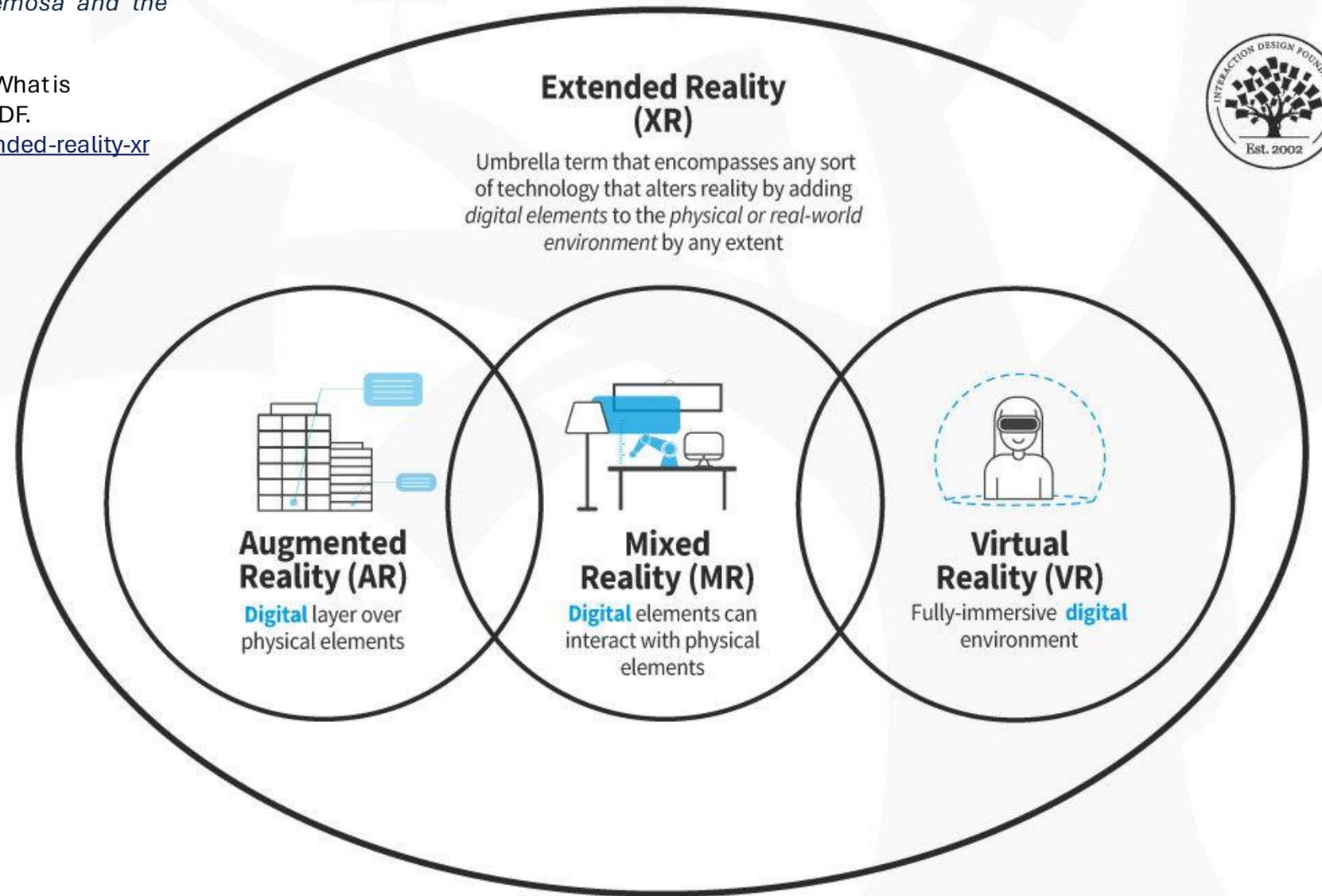
This refers to digital technology that creates or enhances an environment, either to simulate the physical world or to create something completely new. It engages users on various sensory levels and offers a more intense and interactive experience than traditional media. Examples include VR and AR, but also technologies such as AI-based Photogrammetry and web-based Frame technologies (web-based VR environments).



