

# Competence Development in Public Transport for More Diversity and Inclusion



## Methodology for the Use of XR and Gamification in VET

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DAUGAVPILS  
TEHNOLOĢIJU UN TŪRISMA  
TEHNIKUMS

# 1. Introduction

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## Summary

*The Methodology for the Use of XR and Gamification in VET is a structured approach to the development and delivery of training programs that use XR and Gamification in general and the COMP+ materials specifically. To make the approach of the COMP+ projects as useable as possible for educators, we will provide a methodology for trainers in VET and further education on the use of VR and gamification in education contexts. The methodology will provide educators with engaging, interactive, and effective teaching methods that support their own and learners' professional development. Additionally, the Methodology will explain in-depth, how the COMP+ materials can be used in VET. The Methodology thus not only provides background knowledge and functions as a guideline for the specific training with COMP+, but it also ensures the transferability of the project results and thus the project's sustainability. This output is crucial for the project's goal of establishing innovative teaching and training methods in VET: Trainers will not only gain knowledge about the COMP+ topics but also on the methods of VR and Gamification which can be transferred to other training contents as well. This chapter will briefly outline the relevance of XR and Gamification in VET, define the most important terms, describe the characteristics of a training including XR and VET as well as the needed equipment, and, finally, touch on aspects of inclusion that one should keep in mind planning a training with these methods.*

## Relevance

In today's professional landscape, vocational education must prepare learners not only with theoretical knowledge but with practical, work-related competencies that align with modern workplace demands. As Nick Babich (2021) highlights, true learning goes beyond consuming information; it involves the development of actionable skills and abilities. This is where immersive technologies such as Virtual Reality (VR) and gamification prove transformative.



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VR creates a "life-like perception" (Sherman & Craig, 2002) by immersing learners in interactive, sensory-rich environments that mimic real-world scenarios. As Maricic et al. (2019) emphasize, this immersive experience allows learners to engage deeply with content, interact with their surroundings, and practice procedural skills in ways traditional methods cannot replicate. Hamilton et al. (2020) demonstrated through a comparative study that immersive VR significantly outperforms less immersive approaches in teaching procedural skills, showcasing its potential to revolutionize vocational training.

Crucially, VR and gamification also support inclusion and diversity in vocational education. By removing physical barriers and offering customizable, accessible training environments, VR provides opportunities for learners with disabilities to participate fully in vocational education. Gamification, with its adaptive and engaging design, motivates learners from diverse backgrounds, fostering a sense of achievement and belonging.

While promising, adopting VR and gamification in vocational education presents challenges. High initial costs, gaps in digital literacy, and the need for inclusive content design are significant hurdles. Sustaining learner engagement over time also requires careful gamification design.

Nevertheless, the methodology outlined here marks a vital first step in overcoming these barriers. Strategic investments and a commitment to inclusivity will pave the way for scalable, equitable solutions that prepare learners for the workplace and enhance vocational education's accessibility and appeal.

Before we dive deeper into the characteristics of these technologies as teaching methodologies, we will first clarify some key terms that are essential for understanding Extended Reality (XR) and Gamification in vocational education.

## Terminology

In this chapter, we will familiarize you with the most important terms related to gamification and XR in the classroom. These concepts are crucial for understanding how these technologies can transform vocational education:



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- **XR (Extended Reality):** XR is an umbrella term that encompasses all immersive technologies combining real and virtual environments, including Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR). XR technologies allow for a range of immersive experiences that adapt to different educational needs, from fully virtual environments to overlays of digital content on the real world.

- **VR (Virtual Reality):** VR refers to a fully immersive, computer-generated environment in which users can interact with the virtual world through specialized devices such as VR headsets and controllers. This technology isolates the user from the real world, offering a completely digital experience.



*Example in VET:* VR is used in flight simulation for aviation training. Trainees can practice flying an aircraft in a virtual environment, allowing them to experience real flight scenarios without the costs or risks associated with actual flights.

- **AR (Augmented Reality):** AR enhances the real world by overlaying digital information—such as text, images, or 3D objects—onto a user’s physical surroundings through devices like smartphones, tablets, or AR glasses. This allows users to see both the real world and digital content simultaneously.



*Example in VET:* In healthcare, AR can assist nurses and doctors during surgery by displaying real-time, detailed anatomical information directly onto the patient's body, helping them make informed decisions while performing procedures.



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- **MR (Mixed Reality):** MR blends both virtual and physical worlds, enabling users to interact with and manipulate both physical objects and virtual elements at the same time. MR creates a more integrated experience than VR or AR alone by merging the digital and physical realms in real-time.



*Example in VET:* In construction training, MR could be used to overlay digital blueprints onto a physical building site. Learners can manipulate the virtual blueprints to visualize changes while interacting with real-world structures, thus combining theory with practical application.

- **Gamification:** Gamification involves integrating game design elements such as points, achievements, levels, and leaderboards into non-game contexts, such as educational settings. This approach motivates learners by making tasks more engaging and interactive, encouraging them to complete challenges and achieve goals.



*Example in VET:* In logistics training, a gamified system could reward learners with points for correctly sorting and storing items within a warehouse. As learners progress, they can unlock more complex challenges, simulating real-world tasks in a motivating, game-like environment.

- **Serious Games:** Serious games are digital games specifically designed for educational purposes. Unlike traditional games, which are primarily for entertainment, serious games use game mechanics to teach specific knowledge or skills in an engaging and interactive way.



*Example in VET:* In culinary arts training, a serious game might challenge students to manage a virtual restaurant. They would need to take orders, manage inventory, and ensure timely delivery of food while learning about kitchen operations, food safety, and customer service.

- **Metaverse/Eduverse:** The metaverse refers to a virtual, persistent online space where users can interact with each other and digital objects in a shared environment. The "Eduverse" is a specific application of the metaverse for educational purposes, providing a virtual space for learning, collaboration, and simulation.



*Example in VET:* In the Eduverse, learners could virtually attend a construction site management course, working together with others to solve real-world building problems, all in an immersive, shared virtual environment that replicates real-world challenges.

- **360° Content:** 360° content includes interactive media, such as videos or images, that provide a panoramic view of an environment. Users can explore this content by rotating or moving their viewpoint, often using VR headsets or smartphones, to gain a deeper understanding of the space or situation depicted.



*Example in VET:* In industrial safety training, a 360° video could be used to give learners a virtual tour of a factory floor. They could look around and identify potential hazards or safety violations, all from the safety of their training environment.

## Characteristics

This chapter delves into the distinct characteristics of Extended Reality (XR) and Gamification as teaching methodologies, exploring how these innovative approaches foster deeper learning experiences in Vocational Education and Training (VET). Both XR and Gamification provide unique advantages that can significantly transform the way vocational learners acquire knowledge and develop practical skills.



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**Extended Reality (XR)** enables learners to immerse themselves in interactive, simulated environments. One of the key benefits of XR is its ability to facilitate the practical application of theoretical knowledge in a controlled setting. Learners can directly apply what they have learned in theory to real-world-like situations, which helps bridge the gap between abstract concepts and hands-on practice. In vocational training, this approach encourages **learning by doing**, enabling students to interact with tools, equipment, or complex systems virtually before engaging with them in real life. This not only accelerates the learning process but also improves the retention of knowledge by connecting theory to practical use. Furthermore, XR provides opportunities for **repetitive practice**, allowing learners to repeat tasks and routines until mastery is achieved, which is especially valuable in fields that require high precision or frequent practice of certain procedures.

Another significant advantage of XR is that it supports **self-directed learning**. Learners can engage with content at their own pace, exploring areas that interest them or where they need more practice. This individualized learning approach fosters a sense of autonomy and ownership over the learning process, empowering students to take control of their education. Moreover, XR simulations can be easily adapted to accommodate different learning styles, whether through visual, auditory, or kinesthetic experiences, offering personalized learning pathways that suit the unique needs of each learner.

**Gamification** brings a different, but equally impactful, dimension to learning by incorporating game-like elements into educational contexts. By introducing features such as points, badges, levels, and challenges, gamification taps into intrinsic motivation and makes learning more engaging. Rather than relying on traditional, often passive, learning methods, gamification turns the learning experience into an active, dynamic process that encourages learners to **set and achieve goals**. The competitive nature of gamification, including leaderboards and rewards, also provides a strong incentive for learners to stay motivated and push through challenges.



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Importantly, gamification fosters a sense of **purpose and meaning** in the learning process. By framing learning tasks as quests or challenges, learners are more likely to see the relevance of their education in the context of real-world applications. This sense of purpose increases motivation and the desire to complete tasks, making the overall experience feel more meaningful and rewarding. In addition, gamification supports **learning through repetition**, as learners are encouraged to revisit tasks, refine their skills, and achieve mastery before advancing to more complex challenges. This iterative process helps solidify routines and ensures that key concepts are fully understood and retained.

Both XR and gamification also contribute to **resource savings**. XR reduces the need for physical equipment and materials, as many simulations can take place in virtual environments, making training more cost-effective and sustainable. Gamification, by contrast, minimizes the need for traditional forms of assessment and feedback, replacing them with automated tracking and rewards systems that continuously monitor progress without requiring additional resources.

