Maastricht University

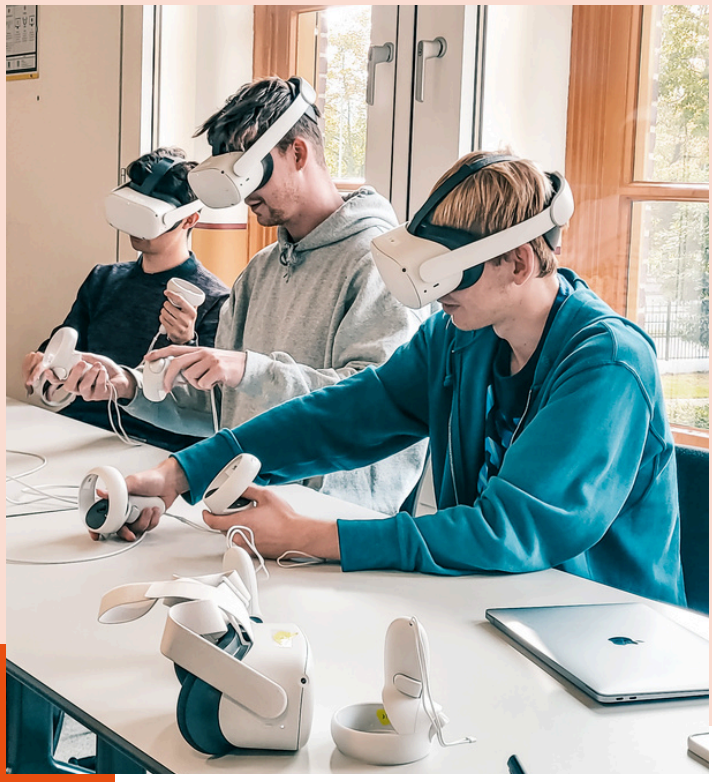
EDLAB DEX LAB

VR-ENHANCED PBL

IMPLEMENTATION GUIDELINES

ROBERTA DI PALMA (SBE)
WALTER JANSEN (EDLAB)

GUIDELINES



These guidelines are derived from the VR-enhanced PBL project findings. The guidelines provide input for didactic and technical applications of VR-enhanced PBL classrooms. Furthermore, they provide a suggested roadmap for VR implementation.

Didactic Guidelines

Guideline 1

Align VR Activities with Intended Learning Outcomes

Guideline 1: What it means

Aligning VR activities with intended learning outcomes is crucial for ensuring that the VR implementation complements the course's learning goals and teaching methods. This is essential for the VR activity to provide educational value. The integration of VR should be in line with the assessment methods in the course e.g., to integrate the VR presentation skills training, the course must have a final presentation assessment. This strategic alignment helps bridge theoretical knowledge and practical application, making learning more engaging and effective.

Guideline 1: What it takes

Determine Learning Objectives:

- Identify whether your learning goals are focused on knowledge acquisition or skill development. This distinction will guide your search for appropriate VR content. Refer to sections 1.7 and 1.8 for inspiration.
- Regardless of the type of activity, use platforms such as the Meta Game Store, Sidequest.com, and YouTube 360 to explore available VR applications. These resources cater to broad educational needs, from immersive experiences that elucidate complex concepts to interactive simulations for hands-on skill training.

Research and Selection of VR Content:

- Conduct a thorough search for VR apps that align with your course's specific learning objectives. For knowledge development, prioritize content that offers detailed explorations of concepts. For skill training, look for interactive simulations that provide practical experience.

- Compile a list of potential VR activities that seem promising for meeting your educational goals.

Engage with VR Experts and Technical Support:

- With your list of potential VR activities in hand, consult with your institution's VR experts, tech labs, or educational technology support staff. They can offer valuable insights into the practicality of integrating these VR activities into your curriculum and suggest additional resources or alternatives you may not have considered.
- Utilize the faculty sheets provided at the end to find the appropriate point of contact within your institution for a consultation.

Evaluate and Test Selected VR Activities:

- Personally test the VR applications to assess their alignment with learning objectives, educational value, technical reliability, and user-friendliness.

Integrate VR into the Curriculum:

- Plan the integration of the selected VR sessions into your curriculum, choosing moments that naturally complement and enhance the course material without overwhelming students.
- Address logistical needs such as scheduling, room bookings, and technical setups in advance, especially for activities requiring special arrangements like individual VR training rooms or a dedicated VR content session space.