Figure 1. The term XR includes AR, MR, VR, and any technology that blends the physical and the digital world. © Laia Tremosa and the Interaction Design Foundation

Interaction Design Foundation - IxDF. (2022, January 24). What is Extended Reality (XR)? Interaction Design Foundation - IxDF.

<https://www.interaction-design.org/literature/topics/extended-reality-xr>



Background

XR Technologies, specifically Virtual Reality (VR), is an area of keen interest and recent intense development, with many Schools, Colleges, and Universities within the UK and Internationally (with the United States and Canada taking the lead) implementing XR Technology solutions to support the pedagogical development of their learners.

In this talk, we will explore what some of these solutions look like, and what feedback has been received so far, from learners, practitioners, and developers.

If we have time, I will also share some of my own experiences of teaching Higher Education within a Virtual Environment over an extended period of time during the COVID pandemic lockdown within the UK, from March - June 2020. During this time of global pioneering work, students and I undertook a structured timetable of teaching for 21 hours per week over this four-month period.

VR - Developer Use Cases

Use cases and examples for how VR can be used in your teaching and research practice, as well as staff training from commercial users and developers

BODYSWAPS - [HTTPS://BODYSWAPS.CO](https://bodyswaps.co)

- Bodyswaps lets learners safely practise soft skills through realistic workplace scenarios and learn by observing their own behaviour.
- The scenarios can be delivered as part of face-to-face training sessions, integrated with remote learning programmes or experienced fully autonomously.
- All modules are available for VR, PC and mobile in English and French.
- Variety of modules exist, including:
 - Active Listening
 - Clear Communication and Giving Feedback
 - Gender Inclusion
 - Conflict Management and Resolution
 - Job Interview Simulator
 - Group Work
 - Medical context-based communication skill development (doctor / nurse / patient communication)

Soft Skill Development - <https://bodyswaps.co/soft-skills-training-in-vr/>

EMPLOYER FEEDBACK USING BODYSWAPS VR

Proven Results

The Bodyswaps format has been designed to enhance learner engagement, accelerate learning and accommodate multiple deployment modalities.



of learners report a significant improvement in their **self-awareness** and knowledge of how to improve their skills.



of learners report a significant improvement in their **confidence** to apply the simulated soft skills in real situations.



of learners report being likely to **recommend** Bodyswaps to their colleagues over traditional forms of training.

STUDENT FEEDBACK USING BODYSWAPS VR

73% more engaged / 78% identified self-improvements / 53% more confident / 82% recommended

Key Data (VR-only)

ENGAGEMENT



73% of learners of learners found the simulation **engaging**

AWARENESS



78% were able to identify **areas for improvement** for their own professional communication skills

CONFIDENCE



53% reported feeling **more confident** in my professional communication skills

RECOMMENDATION



82% **recommend** this learning experience to other students

PWC – PRICE WATERHOUSE COOPER

WWW.PWC.CO.UK/VR

VR learners were:

4x

faster to train than in the
classroom

275%

more confident to apply skills
learned after training

3.75x

more emotionally connected
to content than classroom
learners

4x

more focused than their e-
learning peers

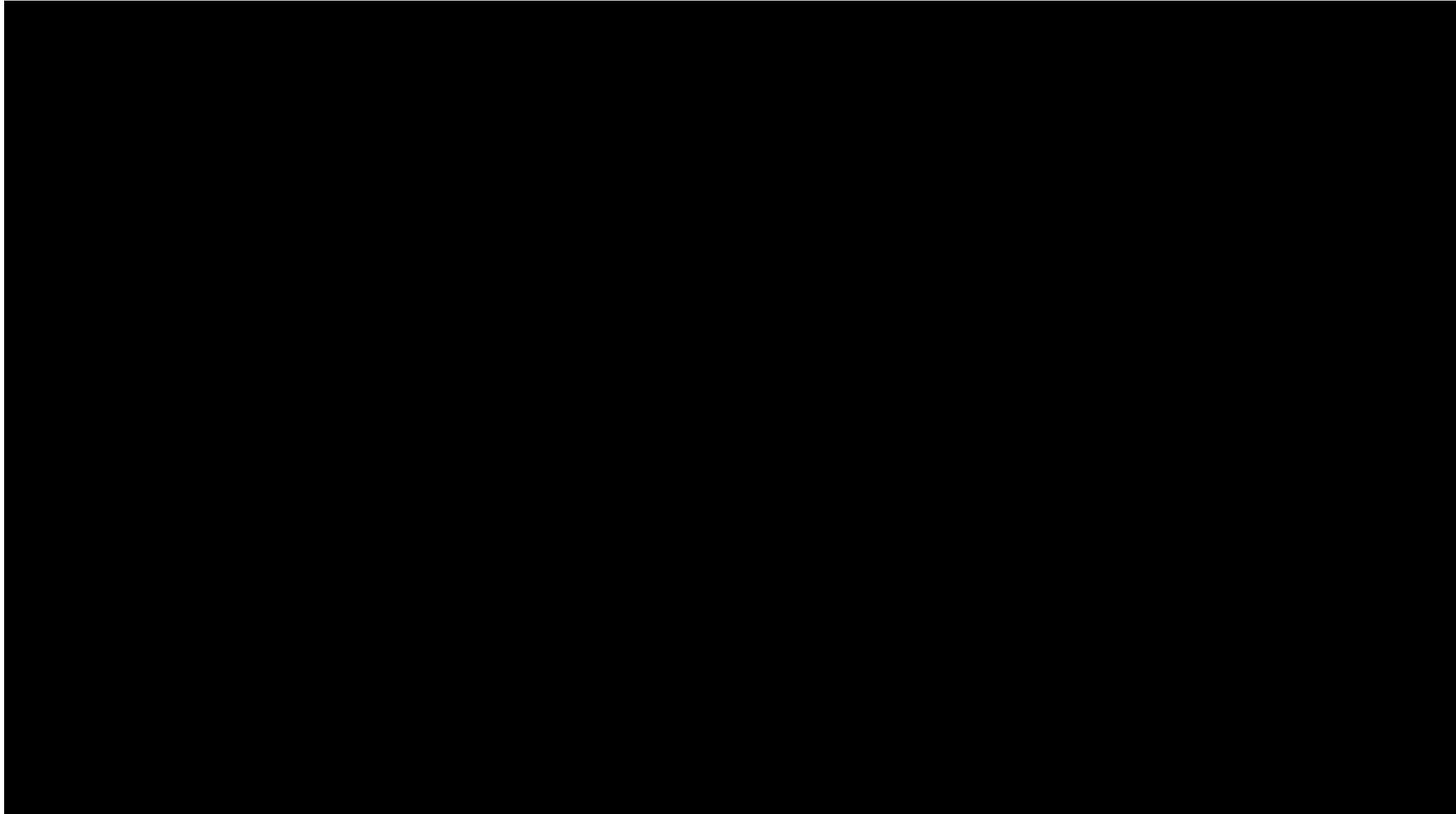
*Understanding the effectiveness of VR soft-skills training in the enterprise -
<https://www.youtube.com/watch?v=I0QfvzrUT8s>*

*The VR Advantage: How virtual reality is redefining soft skills training -
<https://www.pwc.com/us/en/services/consulting/technology/emerging-technology/vr-study-2020.html>*

FIVE KEY ELEMENTS TO VR LEARNING

- **Learners in VR courses can be trained up to four times faster**
 - 4x faster to train than in the classroom - what took two hours to learn in the classroom could possibly be learned in only 20-30 minutes using VR
- **VR learners are more confident in applying what they're taught**
 - In fact, learners trained with VR were up to 275% more confident to act on what they learned after training – this equates to 40% greater improvement in confidence than classroom learners and 35% improvement over e-learners to act on what they learned after training in VR
- **Learners are more emotionally connected to VR content**
 - V-learners felt 3.75 times more emotionally connected to the content than classroom learners and 2.3 times more connected than e-learners.
- **VR learners are more focused**
 - Immersive VR learning means fewer distractions and better focus – up to four times more focused during training than their e-learning peers and 1.5 times more focused than their classroom colleagues
- **VR learning can be more cost-effective at scale**
 - At 375 learners, VR training achieved cost parity with classroom learning. At 3,000 learners, VR was 52% more cost-effective than classroom