Despite their focus on self-directed learning, both XR and gamification also offer substantial opportunities for **collaborative and social learning**. In XR environments, learners can engage in **virtual teamwork or group simulations**, where they collaborate with others to solve problems, complete tasks, or navigate complex scenarios. For instance, in a virtual manufacturing environment, trainees can work together to troubleshoot a machine malfunction or manage a production line, learning from each other's approaches and developing essential **teamwork skills**. These interactive, group-based tasks not only promote the development of technical skills but also encourage communication, cooperation, and shared problem-solving.

Similarly, gamification can foster collaboration through **multiplayer challenges**, where learners work in teams to achieve common goals or compete against other groups. By including social features such as leaderboards, peer feedback, and group rewards, gamification encourages students to engage with their peers, exchange ideas, and provide support in their learning journeys. This sense of community within gamified learning environments helps students build **social and emotional skills**—such as empathy, communication, and collaboration—that are critical in vocational contexts where team-oriented work is often a key component.

## Equipment

Here, we will offer a brief overview of the possible equipment choices for those who are just starting out with VR/AR in teaching. We will introduce the different kinds of headset types, highlight the more common ones used in educational contexts, and discuss the limitations that may come with the selection of certain devices. It's important to note that the equipment and prices listed here represent the



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current state of technology and may change rapidly as new models are released and prices fluctuate. As the VR/AR field is rapidly evolving, it is important to stay informed about the latest technology trends and pricing to make the most cost-effective and pedagogically suitable equipment choices for educational settings.

### 1. Virtual Reality Headsets (VR)

VR headsets completely immerse users in a virtual environment, blocking out the real world. They are most commonly used for creating fully immersive simulations in which learners can interact with a virtual environment. These headsets typically come with built-in sensors that track the user's movements and provide real-time feedback.

#### Examples:

- **Meta Quest 3** (formerly Oculus Quest 3): This standalone headset is one of the most popular for educational use. It does not require a computer or external sensors, making it a flexible option for schools and training centers. It provides an immersive VR experience with an excellent range of apps designed for education and training. - Price: **ca. €550** for the headset with controllers.
- **HTC Vive Pro 2**: Known for its high-resolution display and precise tracking, the Vive Pro 2 is ideal for advanced VR applications. However, it requires a powerful computer to run and is generally used in more specialized, professional settings. - Price: **ca. €1.200** for the headset with controllers.



Source: Wisamar Bildungsgesellschaft gGmbH

#### Suitability

Meta Quest 3 is suitable for entry-level to intermediate training programs, particularly in educational institutions like vocational schools and community colleges. It is ideal for training in fields such as healthcare, technical skills, and safety procedures, where learners can practice complex tasks without risk. Its portability makes it especially useful in mobile learning setups or smaller schools with limited space.

HTC Vive Pro 2 is better suited for larger institutions with the infrastructure and budget to support advanced VR training. This might include technical training centers or universities with dedicated VR labs, where high-end simulations in fields like engineering, automotive repair, or advanced medical training can be performed.

#### Limitations

While standalone headsets like the Meta Quest 3 offer convenience, they often have limitations in terms of graphics and computing power compared to PC-connected systems like the HTC Vive Pro 2. The need for a strong computing system for certain headsets can also be a cost and setup challenge for schools.

## 2. Augmented Reality Headsets (AR)

AR headsets overlay digital information onto the physical world, enhancing the real environment with virtual elements. These devices are particularly useful in vocational training, where learners can access contextual information or step-by-step instructions while interacting with real-world objects.

### Examples:

- **Microsoft HoloLens 2:** This is one of the most advanced AR headsets, offering high-resolution holographic displays and precise spatial mapping. It is designed for professional environments and is used in industries like healthcare, manufacturing, and education to provide immersive AR experiences. - Price: ca. €3.500
- **Magic Leap 2:** Another high-end AR headset that allows users to interact with both physical and digital worlds in real time. It is widely used in design, healthcare, and education, allowing users to collaborate on virtual projects while maintaining interaction with the physical space. - Price: ca. €3.000.

### Suitability

Microsoft HoloLens 2 and Magic Leap 2 enable learners to interact with real-world machinery or simulations while receiving virtual instructions. They are ideal for high-tech training centers or vocational schools with advanced programs in areas like surgery, mechanical engineering, or architecture.

### Limitations

AR headsets tend to be expensive and are typically used in professional training environments that require specialized tools. The complexity of their use and the setup required may not be suitable for general classroom settings.

## 3. Mixed Reality Headsets (MR)

Mixed Reality headsets combine elements of both VR and AR, allowing users to interact with digital content that is anchored in the physical world. MR enables users to manipulate and interact with virtual objects that appear to exist in their real environment, offering highly interactive learning experiences.

### Examples:

- **Microsoft HoloLens 2** (also an MR headset, as described above).
- **Magic Leap 2** (also an MR headset, as described above).

### Suitability

MR devices are ideal for institutions with advanced technical training programs that need highly interactive, immersive environments. They are perfect for sectors where learning requires interaction with both the digital and physical world, such as automotive technology, healthcare, and architecture.

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### Limitations

Like AR headsets, MR devices are typically more expensive and may require powerful computing systems to function effectively. The complexity of the technology can also make it more difficult to integrate into general classroom settings.

## 4. Mobile VR Solutions

Mobile VR systems use smartphones as the display and processing unit, making them more affordable and portable than traditional VR headsets. These systems are a good entry-level solution for those looking to incorporate VR into educational settings without significant investment in more expensive equipment.



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### Examples:

- **Samsung Gear VR** (older model, still available in some markets): This headset uses a smartphone for display and processing, providing a relatively low-cost entry into VR. It is suitable for simple VR applications, such as virtual field trips or basic simulations. - Price: ca. €100-€150 for the headset, depending on the model.

### Suitability

Mobile VR is an ideal solution for institutions with limited budgets, such as smaller vocational schools or community colleges. It can be used for simple training applications such as safety simulations, virtual tours, or educational games that introduce basic concepts. It is also an excellent tool for mobile learning programs, where learners can use the headsets off-site, such as during fieldwork or apprenticeships.

### Limitations

Mobile VR lacks the immersive experience of more advanced systems and has lower graphical fidelity. Additionally, it relies on the quality of the smartphone, meaning that users with older devices may experience lag or poor visual performance.

## 5. Classroom Sets

Many vendors now offer classroom sets of VR/AR/MR headsets that include both hardware and software tailored for educational purposes. These sets typically include multiple headsets, charging stations, and pre-configured content or platforms designed for classroom use.

### Examples:

- **Meta Quest for Education:** Meta offers VR bundles designed for educational institutions, including a set of headsets with educational apps and resources. This allows teachers to quickly integrate VR into their curricula, with apps ranging from virtual field trips to skill-based simulations. - Price: ca. €4,000-€5,000 for a set of 10 headsets.

- **ClassVR:** This is a VR solution specifically designed for schools, offering classroom-ready sets that include a range of pre-selected VR content for different subjects. It is often used in K-12 or vocational schools to bring immersive experiences into the classroom. - Price: Starts from €5,000 for a set of 10 headsets, including software.

### *Suitability*

Classroom sets are ideal for larger institutions or vocational schools that need to equip multiple students at once. These sets are particularly useful in environments where multiple learners need access to the same content simultaneously, such as in group training scenarios, interactive workshops, or when conducting virtual collaborative exercises.

### *Limitations*

Classroom sets can be costly and may require dedicated IT support to manage the equipment and software. Additionally, space and infrastructure need to be in place to accommodate multiple learners using the equipment simultaneously.

## Aspects of Inclusion

XR and gamification can play a crucial role in reducing barriers to participation for learners from marginalized groups, such as individuals with disabilities, those from remote or underserved areas, and learners facing cultural or linguistic challenges. The key to creating inclusive learning



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experiences lies in how those applications are implemented and how they are integrated in learning environments.

One of the most powerful aspects of XR is its ability to **customize learning environments** to accommodate diverse learners. For instance, VR can be adapted to enable learners with physical disabilities to interact with tasks through voice commands, adaptive controls, or specialized interfaces, allowing them to practice skills that might be difficult or impossible in traditional physical settings. Similarly, AR can provide real-time feedback through visual cues, audio descriptions, and context-sensitive support. These features can be particularly beneficial for learners who struggle with text-heavy materials or who have learning difficulties, as AR makes the content more accessible by offering multiple modalities for engagement. By incorporating these adaptive features, XR technologies can ensure that learners have equal opportunities to access and engage with educational content, thereby fostering a more inclusive learning environment. Further approaches on how "Inclusive Immersion" can be implemented are explored in a review of efforts to improve accessibility in virtual reality, augmented reality, and the metaverse, a part of the British Inclusive Immersion Project (see additional sources).

However, it is important to recognize that the mere presence of XR technology does not automatically guarantee inclusivity. If XR tools are not carefully designed, they may not provide adequate support to learners with special needs, reinforcing rather than breaking down existing barriers. It is therefore crucial that XR and gamified content is purposefully designed with inclusivity in mind to ensure that all learners, regardless of ability or background, can benefit from these technologies.



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In addition to the technical aspects of XR, the **cultural and linguistic diversity of learners** must also be considered. When designing XR and gamified content, it is important to account for the diverse backgrounds, languages, and learning preferences of the target audience. For example, when gamifying educational content, it is essential to consider the cultural relevance of the game elements,

such as symbols, narratives, and themes. These elements should reflect diverse cultural perspectives to ensure that learners feel represented and engaged. Moreover, the use of language in both XR and gamified environments should be inclusive, providing support for non-native speakers or learners with language barriers, such as translation or multilingual content.