Prepare for Debriefing and Assessment:

- Develop a clear instructional plan for how VR sessions will be followed up, including debriefing discussions, reflective assignments, or application of VR experiences in subsequent class activities.
- Outline how VR participation will be assessed and integrated into the overall grading scheme of the course, if needed.

Collect Feedback and Adjust Implementation:

- After conducting VR sessions, gather student feedback to evaluate the effectiveness and impact of VR activities on learning outcomes.
- Use this feedback to refine future VR integrations, optimizing content selection, timing, and technical arrangements to better align with course objectives.

Guideline 2

Integrate VR as a Complementary Tool

Guideline 2: What it means

VR technology should be leveraged to enhance the educational experience by providing unique, immersive opportunities that complement traditional teaching methods. This approach enriches the curriculum without replacing fundamental educational practices. VR should offer supplementary experiences that deepen understanding, introduce new perspectives, or allow students to practice skills in a risk-free environment.

Guideline 2: What it takes

Early and Strategic Planning:

- Begin planning the integration of VR into your curriculum at least three to six months in advance. This foresight is crucial for thorough app testing, scheduling considerations, and logistical preparations.

- For coordinators looking to implement VR on a shorter timeline, identify "quick win" VR experiences that require minimal setup, learning and align closely with course objectives.

Logistical arrangements:

- Ensure there are sufficient individual rooms for VR training sessions that require voice interaction, like presentation skills training. This is important because VR applications utilizing voice recognition need a quiet environment to function correctly.
- For content-driven VR sessions, secure a dedicated VR room where headsets can be set up once for the entire day. This setup includes charging stations and a defined play area or boundary for each headset, facilitating a smooth rotation of students through the VR experience.

Managing VR session duration:

- Limit VR activities to a maximum of 30 minutes to maintain student engagement and prevent fatigue. If a VR experience is designed to last longer, incorporate scheduled breaks to allow students to rest, especially their eyes.
- Be mindful of the potential for adverse effects from prolonged VR exposure, such as decreased concentration or physical discomfort. Planning breaks not only mitigates these risks but also ensures a more effective learning experience.

Scheduling considerations:

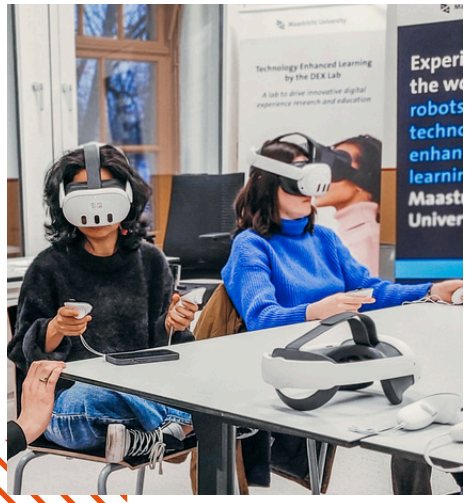
- Coordinate with academic scheduling teams to ensure VR sessions do not conflict with other critical learning activities. VR should act as an enriching addition to the curriculum, enhancing rather than disrupting the overall educational flow.
- For individualized VR training sessions, schedule times with enough flexibility to accommodate all students without rushing the experience. This might involve booking additional time slots or extending the VR activity over several class periods.

Guideline 3

Choosing the right type of VR activities: Active vs Passive Engagement

Guideline 3: What it means

The effectiveness of VR in promoting active learning hinges on selecting the right type of activity—active or passive—based on the educational objectives. Active engagement in VR, where students interact, make decisions, and solve problems, is crucial for developing critical thinking and practical skills. However, passive experiences, where students observe and absorb information as a 'fly on the wall,' can also be incredibly effective, particularly for conceptual understanding and exposure to new environments. The choice between active and passive VR experiences should be informed by the learning goals of the course, with a clear understanding of how each type of VR activity contributes to these goals.



Guideline 3: What it takes

Determine the goal of the activity:

- Determine whether the goal is to develop skills (indicating a preference for active participation) or to enhance understanding of concepts (where passive observation may suffice).

Refer to the activity quadrants:

- Consult the quadrant framework that classifies VR activities into active and passive engagement for skill training and knowledge acquisition. This framework can guide the selection of VR experiences that align best with your educational goals.

Selecting VR apps:

- For active engagement, look for VR applications that allow students to manipulate the environment, engage in simulations, or complete tasks that require critical thinking.
- For passive engagement, select 360-degree videos or observational VR experiences that immerse students in scenarios relevant to the course content without requiring direct interaction.