VR SOFT-SKILLS TRAINING STUDY



<https://www.youtube.com/watch?v=KCBwUySF4uk>



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VIRTUALSPEECH - [VIRTUALSPEECH.COM/](https://virtualspeech.com/)

SOFT SKILLS TRAINING IN VR



VR – Practical Applications

Examples of how VR applications can be used to enhance learning opportunities

LABSTER - THE FUTURE OF EDUCATION AT YOUR FINGERTIPS



<https://www.youtube.com/watch?v=UEW4JeVwvps>



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VICTORYXR & HTC - WWW.VICTORYXR.COM

THE DEMOCRATISATION OF EDUCATION

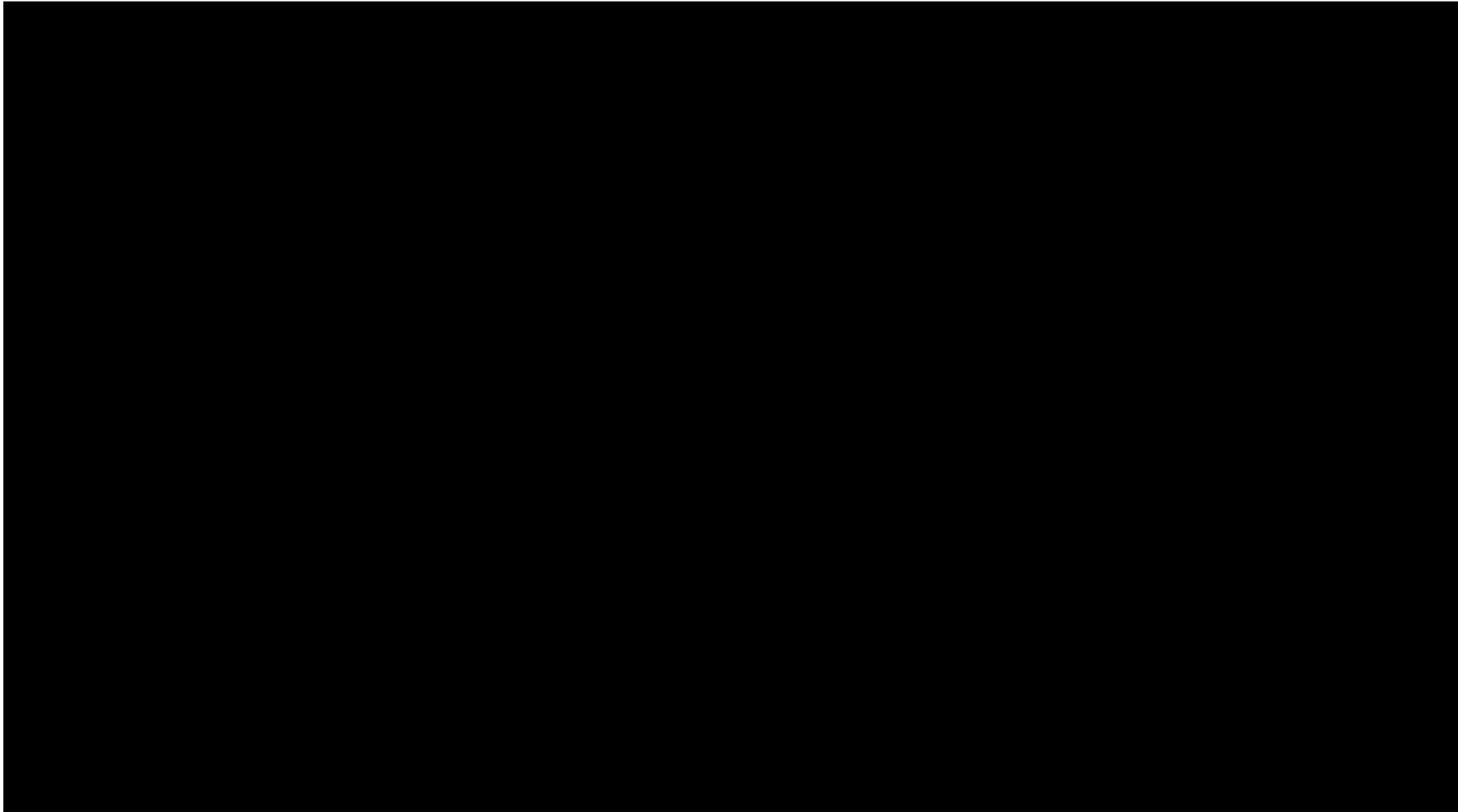
Freeman (2021) reports that “*The retention level one year after a VR training session can be as much as 80%, whilst traditional training retention is 20% after one week*”