Furthermore, XR and gamification provide opportunities for **self-directed and personalized learning**, which can be particularly valuable for learners with different needs and learning styles. However, this autonomy also requires that the learning paths, resources, and feedback mechanisms are adaptable to cater to individual preferences and learning speeds. These personalized learning experiences help to engage learners who might otherwise struggle with traditional, one-size-fits-all education methods.

For XR and gamification formats to truly realize their potential in vocational education, they need to be **integrated into curricula**, or in other words, teachers need to place them in a didactic context in a targeted manner. Here, too, it is crucial that diversity and inclusion are taken into account from the very beginning in this process. Before introducing VR and gamification into the classroom, teachers should consider their learners' diverse needs to **ensure an inclusive and accessible experience**. While you may not have control over the content, you can still take practical steps to make sure all students can benefit from these technologies. Start by ensuring the technology is accessible, such as checking for customizable features like subtitles or adjustable settings for sensory needs. Provide clear instructions to help students navigate the technology confidently, and consider integrating collaborative elements that encourage teamwork. Remember, VR and gamification can offer a personalized learning experience, but they also promote social learning and engagement, making it easier to support learners of varying abilities. With a bit of preparation and support, you can create a positive and inclusive learning environment where all students can thrive without overwhelming yourself or your class. This methodology is designed to help you explore these aspects in more detail, providing the guidance and confidence needed to successfully integrate these exciting technologies into your teaching practice.



## Digging Deeper

### **Report: The current status quo of XR use in VET development projects**

VET Toolbox Coordination Hub (2023). The current status quo of XR use in VET development projects, published as part of the project VET Toolbox.

[https://www.giz.de/fachexpertise/downloads/230222\\_vet\\_stocktakingreport\\_XR.pdf](https://www.giz.de/fachexpertise/downloads/230222_vet_stocktakingreport_XR.pdf)

### **Inclusive Immersion Project (2019-2023) and Equitable Social VR (2022-2025) - Brunel University London**

Link to the project abstract: <https://gtr.ukri.org/projects?ref=EP%2FS027637%2F1>

Link to the outputs: <https://www.brunel.ac.uk/people/project/203683>

Link to video “Inclusive Immersion: Inclusive Design of Immersive Content”:

<https://youtu.be/CPH9zSRpok0?feature=shared>

### **Article: Current and Potential Uses of AR/VR for Equity and Inclusion**

Dick, E. (2021). Current and Potential Uses of AR/VR for Equity and Inclusion.

<https://itif.org/publications/2021/06/01/current-and-potential-uses-arvr-equity-and-inclusion/>

### **Article: Improving Equity and Inclusion in Education using Virtual and Augmented Reality in Open Distance Learning**

Abdul Uzza, A., Hamdan, A., & Singh, A. (2022). Improving Equity and Inclusion in Education using Virtual and Augmented Reality in Open Distance Learning. <https://doi.org/10.56059/pcf10.142>

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Maricic, S., Radolovic, D., Veljovic, I., & Raguz, R. (2019). VR 3D Education for Vocational Training. *MATEC Web of Conferences*, 299, 03006. <https://doi.org/10.1051/mateconf/201929903006>

Sherman, W. R., & Craig, A. B. (2002). *Understanding Virtual Reality: Interface, application, and design* (1st ed.). Morgan Kaufmann.

## 2. Needs analysis

By Strojarška i prometna škola



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### Summary

*It is generally accepted that learning is easier through play and that today's generations of students find it easier to acquire new knowledge and skills through play-based learning. The use of XR and computer games allows us to do this. Play fosters curiosity and engagement on a much deeper level than when a teacher addresses students directly. But at the same time, the use of XR and computer games in teaching is a great challenge for everyone involved in the teaching process. For such a way of working, it is necessary to educate teachers on the use of new means of work and allocate a certain amount of money. In computer games, teachers should carefully use existing and develop new pedagogical models and learning scenarios that would be suitable for game-based learning, taking into account students' different previous knowledge and different speed of mastering the material. The goal of this way of working is to increase the motivation and interest of students and encourage certain forms of behavior (non-discrimination, promotion of equality and respect, etc.). This chapter therefore examines the potential benefits and challenges of using XR and gamification in the context of training, how to determine learning objectives for XR/play-based training, and how to identify the skills and knowledge of learners and trainers that interfere with learning and teaching.*

## Identifying Strengths, Challenges, and Learning Goals

### Setting Learning Goals for XR/Game-Based Training: What Should Students Take Away?

One of the primary objectives of using XR technologies and (serious) games in vocational education is to increase learner engagement and active participation in practice-oriented training. Both approaches aim to foster motivation and sustained involvement, which can enhance skill acquisition, reinforce professional competencies, and support long-term learner commitment — key factors for effective vocational learning and workforce readiness.

To fully realize the potential of XR and game-based learning in vocational education, it is essential to define clear, specific, and measurable learning objectives. These goals should align the pedagogical possibilities of immersive technologies and game mechanics with the practical skills and knowledge outcomes required in real-world professional contexts.

### Steps in setting goals



### 1. Identify user needs and learning outcomes

- What do students need to know, understand or be able to do after participating?
- What specific competencies (knowledge, skills, and attitudes) do you want to develop?
- Consider: Is the goal education, practice, emotional development, or evaluation?

### 2. Align objectives with XR/game format

- Determine which aspects of XR/game training best support:
  - Simulation of real conditions.
  - Interactive learning through trial and error.
  - Group participation and collaborative problem solving.

### 3. Divide goals into categories

Learning objectives for XR/games often include the following dimensions:

#### A. Cognitive goals (knowledge and understanding)

- Learn the basic concepts.
- Apply theoretical knowledge in a practical context.
- Develop the ability to analyze and make decisions.
-  **Example:** Understand the technical principles of operation of autonomous systems simulated in XR.

#### B. Psychomotor goals (skills)

- To master specific motor actions through simulations.
- Perfect the technique in a safe virtual environment.
-  **Example:** Perform a surgical procedure in a simulation before performing it in real conditions.

#### C. Affective goals (attitudes and emotional reactions)

- Develop empathy for different perspectives through an immersive experience.
- Strengthen self-confidence through safe experimentation.
-  **Example:** Experience the challenges of a person with a disability through a simulation of everyday life.

#### D. Social objectives (cooperation and communication)

- Improve teamwork through games that require joint efforts.
-  **Example:** Solving a challenge together in a business simulation.

### 4. Define measurable success indicators

- What will be the proof that the students have achieved results?

#### Examples of indicators:

- The student can perform the simulated task independently.
  - The team has achieved the goal in the game within the allotted time.
  - Students' reflections indicate better understanding and engagement.
-

## 5. Adjust the level of student goals

- Beginners: Focus on basic understanding and basic skills.
- Advanced: Developing more complex skills and making decisions in complex situations.



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Today, the use of gamification has become very popular in online learning systems because it has proven to be very effective and desirable for users. The eLearning industry portal states that 80% of students say that they would be much more productive if their university or job was more like a game. And that 60% of students would be motivated by rankings and that as many as 89% of them would use an online learning system more if it had a scoring system.

Four main factors for increasing engagement using gamification methods:

1. **Expedited feedback.** In the real world, getting feedback takes a slow time (e.g., an annual performance report) with long gaps between set goals. Gamification significantly speeds up obtaining feedback on employee/user engagement.
2. **Clear goals and rules of the game.** In the real world where goals are vague and rules are selectively applied, gamification provides clear goals and well-defined game rules to ensure that players feel they can achieve goals.
3. **A compelling story.** While real-world activities are rarely overwhelming, gamification builds a story that engages users to participate and achieve the goals of the desired activity.
4. **Tasks that are challenging, but achievable.** While in reality there is an excess of goals/challenges that are mostly large and long-term, with gamification we can organize the task through several short-term and achievable goals.

In (serious) games and game-based learning, the use of specific game mechanics plays a central role in creating engaging and effective learning experiences. These mechanics structure the learning process, promote motivation, and guide learners toward clearly defined goals. The following section introduces the most commonly used game mechanics:



**Points** – mechanics where points are awarded for (non)fulfillment of a task, and the use of point scales indicates the progress or achievement of the student.

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**Levels/Levels** – a mechanic that decomposes the main goal into several smaller goals, or tasks. By meeting the goals of each level, an achievement is achieved.
- 

**Tasks/Challenges** – mechanics where the main goal is broken down into activities and tasks.
- 

**Badges** – a mechanic that awards a "reward" for completing a task or activity as a visual representation of success.
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**Ranking scales** – the mechanics of displaying the best scores, and are often related to the mechanics of awarding points for a completed task or activity.
- 

**Rewards** – mechanics that denote (in)material rewards for achieving achievements or goals.
- 

**Progress bars** – mechanics that track and show students' progress towards goals.
- 

**Stories** – mechanics that intertwine material and problems with a good story in order to increase the interest of students.
- 

**Avatars** – mechanics that represent a visual representation of students such as animated Feedback – a mechanic that gives the student information about his previous performance and engagement. Other gamification mechanics, such as points and badges, can be used as feedback, but it can also be concrete feedback of a constructive nature.

Identifying the potential benefits and challenges of using XR and gamification in the context of training: How can I help you in your context and where are the limitations?