Guideline 4

Enable Self-Directed Learning with Accessible VR Resources

Guideline 4: What it means

This emphasizes the importance of accommodating diverse learning styles by making VR technology accessible for self-directed learning. By providing a spectrum of VR experiences—ranging from interactive simulations to narrative-driven explorations—educators can support students in engaging with content in a manner that best suits their learning preferences. The key is to offer VR as a flexible resource that students can utilize independently, allowing them to delve deeper into course concepts at their own pace or practice skills such as public speaking in a low-pressure environment.

Guideline 4: What it takes

Establish a VR learning hub:

- Set up a dedicated space within the library, tech lab, or faculty where VR equipment is available for student use. This VR hub should be equipped with a variety of VR headsets and preloaded with educational content relevant to different courses and subjects.

Curate a VR app library:

- Assemble a comprehensive library of VR content that spans various disciplines and learning objectives. This library should include a mix of interactive, explorative, and narrative-based VR experiences catering to different learning styles and educational needs.

Implement a booking system:

- Create an easy-to-use booking system for students to reserve VR equipment and sessions. This system should allow students to select specific VR experiences they wish to explore and book times that fit their schedules, enabling flexible, self-directed learning opportunities.

Promote VR as a study tool:

- Actively promote the availability of VR resources to students as a supplementary study tool. This can be done through course syllabi, class announcements, or informational sessions highlighting how VR can enhance their understanding of course material and provide additional practice opportunities.

Technical Guidelines

Guideline 1

Maintain Ethical and Privacy Standards

Guideline 1: What it means

Prioritizes ethical considerations and privacy protection in VR usage, ensuring content appropriateness and secure handling of personal data in compliance with regulations like GDPR.

Guideline 1: What it takes

Conduct Content Reviews:

- Regularly evaluate VR content for ethical integrity, appropriateness, and adherence to privacy standards, particularly for content that involves sensitive topics or simulations.
- Keep the educational community informed about privacy practices and any changes to VR platforms that may affect data handling.

Implement Privacy Protections:

- Use non-identifiable user accounts for VR applications to protect personal information or data encryption to safeguard personal information accessed or generated through VR activities.

Educate on Ethical Use:

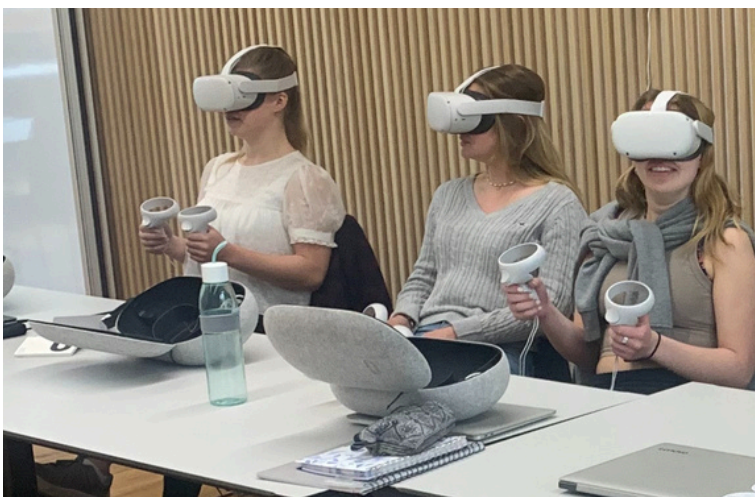
- Provide training for educators and students on ethical VR usage, highlighting specific concerns related to VR, such as the potential for virtual harassment or the ethical implications of simulating sensitive historical events.
- Educate users about the types of data collected by VR applications, including motion tracking and biometric data, and discuss the implications for privacy and consent.

Develop VR Ethics Guidelines:

- Create guidelines that outline the ethical use of VR in education, covering content selection, user interaction norms, and privacy measures.

Review & Comply with Regulations:

- Ensure all VR content and activities comply with existing educational and data protection regulations, updating practices as laws evolve.