Dr Narendra Kini, Miami Children’s Health System

Freeman, T (2021) *Medical VR Training Works, Here’s Proof*

<https://axonpark.com/medical-vr-training-works-heres-proof/> [accessed 08/01/24]

COLLABORATION – VICTORYXR & HTC VIVE



<https://www.youtube.com/watch?v=ODPBJexJFhQ&t=60s>



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Using VR

Key aspects to consider when planning to use XR and Immersive Technologies

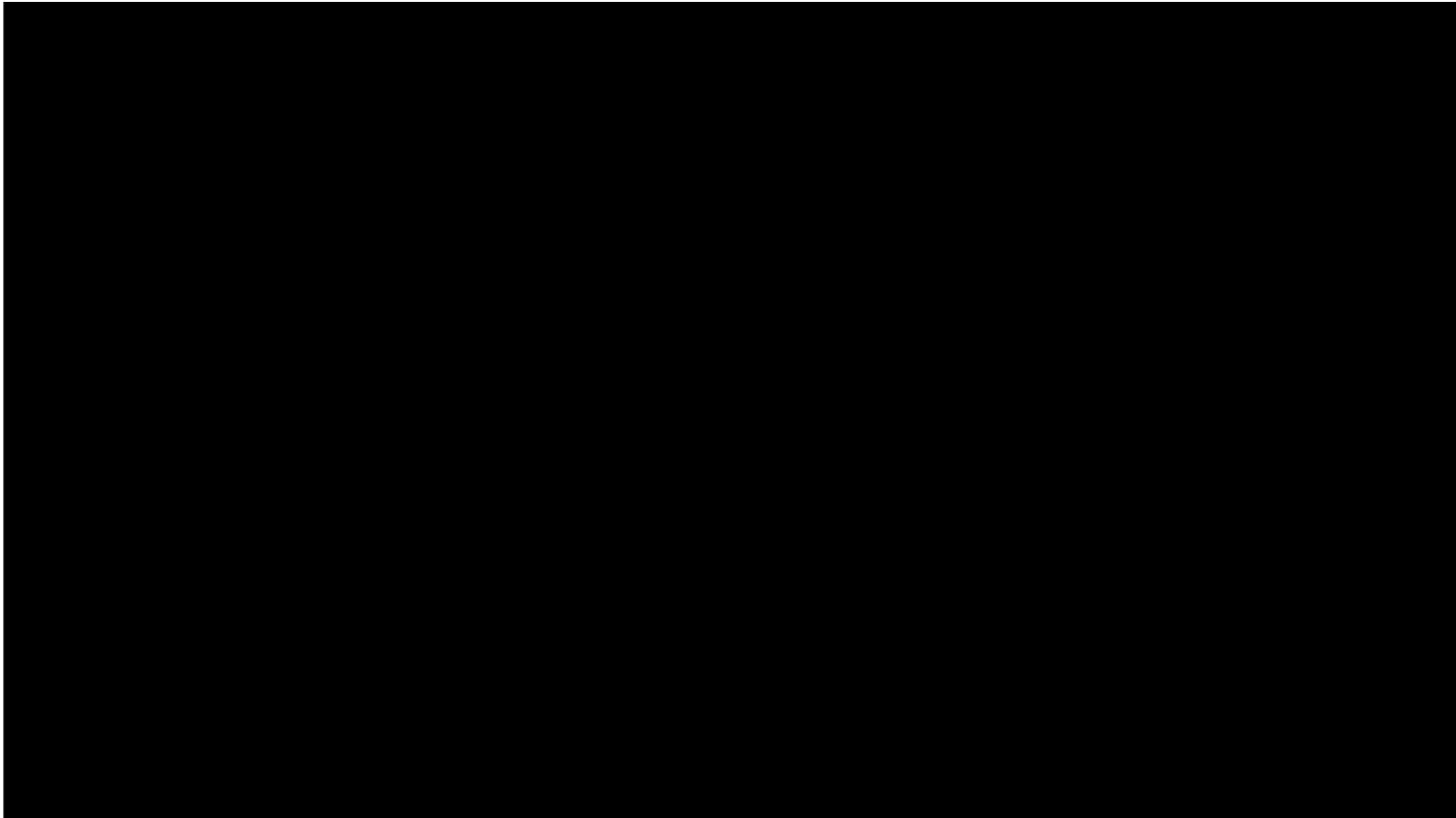
In HE, we use experiential learning methods and techniques; VR is a perfect tool to add to your repertoire.