Today's learners in vocational education are part of generations that have grown up with digital technologies such as smartphones, video games, and interactive media. These experiences have fundamentally shaped how they process information, interact with content, and engage with learning environments. XR technologies and (serious) games respond to these shifts by offering immersive, interactive formats that promote deeper understanding, active participation, and long-term retention. In addition to cognitive and practical benefits, these technologies also offer a unique opportunity to foster diversity and inclusion. Simulated environments and game-based

scenarios can raise awareness for different perspectives, create empathy through role-taking, and allow learners to safely explore diverse social or workplace situations.

However, while XR and gamification hold great potential to modernize and enrich vocational training, their implementation must be carefully managed. Challenges such as unequal access to technology, high costs, or cognitive overload need to be addressed proactively. Ensuring inclusive design, providing adequate support for trainers, and maintaining a balance between innovation and usability are key to unlocking their full potential in both educational and professional contexts.



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### Benefits of using XR and gamification in vocational training

#### 1. Increased learner engagement

- **XR:** Immersive environments reduce distractions and enable active participation.
  - **Example:** Learners engage in interactive simulations instead of passively consuming lectures.
- **Gamification:** Points, badges, and leaderboards motivate learners and encourage sustained effort.

#### 2. Improved knowledge retention

- **XR:** Experiential learning through hands-on simulations enhances memory and understanding.
  - **Example:** Trainees in medical or technical fields can practice procedures safely.
- **Gamification:** Repetition, challenges, and immediate feedback reinforce learning outcomes.

#### 3. Safe and inclusive learning environments

- **XR:** Enables training in realistic scenarios without real-world consequences.
  - **Example:** Flight simulators or virtual emergency drills allow safe practice of complex tasks.
- **Gamification:** Mistakes are part of the game dynamic and are reframed as learning opportunities, supporting a growth mindset.



*Made by Frolopiaton Palm for freepik*

#### 4. Personalization and adaptability

- **XR:** Training modules can adapt in real time to the learner's pace and progress.
  - **Example:** Dynamic scenarios that increase in complexity based on performance.
- **Gamification:** Learners can pursue individual learning paths, increasing autonomy and motivation.

## 5. Development of practical and transferable skills

- *XR*: Simulates real-world work situations, supporting direct application of skills.
  - *Example*: Technicians can practice complex repair procedures in a risk-free environment.
- *Gamification*: Game challenges mirror real-life problem-solving, encouraging strategic thinking and creativity.

## 6. Enhanced feedback and learner reflection

- *XR*: Detailed performance tracking enables targeted support and progress monitoring.
- *Gamification*: Instant feedback mechanisms promote self-assessment and adjustment of learning strategies.

## 7. Support for diversity and inclusion

- *XR & Gamification*: Enable learners to experience different perspectives and social situations.
- *Example*: Simulated scenarios can raise awareness of discrimination, unconscious bias, or inclusive workplace practices.



## Challenges of Using XR and Gamification in Vocational Training

### 1. High costs and unequal access

*XR* technologies require expensive hardware (e.g., VR headsets, powerful computers), which can limit adoption, especially in resource-constrained institutions. *Gamification* may rely on digital infrastructure that not all learners can equally access or navigate.

### 2. Technical barriers

Issues such as unstable software, poor connectivity, or hardware malfunctions can disrupt the learning process and cause frustration among learners and trainers alike.

### 3. Need for trainer preparation and ongoing support

Successful integration requires comprehensive teacher training, technical literacy, and time to adapt content. Trainers must also stay up to date with rapid technological developments.



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### 4. Cognitive overload and physical strain

Overexposure to *XR* environments can cause discomfort (e.g., VR sickness), fatigue, or distraction. Similarly, over-gamification may lead to overwhelming learners with too many stimuli or rules.

5. **Risk of superficial motivation, too much competition and demotivation**

When gamification focuses too heavily on extrinsic rewards (e.g., points or badges), learners may be motivated by competition rather than by a genuine interest in the subject matter. Excessive competition through rankings and rewards in gamified environments can alienate learners who are less competitive, potentially leading to frustration, reduced self-esteem, or demotivation. This can disproportionately affect learners who struggle with performance or have lower self-confidence.

6. **Reduced social interaction and collaboration**

Especially in XR settings, individual immersion may limit interpersonal exchange. Without thoughtful design, this can hinder teamwork and the development of soft skills.

7. **Potential for exclusion**

Learners with disabilities, neurodiversity, or low digital literacy may face accessibility barriers if XR and gamification tools are not inclusively designed from the outset.

While XR and gamification can enhance teaching and make it more interactive, it is important to understand the challenges associated with using them. Effective implementation requires careful planning, teacher training, adequate resources, and a balanced approach that also includes traditional learning methods.

## Identifying the required skills and knowledge of students

Identifying the necessary skills and knowledge of students related to the use of XR and gamification in an educational context is a crucial step for the effective implementation of these technologies in the teaching process. Here, we will list the main categories of skills and knowledge that students need to possess in order to successfully use XR and gamification.

### 1. Technical skills

- **Basic understanding of XR technology:** Students should be familiar with the basics of the used technology (AR, VR or MR), including an understanding of hardware devices (e.g., VR glasses, AR apps, mobile devices) and software platforms.
- **Use of devices and apps:** Students need to know how to use specific XR-related devices and apps, such as VR glasses, AR apps on smartphones, and interactive tools like 3D modeling or virtual simulators.
- **Navigating Virtual Spaces:** Students need to develop skills to move and interact in virtual spaces, which includes knowing basic controls, manipulating objects, and navigating interactive environments.



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- **Use of gamification tools:** Students need to know gamification platforms in education, such as Kahoot!, Quizizz, Classcraft, or digital games that include elements of competitions, scoring, missions, and prizes.

## 2. Cognitive skills

- **Problem-solving:** Gamification often involves challenges and tasks that require developing problem-solving skills, critical thinking, and strategic planning.
- **Ability to multitask:** Students will need to develop skills to simultaneously follow multiple pieces of information and perform several tasks, which is often required in interactive games or learning in an XR environment.
- **Understanding feedback and progress:** In gamification, students often receive feedback on their progress, points, and achievements, so it's important to understand how to use this information to improve their own abilities.

## 3. Sociocultural skills

- **Collaboration and teamwork:** Many games in XR and gamification require collaboration between students, so it's important to develop social skills and the ability to work in a (virtual) team.
- **Communication in virtual environments:** Students need to learn how to communicate effectively with others in virtual spaces, whether through text, voice messages, or as part of collaborative problem-solving.
- **Empathy and Social Interaction:** Possibility that students use games and XR experiences to develop emotional intelligence, understanding of others, and empathy in simulated situations.

## 5. Metacognitive skills

- **Self-assessment and reflection:** Students need to develop the ability to reflect on their learning in an XR environment or a game, identify their strengths and weaknesses, and use feedback to improve their approach to learning.
- **Self-management of learning:** Gamification and XR environments often involves personalized paths and challenges, so it's important for students to develop the ability to manage their learning and progress on their own.

## 6. Digital literacy

- **Security and ethics in XR environments:** Students should be familiar with security practices in digital environments, including privacy protection, ethical issues in games, and responsible behavior in virtual communities.
  - **Understanding digital media:** It is important for students to develop critical thinking towards digital content, identify false information, and understand how content can be manipulated or shaped in gamification and XR platforms.
-

## Identifying teachers' skills and knowledge



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In the context of vocational training, the role of the teacher is shifting away from traditional, didactic instruction to a more modern, student-centered approach. Teachers now prepare dynamic learning environments and tasks that encourage independent learning, guiding students through interactive, innovative experiences. This approach involves facilitating creativity, supporting problem-solving, and enabling students to engage with technology-driven tools such as XR and serious games.

For successful integration of XR technologies and serious games into educational settings, teachers must acquire specific competencies in both technical and pedagogical domains.

While creating custom XR content or games

may be an advanced skill, the effective use of available platforms, tools, and resources should be prioritized for most educators.

Importantly, teachers can benefit from mutual support within their professional networks, helping each other develop the necessary **skills for using** these technologies effectively in the classroom.

### 1. Technical skills

- **Knowledge of XR technologies:** Teachers need to understand the basic concepts of the XR technology they want to use. This implies knowledge of devices such as VR glasses, AR applications and mobile devices, and how to use them in the classroom.
- **Knowledge (and creation) of content:** Teachers need to know where to find content for their teaching purposes. It is not absolutely necessary and very time-consuming, but it is also very effective if teachers can create content themselves.
- **Management of technology in the classroom:** Teachers should be able to manage the devices, platforms and applications used in the classroom, or at least know who to contact for assistance. This includes installing, updating and maintaining the necessary apps and devices.

### 2. Pedagogical skills

- **Integrating XR and games into the curriculum:** Teachers need to understand how to use XR technologies and games in the context of their subject and how to relate them to the curriculum. This includes class planning that includes XR and game experiences and the development of educational goals and tasks based on XR/games.
- **Understanding learning through play (gamification):** Teachers need to know the principles of gamification, including how to use games, points, badges, and challenges to improve student engagement and motivation.