Guideline 2

Select User-Friendly VR Platforms

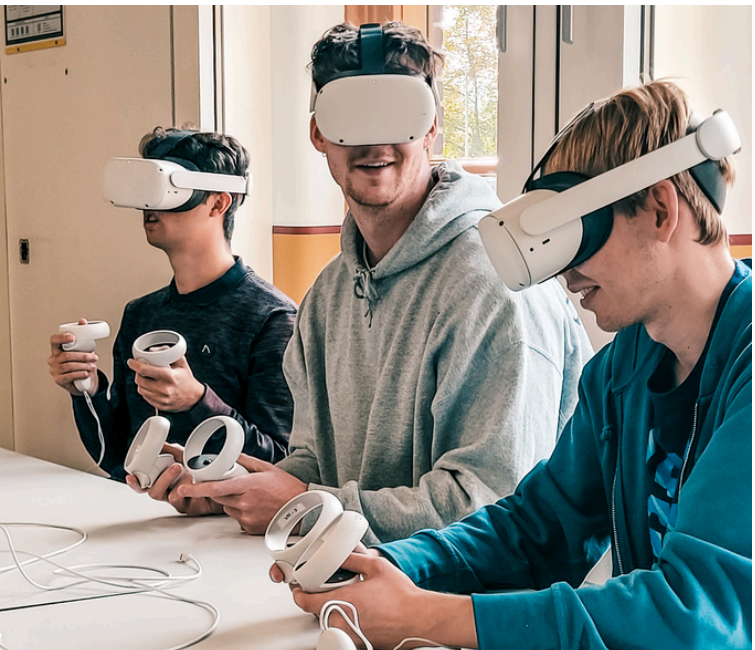
Guideline 2: What it means

Emphasizes the selection of VR hardware and software that are accessible and easy to use, minimizing technical barriers for educators and students and enhancing the learning experience.

Guideline 2: What it takes

Prioritize Intuitive Interfaces:

- Choose VR platforms with straightforward, intuitive user interfaces that facilitate easy navigation and interaction, especially for first-time users (e.g., intuitive navigation, responsive controls, adaptive interface etc.)
- Opt for VR systems that require minimal setup and technical knowledge (e.g., no additional hardware beyond the VR headset), streamlining the process for educators to integrate VR into their teaching.



- Before finalizing selection, conduct trials with representative user groups (students and educators) to assess the usability and overall user experience of the VR platforms.

Tailor Support Needs to Content Complexity:

- Ensure that the chosen VR platforms provide adequate support materials, like tutorials, FAQs, and user forums, tailored to the complexity of the VR content and the platform's functionalities. This comprehensive support is essential for platforms hosting interactive simulations or environments that require user navigation and manipulation.
- For simpler VR experiences such as 360-degree videos, which generally involve basic playback functionality, the need for extensive support resources is significantly reduced. For these types of content, focus on ensuring accessibility and straightforward playback controls, acknowledging that the simplicity of "pressing a play button" inherently lowers the barrier to entry and reduces the demand for detailed support materials.

Guideline 3

Select High-Quality VR Content

Guideline 3: What it means

Prioritize choosing VR content that adheres to both educational and technical excellence. High-quality VR experiences should be engaging, pedagogically sound, and technically robust, providing meaningful and immersive learning opportunities.

Guideline 3: What it takes

Assess Immersion and Interactivity Levels:

- High-quality VR content should offer a deep level of immersion, making learners feel genuinely part of the virtual environment. This is especially important when selecting 360 videos.
- When Interactivity is included, it should be meaningful and facilitate active learning, allowing students to manipulate objects, make decisions, and experience the consequences of those decisions in a controlled, virtual setting.

Ensure Technical Reliability and Accessibility:

- The content should run smoothly on the available VR hardware, with minimal technical issues by ensuring compatibility with the hardware available (i.e., Oculus Quest)

Seek Customization Opportunities:

- Consider exploring partnerships with VR content developers to create custom materials specifically designed for your educational needs. Such tailored content can fill gaps in existing resources and offer highly engaging learning experiences. However, due to the significant costs involved, it is advisable to first familiarize yourself with commercially available VR apps before pursuing customized solutions.

Train Educators and Students:

- Offer training sessions that include practical tips on quickly addressing minor technical issues. Emphasize that no advanced developmental skills are required to solve most problems encountered during VR sessions.
- Develop and distribute easy-to-follow troubleshooting guides that educators and students can use to resolve basic technical problems. These guides should cover common issues and their solutions in a step-by-step manner.

Prepare for Inevitable Technical Issues:

- Acknowledge that technical glitches may occur despite careful selection. Establish straightforward protocols for addressing common issues, ensuring that these can be resolved quickly and without the need for advanced technical knowledge.

Guideline 4

Ensure Robust Technical Support

Guideline 4: What it means

Underlines the necessity of having a solid support framework for VR integration, covering everything from technical troubleshooting to regular maintenance.

Guideline 4: What it takes

Develop Specialized VR Support Channels:

- Establishing dedicated support channels for VR ensures that users have direct access to help when facing VR-specific issues. This step is crucial because the unique challenges of VR technology—ranging from hardware setup to software navigation—require specialized knowledge for effective troubleshooting.