VR is *experiential* – this means no-matter how many times it is described to you, you must use it to be able to understand what it does and how it can be used. Experience is everything!

The Three Pillars of Virtual Reality - **Immersion, Presence, and Interactivity**

Mutterlein (2018) discusses that the interplay of the key features of an influence a VR context by relating them to satisfaction with the VR experience itself.

Considering the conceptualisation of **immersion, presence** as well as **interactivity** contribute to **immersion**. In addition, **interactivity** contributes to **presence**. Furthermore, **immersion** influences satisfaction with a VR experience.



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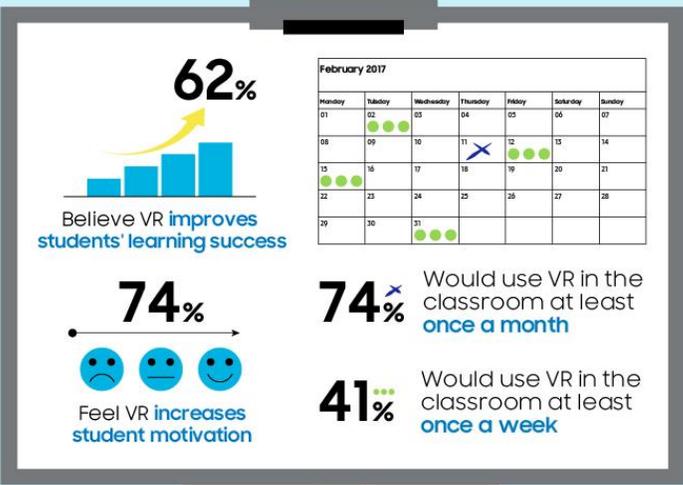