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- **Assessment of learning effectiveness:** Teachers need to know how to track students' progress in interactive, gamified experiences and how to tailor teaching based on this data. This includes using analytics and feedback to tailor educational goals.
- **Personalization of learning:** XR and gamification often allow for personalized approaches to learning. Teachers must know how to adapt activities and tasks according to the needs and abilities of students, creating challenges that are appropriate for each student.

### 3. Creative and communication skills

- **Creative thinking:** Developing new and innovative methods for using XR and gamification in teaching. Teachers should be able to design interactive projects that encourage students to be creative and explore independently.
- **Communication with students:** Teachers must be able to explain how to use XR technologies and games, and how to motivate students to use them in the best way. Also, the ability to give clear instructions and support to students during XR and gamification activities is essential.
- **Supporting students with special needs:** Using XR and gamification can be very beneficial for students with special educational needs. Teachers need to have the skills to adapt and optimise technologies to make them accessible and useful for all learners, including those with learning disabilities.

### 4. Digital literacy and ethical skills

- **Digital literacy:** Teachers should have a high degree of digital literacy, including an understanding of online security and data privacy, especially when using XR technology that can collect students' personal information.
- **Ethics in Education:** In the context of XR and gamification, educators need to be aware of ethical issues, including balancing entertainment and educational goals, as well as ensuring that content is appropriate for all ages.

### 5. Continuous professional development and learning

- **Keep up with new trends:** XR and gamification are evolving rapidly, so it's important for educators to keep up with new technologies, tools, and educational approaches. This includes participation in professional networks, webinars and workshops.
- **Experimentation and feedback:** Teachers should be prepared to experiment with new technologies, seek feedback from students, and adapt their methods based on that feedback.

In conclusion, a thorough needs analysis is essential when considering the use of XR and gamification in vocational training. These technologies offer great potential to enhance

engagement, deepen understanding, and support inclusive, learner-centered education. However, their implementation comes with challenges – from technical and pedagogical demands to the need for continuous professional development. To navigate these complexities successfully, it is crucial to foster a culture of mutual support and shared learning. Both teachers and learners bring valuable perspectives, skills, and experiences to the table. By encouraging collaboration and breaking down traditional hierarchies between educators and students, we can create a more dynamic, responsive, and equitable learning environment in which everyone benefits and grows together.



## Digging Deeper

### **GAMIFICATION METHODS IN ONLINE PROGRAMMING LEARNING - PERSONAL EXPERIENCE**

Vjeran Bušelić<sup>1</sup>, Kristijan Župan<sup>2</sup> <sup>1</sup>Zagreb University of Applied Sciences, Vrbik 8, Zagreb, Croatia  
<sup>2</sup>Q software, Amruševa ul. 6, Zagreb, Croatia ;

<https://hrcak.srce.hr/file/318509>

### **USE AND TEACHERS' ATTITUDES TOWARDS GAMIFICATION IN PRIMARY AND SECONDARY SCHOOLS**

Dijana Plantak Vukovac, Maja Škara; Goran Hajdin; Faculty of Organization and Informatics, Varaždin, Croatia;

<https://hrcak.srce.hr/clanak/294324>

Klara Lovrečki, univ. bacc. Paed. And philol. franc. Faculty of Humanities and Social Sciences, University of Zagreb, Ivan Moharić, univ. bacc. Philol. God. et philol. Croat. Faculty of Humanities and Social Sciences, University of Zagreb; Gamification (elements of video games) in teaching: a view from a pedagogical-didactic perspective;

<https://hrcak.srce.hr/file/396308>

ChatGPT.com

<https://elearningindustry.com/>

## References

Ivona Franković, Department of Informatics, University of Rijeka, Radmile Matejčić 2, 51000 Rijeka

DAVOR PEJDO, Juraj Dobrila University of Pula, Faculty of Informatics in Pula, XR-XTENDED REALITY IN EDUCATION, Pula, September 2021.

# 3. Course Design

By Domspain



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## Content

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- Aligning the XR/game content with the learners’ skills and knowledge levels .....33
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## Summary

*This chapter looks at the integration of Extended Reality (XR) and gamification elements into training programmes and provides guidance on how to determine their value in the teaching and learning process. It examines the different phases of a lesson — introduction, deeper learning, application, repetition, and assessment— and provides examples of how XR and gamification can enhance each phase. In addition, this chapter discusses the selection of XR scenarios and games relevant to the learning objectives, focusing on considerations such as customisation to the skills and knowledge levels of participants, both professional and digital/technical. Finally, options for developing customised XR applications for specific training needs will be discussed.*

## Incorporating XR and gamification elements in a training program

The first step is to determine if and where the use of XR and gamification adds value to the teaching and learning process. Below is a breakdown by lesson phase, describing general applications of XR/gamification followed by specific examples from the COMP+ context:



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- In the **introductory phase**, XR and gamification can be used to create immersive, engaging experiences that help learners connect with the training topic from the outset. These tools can present key themes in a vivid and interactive way.

 **Example:** A XR scenario could illustrate the diversity of passenger needs—such as hearing impairments or limited language skills—setting the stage for understanding the importance of inclusion in mobility services. Gamified activities can introduce communication strategies and cultural sensitivity in a playful mode.
- In the **immersion phase**, XR offers learners the opportunity to explore realistic, situational environments, helping them engage with the material through direct experience. Gamification supports this by rewarding progress and maintaining motivation.

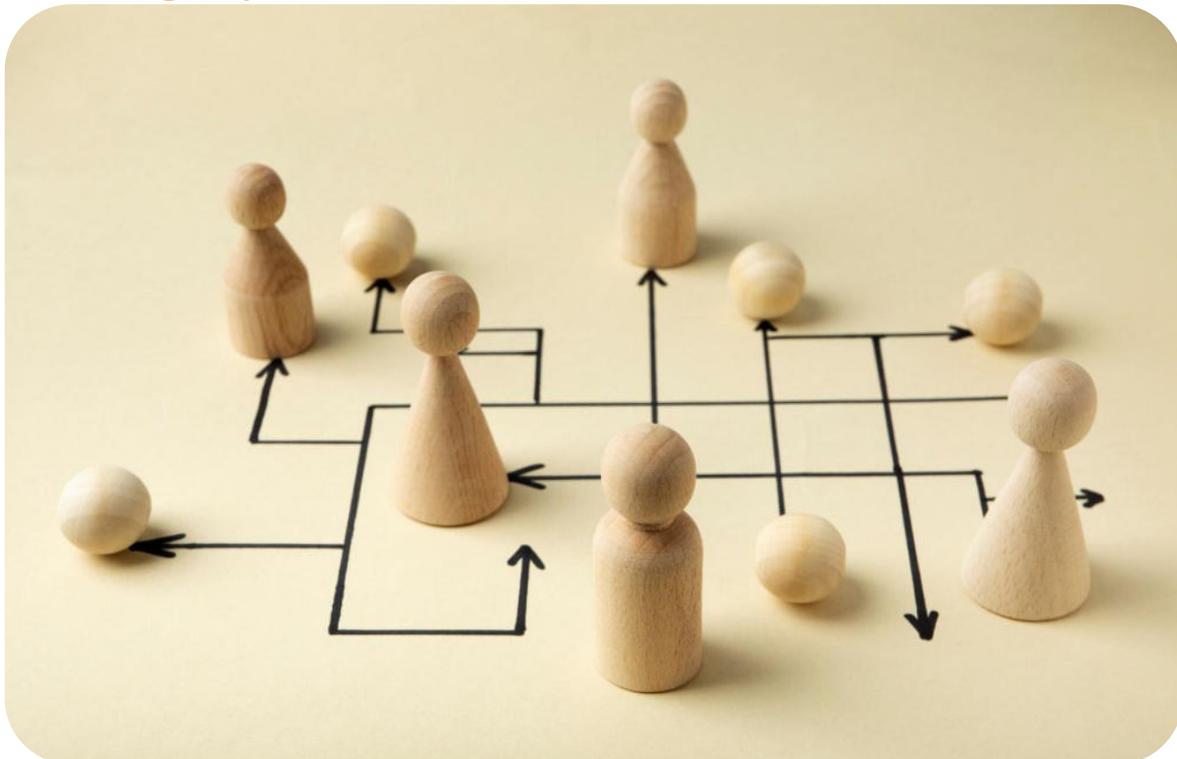
 **Example:** A VR scenario might simulate a busy transport terminal, where learners assist passengers and receive badges or points for demonstrating inclusive service skills.
- In the **application phase**, XR enables learners to practise their skills in interactive, lifelike contexts. Gamification elements structure challenges and deliver instant feedback to support learning.

 **Example:** Learners might guide a non-fluent speaker using visual tools or assist a hearing-impaired traveller. Through gamified challenges, they receive real-time responses that help them refine their performance.
- In the **repetition and reinforcement phase**, XR allows learners to repeat scenarios for skill consolidation, while gamification keeps them engaged through elements like leaderboards, progress bars, or achievements.

 **Example:** Learners can return to previous VR tasks with slight variations and compete for high scores or personal achievements, supporting continuous improvement.

- In the **assessment and feedback phase**, XR can simulate realistic evaluation situations, while gamification facilitates self- and peer-assessment in a collaborative and motivating format.
  - **Example:** Learners complete an XR scenario and receive feedback from peers on their inclusion practices, supported by digital rubrics and gamified progress indicators.