Offer VR-Specific Training for Technical Staff:

- Given the specialized nature of VR technology, providing targeted training for technical support staff is essential. This ensures that they are equipped with the knowledge and skills to address VR-specific problems, which can significantly reduce downtime and enhance the overall user experience.

Implement a VR Equipment Check and Maintenance Routine:

- Regular maintenance and check-ups of VR equipment are vital for preventing technical issues before they impact classroom activities. Proactive maintenance helps in identifying and addressing potential hardware or software problems, ensuring that VR resources are always ready for educational use.

Establish an Accessible VR Equipment Booking System:

- Create an intuitive and user-friendly booking system that allows educators and students to reserve VR equipment easily. This system should be accessible online and provide clear information on availability and booking procedures

Guideline 5

Facilitate Access to VR Equipment and Promote a Network of Practice

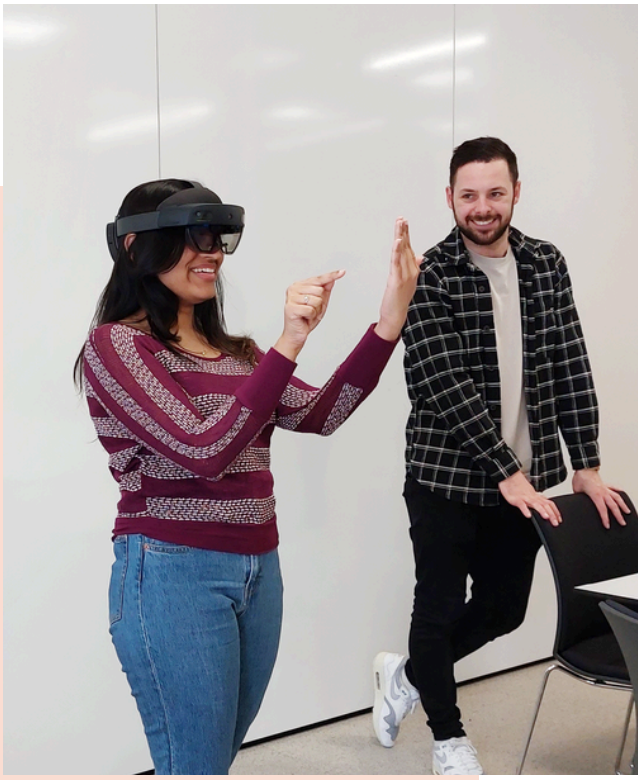
Guideline 5: What it means

Aim to democratize access to VR technology and foster a community of practice among educators, facilitating the exchange of ideas and experiences.

Guideline 5: What it takes

Build a Supportive Community of VR Educators:

- Foster a network of practice by creating online forums, social media groups, or regular meetups where educators can ask questions, share resources, and collaborate on VR projects. This community should be welcoming to both experienced VR users and newcomers.



Organize Interactive VR Workshops and Sharing Sessions:

- Schedule regular events that bring together educators from various disciplines to share their experiences, challenges, and successes with VR in education. These sessions can be a platform for exchanging best practices and innovative teaching strategies.

Highlight Success Stories and Best Practices:

- Collect and disseminate stories of successful VR implementations across different educational contexts. This could include case studies, interviews, or presentations that showcase how VR has been effectively integrated into teaching and learning, providing practical inspiration and ideas to others.

Create Incentives for Innovation:

- Develop recognition or reward programs that acknowledge and incentivize faculty members who incorporate VR in innovative ways into their curriculum. This could range from grant opportunities for VR project development to awards for outstanding VR-based teaching initiatives.

Step-by-step Implementation - VR-Enhanced-PBL Roadmap

Integrating VR into PBL environments offers a dynamic and engaging educational experience but requires careful planning, preparation, and flexibility. It is not a process that can be hastily assembled; instead, it demands a thoughtful and methodical approach, often spanning several weeks or even months. Educators need to allocate adequate time for exploring and testing various VR applications, preparing the necessary equipment, and aligning the VR activities with the course's curriculum. Additionally, it is crucial to anticipate and prepare for potential technical issues that may arise during implementation. Despite these challenges, the effort to integrate VR into PBL can be immensely rewarding, providing students with a unique and immersive learning experience.

The following steps are designed to guide educators through this process, highlighting key considerations and best practices. While challenges may arise, we encourage educators to embrace this innovative teaching method and explore the vast potential of VR in education.

Roadmap

1. Curriculum Alignment

Review the course syllabus to identify where VR can enhance learning objectives, teaching methods, and/or assessment strategies.