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VR in the Classroom

What Teachers Think About

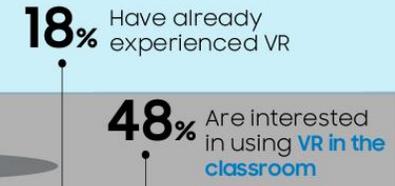
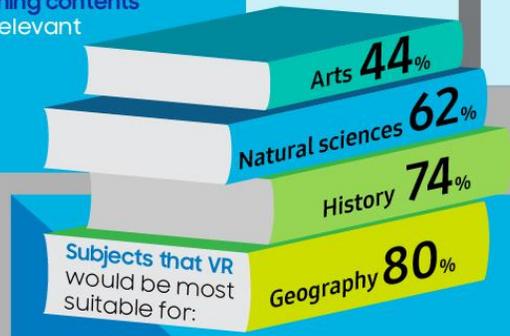
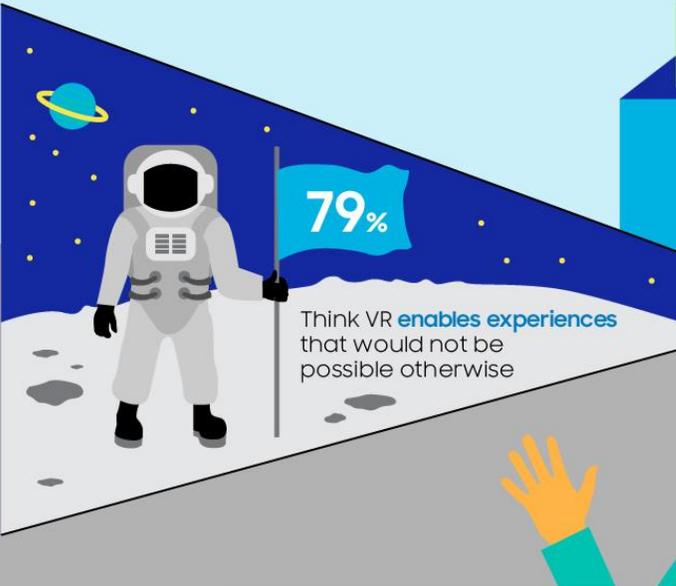
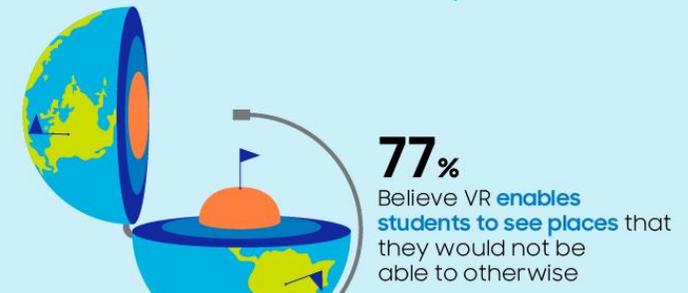
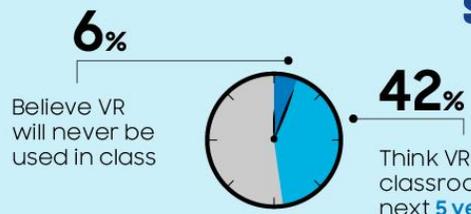
SAMSUNG



92% Support the use of digital technologies in the classroom



71% Consider interactive learning contents to be particularly relevant



For the Samsung-backed survey "VR in the Classroom," Kantar EMNID interviewed 606 teachers from schools throughout Germany in November 2016. The interviews were conducted in a personal computer-assisted procedure. In addition to focusing on the utilization of digital technologies in schools, the survey was also directed to find out more about the concrete application of virtual reality in education

Managing Expectations

“Virtual reality is not a technology that should replace other teaching resources. Instead, it should serve as a complementary tool that can enhance learning across disciplines.

As with any new technology being introduced into the classroom, success depends on expectations, an effective strategy and the practical details of how it is being used”

iLRN2021 SCHED - <https://sched.co/jH1c>



Adopting VR into Your Work

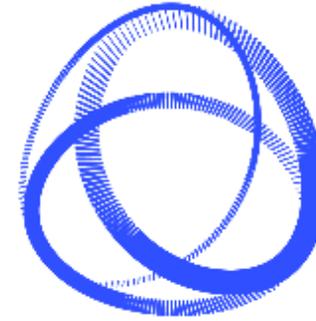
VR is 'just another tool' in your toolbox. It has strengths and weaknesses like any other

You are the experts in your areas. You are best placed to understand how the technology could be used in your specialisms

What ideas do you have for using VR in your work and research?

Students in VR Conference - Day 2 - Life Lockdown - A Student Perspective - YouTube

An opportunity for questions...



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VirtualSpeech - *Soft Skills Training in VR* <https://virtualspeech.com/>

VirtualSpeech - *Soft Skills Courses & Training* <https://virtualspeech.com/courses/>

VirtualSpeech - *Training for Education* <https://virtualspeech.com/education>