## Selecting XR scenarios and games relevant to the learning objectives



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Selecting the right applications for teaching is not always easy, especially if you are new to the methodology or the equipment. This subchapter will line out the most important aspects of what to keep in mind when selecting the activities and applications for the course design.

There are a number of challenges educators might face when integrating XR technologies into their teaching:

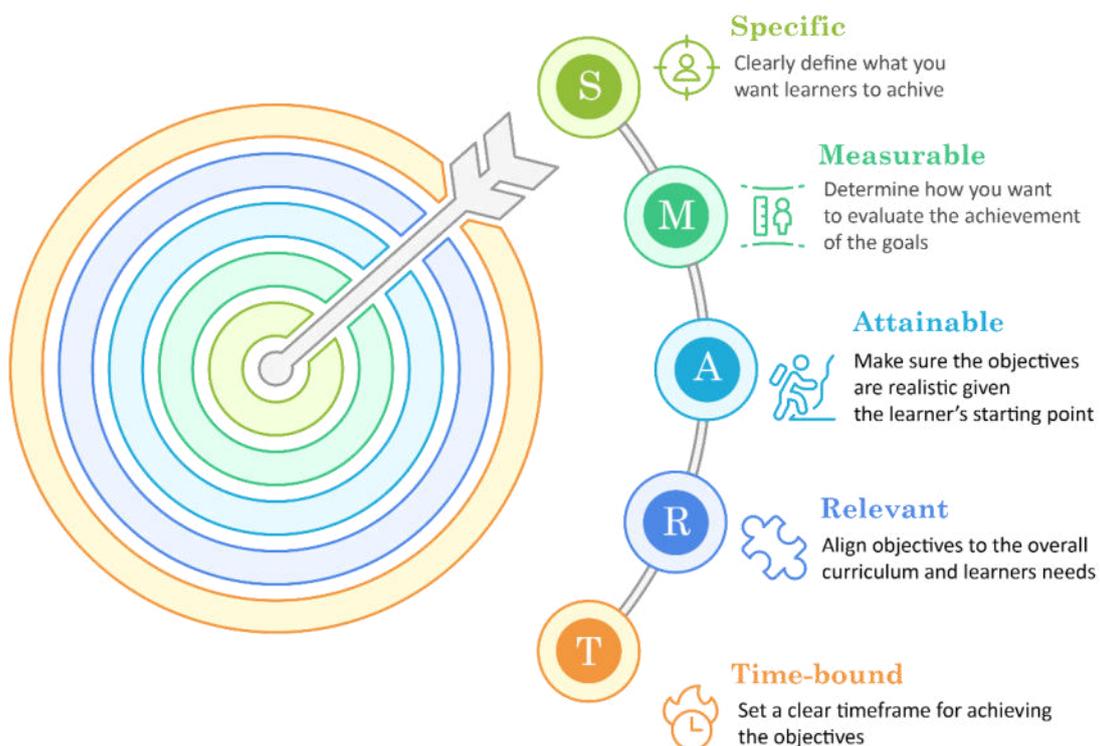
- **Cost.** XR technologies are expensive, which is a significant barrier for educational centres, especially if they need to buy class sets.
- **Limited presence with low-cost alternatives.** While there are more affordable options such as Google Cardboard, these often lack immersive “presence” that is crucial for a good experience.

- **Availability of learning assets.** Many educators lack the time or expertise to create their own 3D learning environments, which means educators have to rely on external resources to provide educational content. Although the industry is growing, and some open-source resources, like this one, are available, this is still a considerable challenge.

## Defining Learning Objectives

Before choosing an XR scenario or game, it's important to clearly define the learning objectives. These objectives should be SMART (Specific, Measurable, Achievable, Relevant, Time-bound). Clear objectives guide the selection process and ensure that the selected XR applications are purposeful and effective.

### SMART Objectives



More information on how to set learning objectives for XR/game-based training can be found in Chapter 2, Needs Analysis.

## Case Study - The Empathy in VR Pilot Project

The pilot project "Empathy in VR", a collaboration between Lumination and Goolwa Secondary University (GSC), investigated the effectiveness of VR in teaching empathy to secondary school students. This initiative utilised GSC's Lumination Learning Lab, which uses VR and AR technology to create immersive learning experiences. The 10-week empathy unit was designed to measure and improve students' empathy skills.

The course used the **Perth Empathy Scale (PES)** to assess empathy levels at the beginning, middle and end of the programme. Weekly activities were assessed using a 10-point scale to measure student engagement. The VR experiences covered topics such as **water scarcity, visual impairment, environmental sustainability, migration** and **war** and provided students with different perspectives on these issues.

Students also participated in creative projects and designed their own VR experiences to help others develop empathy. This hands-on approach not only engaged the students, but also deepened their understanding of empathy through practical application.

The results show that **overall empathy skills increased by 12%**, highlighting the effectiveness of the programme. In addition, the **average engagement of the students was 70%**. Particularly impressive were experiences such as understanding colour blindness and using the app "The Book of Distance", which provides an emotional journey through immigration.

This **project demonstrated that VR can effectively promote empathy and student engagement and highlights the potential of VR applications** to achieve specific educational objectives.



Source:



<https://lumination.com.au/>

## Key considerations for selections of scenarios and games

When selecting XR scenarios and games for educational or institutional use, the following key factors should be considered. It is important to note that educators must always assess which of these criteria are relevant in their specific teaching context, as not all considerations may apply equally in every situation:



**Educational objectives:** Ensure that the XR content aligns with the educational objectives and learning outcomes of your programme. The scenarios should effectively support the learning objectives.



**Technical requirements:** Make sure the XR scenarios and games are compatible with the hardware and software available. Assess the technical requirements, such as device specifications and system integration requirements.



**User-friendliness:** Assess the user-friendliness and accessibility of the XR content. It should offer an intuitive user interface and be accessible to users with different levels of technical knowledge.



**Content quality:** Assess the quality of the content, including graphics, interactivity and engagement. High quality content should provide an engaging and realistic experience.



**Scalability:** Consider the scalability of the XR scenarios and games. Make sure they can be used by multiple users or institutions without major additional costs or technical challenges.



**Support and updates:** Check the availability of technical support and regular updates for the XR content. Reliable support and updates are critical to maintaining the functionality and relevance of the content.



**Costs and licences:** Review the cost of the XR scenarios and games, including licence terms and ongoing fees. Make sure the costs fit within your budget and offer good value for the



**Privacy and security:** Ensure that XR content adheres to privacy and security standards. Make sure that all user data collected is managed securely and in accordance with the relevant regulations.



**Adaptability and customisation:** Check whether the XR scenarios and games can be adapted or customised to better meet specific educational or institutional needs.



**Feedback and evaluations:** Pay attention to feedback and reviews from other users or institutions. Positive feedback can provide insight into the effectiveness and reliability of the XR content.

## Aligning the XR/game content with the learners' skills and knowledge levels



Photo by Ron Lach : <https://www.pexels.com>

How you use XR and gamification and to which degree will largely depend on your group of learners, their level of professional skills as well as their digital/technical skills. For example, people experienced with video gaming will be much more at ease and require less guidance than those learners who are not used to navigating digital environments. In this chapter we will give some pointers of how to align the content with your learners' skills and your teaching goals.

The effectiveness of XR and gamification in education depends heavily on tailoring the content to the learners' existing skills and knowledge. If the material is too advanced, it can overwhelm and demotivate participants, while content that is too simple can lead to boredom and a lack of motivation. It is therefore crucial for optimal learning success that the complexity and style of the content is matched to the learners' abilities. The right focus allows learners to build on their current knowledge, encourages engagement and provides a meaningful learning experience.

### Assessing learners' skills and knowledge

In a diverse learning environment, it is important to recognise and take into account the wide range of skills and abilities of learners. This process begins by accurately assessing these abilities and then grouping learners in ways that maximise their learning experience.

#### 1. Differentiation as a key strategy

Differentiation is an important method of catering for individual learning needs. In this approach, learning content and methods are adapted to cater for students' different learning styles, backgrounds and abilities. By using differentiation, teachers can make the learning material accessible to all learners, regardless of their starting point.

#### 2. Assessment techniques

- **Pre-assessment:** Use surveys and diagnostic tests to determine learners' basic knowledge and skills. This can include their familiarity with digital tools, previous experience with XR or gaming, and their understanding of the subject matter.



Pre-assessment tools: You can create a survey with **Google Forms**, or design and distribute a survey with **Survey Monkey**. There is always **Kahoot** too, even though this last one has less free options recently.

- Ongoing observations: Ongoing observation during the initial sessions can help teachers determine learner comfort levels and adjust teaching strategies accordingly. Practical assessments through XR simulations or game-based tasks can show how well they are coping in digital environments.



Ongoing observations tools: **Google Classroom** allows you to manage assignments, provide feedback and track students' progress. Another tool, **Seesaw**, works as a digital portfolio where learners can document and reflect on their learning progress.