Determine the type of VR activity (i.e., interactive skills training, immersive 360 videos, interactive exploration and simulations, VR education games) best suited to achieve these objectives.

2. Tech Lab Consultation

Meet with your institution's technical lab or VR support team 3-6 months before integration to explore VR options and seek outsider opinions. Depending on your VR knowledge, the time required may be more or less than the suggested timeframe.

Discuss technical requirements, available equipment, software licenses, and the potential need for custom VR content development.

3. Course Integration Timing & Scheduling

Decide on the optimal timing for VR integration within the course schedule, considering the impact on learning outcomes and course flow.

Plan for additional time or space requirements, such as booking individual rooms for skills training or a dedicated space for immersive video sessions. Contact scheduling if needed.

Ensure sessions are designed with time limits to prevent VR fatigue. Recommended session length should not exceed 20-30 minutes without breaks to accommodate the physical and cognitive comfort of users.

4. Technical Preparation & Equipment Setup

A few days before the planned activity, ensure VR hardware is operational, software is up-to-date, and all necessary technical support structures are in place.

On the day of the integration, set up the VR experience room. We suggest having students rotate to the room rather than moving the VR headsets across rooms.

5. Student Preparation & Engagement

Inform students about the upcoming VR activities, highlighting their educational objectives and how these fit into the broader course context.

In large courses, create sign-up mechanisms for skills training sessions or simply use tutorial group time for 360 video viewing, ensuring all students have the opportunity to participate.

6. Conducting VR Activities

Facilitate the VR experience, whether guiding students through skills training or coordinating in-class post-discussion questions following a VR experience.

Provide immediate support for any technical issues, relying on prepared troubleshooting guides and technical staff assistance.

troubleshooting guides and technical staff assistance.

We suggest screen sharing (also known as casting) the headset to your laptop/smart screen to guide students through their experiences easily.

7. Feedback, Reflection, & Debriefing

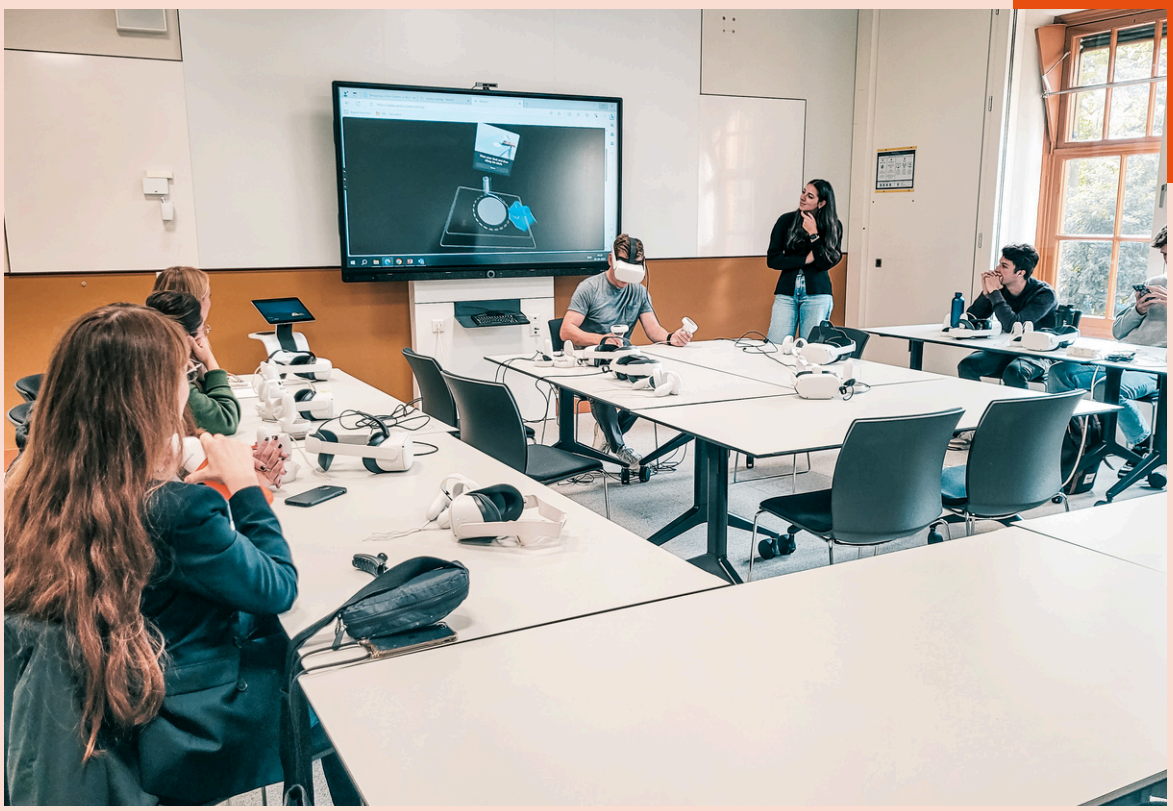
Organize debriefing sessions after VR activities to allow students to reflect on their experiences, discuss insights, and connect VR learnings to course content.