Source: [Seesaw - Adding Evidence and Reflections](#)

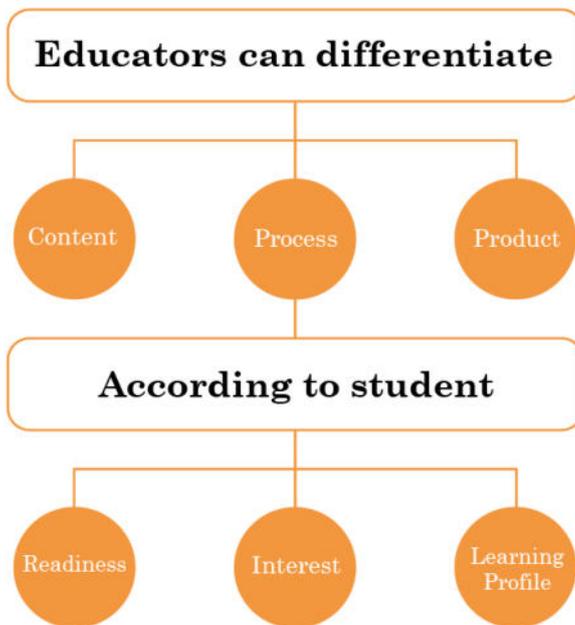
- Self-assessment: Encourage learners to reflect on and evaluate their own skills. This introspection can provide insight into their confidence and help shape learning pathways more effectively.



Self-assessment tools: Reflective journals (e.g., **Microsoft OneNote**, **Evernote**) allow personal tracking of learning. Formative assessment tools like **Quizlet** and **Socrative** offer quizzes for self-testing. **Plickers** uses response cards for instant feedback, while **Padlet** provides a collaborative space for posting reflections and self-assessments.

### 3. Grouping strategies

Targeted grouping is an effective tool for managing a diverse class. Grouping can be based on various factors, such as common interests, prior knowledge or skill levels. For example, learners who are comfortable with digital tools can be grouped together to tackle advanced tasks, while learners who are less familiar with these tools can be given more support with the basics.



#### 4. Differentiation in different phases of learning

Differentiated instruction should permeate all phases of the curriculum:

- **Introductory phase:** use visual aids and repetition to appeal to visual learners and ask higher level questions to challenge advanced learners.
- **Research/exploration phase:** Provide a range of resources such as articles, videos and interactive models to cater for different learning preferences and ensure that every student can relate to the material.
- **Demonstration phase:** Use interviews and other strategies to practise understanding and make abstract concepts more tangible.
- **Practice/Application Phase:** Provide individualised support and feedback to guide learners through challenges and encourage them to apply the new knowledge.

#### 5. Additional strategies for different learning needs

Trying out different teaching strategies as part of differentiation can help to cater for the individual needs of each learner. For example, forming peer groups can facilitate collaborative learning where students can benefit from different perspectives and support each other. In addition, the use of tools such as graphic organisers can help students to organise their thoughts and understand complex information.



Graphic organiser tools: **MindMeister** offers mind maps to visually organise ideas around a central theme. **Coggle** is ideal for creating concept maps that display relationships between concepts hierarchically. **Lucidchart** enables users to design flowcharts for representing processes or workflows. For a strategic analysis, **Creately** provides tools to create SWOT analysis charts, helping evaluate strengths, weaknesses, opportunities, and threats.

## Customizing the content for the different levels

To cater for different skill levels, XR and gamified content must be customisable. Here are some strategies:

- **Structured learning paths:** develop content with multiple levels of complexity. Start with basic concepts for beginners and gradually introduce more complex scenarios for advanced learners. For example, an XR simulation could initially focus on basic navigation and interaction for beginners, while providing more sophisticated problem-solving tasks for experienced users.
- **Adaptive learning:** Implement adaptive learning technologies that adjust the level of difficulty to the learner's performance. For example, in a gamified environment, the game can provide hints or reduce the difficulty level for weak learners, while offering advanced challenges to those who try extra hard.
- **Optional advanced modules:** Offer optional modules or challenges that delve deeper into certain topics for advanced learners. This allows them to explore their areas of interest in more detail without overwhelming others.
- **Personalised feedback:** Provide tailored feedback based on the performance of the individual or group. For example, beginners could receive more guidance, while advanced users receive complex scenarios that test their decision-making skills.
- **Peer learning opportunities:** Facilitate peer learning by giving learners of different levels the opportunity to interact and collaborate with each other. Advanced learners can mentor beginners, strengthening their own understanding while providing support to less experienced peers.



*Made by non3dgraphic for freepik*

## Adapting to diverse learning styles

To maximise learning effectiveness, it is important to align XR experiences and educational games to different learning styles. Below we briefly explore how these tools can be tailored to visual, auditory, kinaesthetic and multimodal learners.



### 1. Visual Learners:

Modern technologies, including XR and educational games, have significantly enhanced visual learning opportunities. The immersive visual experiences offered by XR—such as 3D models, virtual tours, and augmented reality overlays—are especially beneficial for visual learners. These learners can interact with and explore complex visual information, allowing them to better understand and retain the learning material.



**2. Auditory Learners:**

For those who learn best by ear, educators can enrich XR environments and games with audio feedback, narration, and spoken explanations. Elements such as voice notes and interactive dialogues help auditory learners to better absorb and process information. Clear and engaging audio components ensure these learners can follow the lesson and grasp the concepts being taught.



**3. Kinesthetic Learners:**

Kinesthetic learners thrive on physical interaction and hands-on experiences. XR technology supports this learning style by offering interactive, simulated environments in which learners can manipulate objects, perform tasks, and physically engage with the content. This active participation helps them better understand and retain material through direct experience.



**4. Multimodal Learners:**

Many learners absorb information through a combination of sensory channels, known as multimodal learning. The versatility of XR and gamified content in combining visual, auditory, and kinesthetic elements makes them highly effective for these learners. The multisensory experience allows engagement with the content in varied ways, improving understanding and fostering a deeper connection with the subject matter.

## Options for designing your own application

There are some tools out there that allow trainers to design their own content, even if they are not programming specialists or game designers. As this is a fast-evolving field, new developments are always around the corner. Here, we will present you with some examples of what we find are low-threshold options to try out.

### Low-Threshold Tools for XR Content Creation

<b>CoSpaces Edu</b>	
CoSpaces Edu is an intuitive platform that allows users to create virtual reality (VR) and augmented reality (AR) content. It is designed for educational purposes and supports a range of subjects and activities.	
<p>➔ <b>Key Features</b></p> <ul style="list-style-type: none"> <li>6. Drag-and-drop interface</li> <li>7. Library of 3D objects and environments</li> <li>8. Compatibility with various VR headsets</li> <li>9. Coding capabilities with Blockly and JavaScript</li> </ul>	

### Unity with VRTK (Virtual Reality Toolkit)

Unity is a powerful game development engine that, combined with VRTK, offers a relatively accessible way to create VR applications. While it may have a steeper learning curve than some other tools, it is highly versatile.

→ **Key Features**

- 10. Extensive documentation and community support
- 11. Asset Store for pre-made components
- 12. Supports a wide range of VR hardware
- 13. Customisable and scalable for different project needs

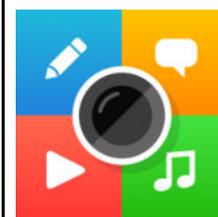


### ThingLink

ThingLink enables the creation of interactive images, videos, and 360-degree media. It is widely used in education for creating engaging and immersive learning experiences.

→ **Key Features**

- 14. Easy-to-use editor for adding interactive elements
- 15. Supports VR and 360-degree content
- 16. Integrates with learning management systems (LMS)
- 17. Analytics to track user engagement

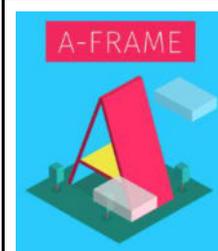


### A-Frame

A-Frame is a web framework for building VR experiences. It simplifies the development process with HTML-like tags and is particularly suited for web-based VR applications.

→ **Key Features**

- 18. Easy integration with web technologies (HTML, CSS, JavaScript)
- 19. Large collection of community-created components
- 20. Runs in web browsers without the need for additional software
- 21. Open-source and highly customisable

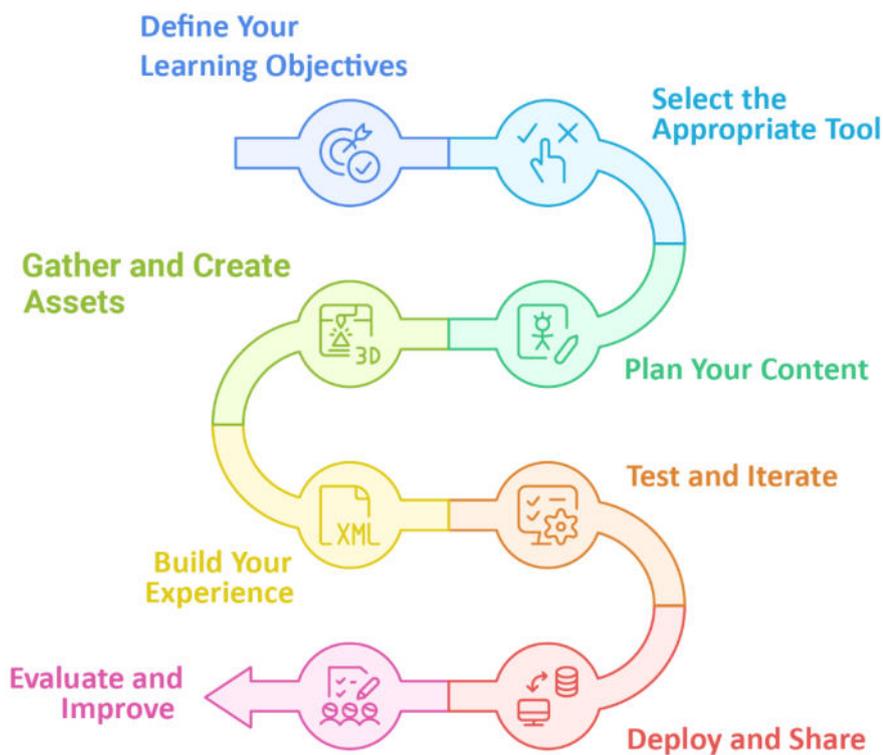


### Google Tour Creator

Google Tour Creator allows users to create VR tours using Google Street View imagery and their own 360-degree photos. It is designed to be accessible and easy to use, making it ideal for educational purposes.