Encourage feedback on the VR experience to gauge its effectiveness and identify areas for improvement.

8. Assessment & Continuous Improvement

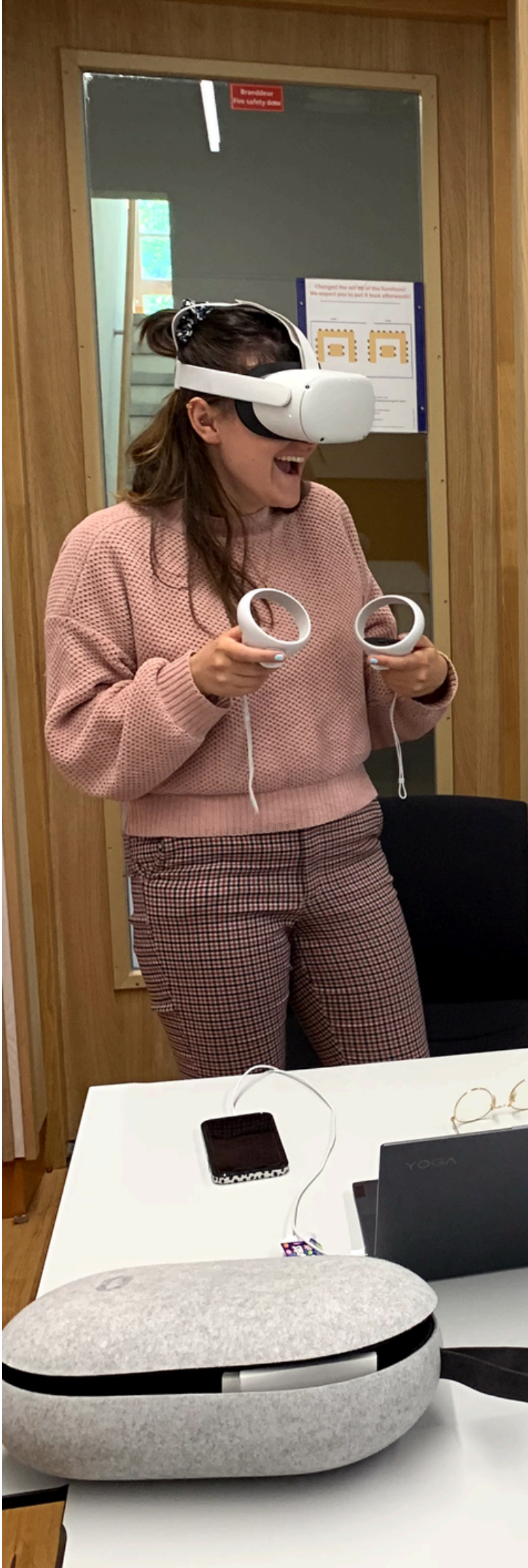
Assess the impact of VR activities on learning outcomes using student feedback, performance data, and personal observations.

Adjust future VR integrations based on these assessments, seeking to enhance the educational value of VR experiences continuously.



Faculty VR-Resources Information

Whether you are exploring VR for the first time or looking to expand your current use of VR in teaching, these Faculty Sheets are a valuable resource for educators looking to incorporate VR into their teaching. They provide tailored information for each faculty, ensuring educators have access to the most relevant point of contact for VR experts for their specific disciplinary needs.



Faculty: FASOS

General	
Contact information	Jaime Simons / Arnoud Wils Creative Lab Technologist / Research Software Engineer plant-fasos@maastrichtuniversity.nl Faculty of Arts and Social Sciences, Grote Gracht 76, Room 0.10
Outreach	Website: https://theplant.maastrichtuniversity.nl/ Instagram: https://www.instagram.com/theplantfasos/ LinkedIn: https://www.linkedin.com/company/theplant-fasos/ X/Twitter: https://twitter.com/PlantFasos
Availability	
General	Monday-Thursday, 9am-5pm
Preferred Method of Contact	Email
Hardware and Software Resources	
Types of VR Headsets/ Equipment	VR for Presentation Skills (with DEXLab), VR for Museum Spaces, VR Play Sessions, VR for Dementia patients, and various VR video/tour production
Expertise & Research Interests	
Past VR Projects	VR for Presentation Skills (with DEXLab), VR for Museum Spaces, VR Play Sessions, VR for Dementia patients, and various VR video/tour production
Research & Education Innovation Interests	VR for research and teaching within the humanities and social sciences (general)

Faculty: FHML

General	
Contact information	Nynke de Jong Associate professor n.dejong@maastrichtuniversity.nl 043-3881827 Located at central point in Randwyck: Office of Nynke de Jong Duboisdomein 30| Room 0.031
Outreach	https://www.maastrichtuniversity.nl/e-reality (in progress)
Availability	
General	Always
Preferred Method of Contact	Via email or physical appointment
Hardware and Software Resources	
Types of VR Headsets/ Equipment	20 Meta Quest 2
Software	None
Other	None
Expertise and Research Interests	
Past VR Projects	360-degree projects (On a home visit, Technology in healthcare, Advance care planning, Problem-based Learning, Intercultural awareness)
Research & Education Innovation Interests	Instructional design

Faculty: FSE

General	
Contact information	Stefan Jongen Assistant Professor stefan.jongen@maastrichtuniversity.nl 06-14330806
Outreach	None
Availability	
Preferred Method of Contact	E-mail
Hardware and Software Resources	
Types of VR Headsets/ Equipment	15 VR Glasses
Software	None
Other	None
Expertise and Research Interests	
Past VR Projects	Virtual Reality as a tool to enhance Problem-Based Learning experiences at Maastricht Science Programme (Bachelor Thesis Research) Virtual Reality as a tool for presentation skills: a UM case study on students (MSP Project)
Research & Education Innovation Interests	VR in STEM Education VR in PBL …

Faculty: FPN

General	
Contact information	Natalja Sarneel - Assistant professor natalja.sarneel@maastrichtuniversity.nl Phone via Teams UNS 40 2.771 Dalena van Heugten - Assistant professor dalena.vanheugten@maastrichtuniversity.nl Phone via Teams UNS 40 2.771
Outreach	https://www.maastrichtuniversity.nl/e-reality (in progress)
Availability	
General	Natalja= mon-tue-thu-fri Dalena= mon-tue-wed-thu
Preferred Method of Contact	Email
Hardware and Software Resources	
Types of VR Headsets/ Equipment	Located at central point in Randwyck: Office of Nynke de Jong Duboisdomein 30| Room 0.031
Expertise and Research Interests	
Past VR Projects	• VR practical in bachelor GGZ on clinical skills in mental health care aimed at senior citizens • Out-of-body experiences using VR leads to dissociation (research study at University of Oxford in collaboration with Dr. Stephen Hicks)
Research & Education Innovation Interests	Teaching: VR in Clinical Practice/ VR in Clinical Skills Teaching Research: out-of-body experiences and dissociation

Faculty: SBE

General	
Contact information	Dominik Mahr – Professor Jonas Heller – Assistant Professor Tim Hilken - Assistant Professor Roberta Di Palma – PhD Student sbe-dexlab@maastrichtuniversity.nl Tapijnkazerne 11, I1 017, 6211 ME Maastricht, Room I1.017
Outreach	Website: https://www.sbe-dexlab.com/ Linkedin: https://www.linkedin.com/company/sbedexlab/ Instagram: https://www.instagram.com/sbe.dexlab
Availability	
General	Any day upon request
Preferred Method of Contact	Email
Hardware and Software Resources	
Types of VR Headsets/ Equipment	https://www.sbe-dexlab.com/equipment
Software	VirtualSpeech – Presentation Skills Training But access to many others
Expertise and Research Interests	
Past VR Projects	https://www.sbe-dexlab.com/publications
Research & Education Innovation Interests	**Education:** Education Innovation & Business Education **Research:** Digital Experiences in Businesses i.e., Service and Retail Marketing, Supply Chain Management , End user experiences & Broader Business and Economic and Innovation Scope

Faculty: LAW

General	
Contact information	Dr. Catherine De Rijdt Coördinator Staff Development catherine.derijdt@maastrichtuniversity.nl 0433884852 Law
Outreach	https://www.maastrichtuniversity.nl/e-reality (in progress)
Hardware and Software Resources	
Types of VR Headsets/ Equipment	15 oculus quest 2 headsets
Expertise and Research Interests	
Past VR Projects	EDLAB Project. Tutor Training in 360-degrees: group dynamics