<p>➔ <b>Key Features</b></p> <ul style="list-style-type: none"> <li>22. Simple, web-based interface</li> <li>23. Integration with Google Expeditions</li> <li>24. Ability to add text, images, and points of interest</li> <li>25. Free to use with a Google account</li> </ul>	
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Creating your own XR content can seem daunting, but with the right tools and a clear process, it becomes an achievable and rewarding task. Below are detailed steps to guide you through the process of developing engaging and effective XR experiences, from defining your learning objectives to delivering and evaluating your content.



1. **Define Your Learning Objectives.** Clearly outline what you want to achieve with your XR content. Make sure your objectives are SMART (Specific, Measurable, Achievable, Relevant, Time-bound). See SMART diagram above, in section “Selecting XR scenarios and games relevant to the learning objectives”.
2. **Select the Appropriate Tool.** Based on your objectives, choose a tool from the list that best suits your needs. Consider factors like ease of use, available features, and compatibility with your existing hardware.
3. **Plan Your Content.** Sketch out your content, including key scenes, interactions, and the flow of the experience. Consider creating a storyboard to visualise the sequence of events.
4. **Gather and Create Assets.** Collect or create the necessary assets, such as 3D models, images, videos, and audio. Many tools come with libraries of assets, or you can find free and paid resources online.

5. **Build Your Experience.** Use your chosen tool to start building your XR content. Follow tutorials and guides provided by the tool's documentation to learn how to use its features effectively.
6. **Test and Iterate.** Regularly test your content during the creation process to ensure it works as expected. Gather feedback from peers or potential users and make necessary adjustments.
7. **Deploy and Share.** Once your content is complete, deploy it to your chosen platform. This could involve publishing it on the web, exporting it to VR hardware, or integrating it into an LMS.
8. **Evaluate and Improve.** After deployment, gather user feedback and assess the effectiveness of your content in meeting the learning objectives. Use this information to make improvements and plan future projects.

In conclusion, the integration of XR and gamification into course design holds significant potential to enrich learning experiences, but it must always serve the overarching educational goals. Technology should be a means to an end—not the end itself. Learning objectives must remain the guiding framework, ensuring that XR scenarios and game elements are selected and applied purposefully, with a clear alignment to the competencies and outcomes being pursued. A holistic view of teaching and learning is essential—one that considers not only content and delivery, but also the diverse needs, backgrounds, and abilities of all learners. Thoughtful course design that leverages technology to support inclusion, accessibility, and individual learning paths can create more meaningful, equitable, and effective educational experiences for everyone involved.



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## 4. Delivery

By Wisamar Bildungsgesellschaft gGmbH



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Source: Wisamar Bildungsgesellschaft gGmbH

### Summary

*This chapter is concerned with the practical delivery of a training using training using XR and gamification techniques, such as 360° videos and interactive games. It will suggest techniques of how to ensure engagement and interactivity and will give practical tips for the onboarding process and outline safety precautions, as well as for optimizing inclusivity.*

## Using XR and Gamification in the classroom

Effective planning and preparation are key to successfully implementing XR and gamification in the classroom, especially in vocational education and training. While the choice of content should ideally stem from learning objectives, the reality for many educators is that existing equipment often imposes limitations. This section provides detailed, practical advice on planning within these constraints while ensuring the activity remains impactful and aligned with educational goals.

### 1. Content Selection

Start by defining the learning objective: What skills or competencies should students acquire? In VET, this might include mastering specific technical tasks, practicing problem-solving, or understanding complex procedures. Once the goal is clear, select or adapt XR or gamified content to achieve it.

#### Example:

- If the goal is to teach automotive students how to disassemble an engine safely, a VR module simulating this process could be ideal.
- However, if existing equipment limits you to AR on tablets, consider using an app that overlays a 3D engine model onto real-world surfaces, allowing students to explore components interactively.

 **Tip:** Adapt content creatively. If pre-designed XR content isn't available for your exact use case, think about how related simulations can still meet your objectives. For instance, a welding VR app could also teach hand-eye coordination and tool handling.

More information on how to select and adapt XR and game content according to the learning objectives and the needs of the learners can be found in chapter 3, Course Design.

### 2. Equipment Requirements

Begin by auditing the technology and tools already available. Is there access to a computer pool or class sets of tablets in the institution? Are VR headsets available, and if so, how many? What software, applications, and licenses are already available for XR and gamification purposes? If equipment is limited, align your content choice with these constraints. If new purchases are possible, prioritize versatility and ease of use.

#### Example:

- If your classroom has access to a limited number of VR headsets, plan a rotation system where small groups take turns using the technology, while others work on complementary tasks such as analyzing safety protocols or preparing peer presentations.
- If only smartphones are available, leverage AR apps that work on these devices, such as augmented tutorials for tool identification.



Source: Wisamar Bildungsgesellschaft gGmbH

 **Tip:** Ensure that all devices are functional and software is updated well in advance. XR experiences can be hindered by simple technical glitches, which can disrupt the flow of the lesson.

### 3. Staff Support

Depending on the complexity of the technology and the size of the group, additional support may be necessary to ensure the activity runs smoothly. Support staff can help troubleshoot technical issues or facilitate smaller breakout groups.

 **Example:**

- For a VR-based forklift operation training, a teaching assistant could help students set up the VR equipment and monitor their progress, while the primary instructor focuses on guiding the learning process and providing contextual explanations.
- Peer support can also be effective. Assign tech-savvy students as “helpers” to assist their classmates in navigating the XR tools.

 **Tip:** If no additional staff is available, consider reducing the scope of the activity to ensure it remains manageable for a single instructor.

### 4. Familiarity with Content

To confidently guide students, educators need to be well-versed in the XR or gamified content. This involves understanding not only the educational material but also the technical aspects of the equipment.

 **Example:**

- Before using a VR construction simulation, spend time exploring the module yourself. Understand the tasks, anticipate potential challenges students might face, and identify areas where additional explanation might be needed.
- Familiarize yourself with troubleshooting common issues, such as recalibrating VR headsets or addressing connectivity problems.

 **Tip:** If time is limited, focus on mastering the key aspects of the content. Identify the most likely questions or difficulties students might encounter and prepare solutions or quick reference guides.

### Working Within Constraints

Many VET educators face limitations, such as outdated or insufficient equipment. This reality requires creative problem-solving and prioritization. Instead of seeing constraints as barriers, use them to shape realistic and innovative lesson plans.

 **Example:**

- If your classroom has only a single VR headset, create a blended learning experience where students first observe the activity through a shared screen, then take turns in the VR simulation.

- Use gamification to complement XR by incorporating low-tech elements like quizzes, competitions, or role-playing scenarios to maintain engagement while others wait for their turn.

By taking a pragmatic and resourceful approach to planning, educators can create meaningful learning experiences that harness the potential of XR and gamification, even within the constraints of real-world classroom settings.

## Tips for engagement and interactivity

Using XR and gamified experiences in the classroom does not mean leaving learners to their own devices—literally or figuratively. While these tools can be highly engaging on their own, educators play a crucial role in ensuring that learners remain focused, actively interact with the content, and complete the experience successfully. Below are practical tips to foster engagement and ensure the learning experience stays on track.

### Set Clear Objectives and Expectations

Before beginning the activity, clearly communicate the purpose and expected outcomes to the learners. This helps them understand how the XR or gamified experience connects to their broader learning goals.



#### Example:

- In a gamified safety training simulation, explain that the goal is not only to complete tasks but to observe and document correct safety procedures.
- For XR, provide a brief overview of the virtual environment and what learners should focus on during their session.



**Tip:** Create a checklist or guide that learners can refer to during the activity to keep them on track and focused on the objectives.

### Encourage Active Participation

Passive observation can diminish the impact of XR and gamified activities. Structure the experience in a way that requires learners to make decisions, solve problems, or collaborate with peers.

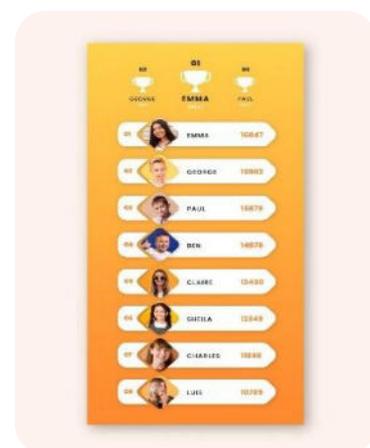


#### Example:

- In a VR construction simulation, assign roles to learners, such as site manager, safety inspector, or equipment operator, and have them work together to complete tasks.
- Use gamification elements like challenges or leaderboards to motivate participation and reward accomplishments.



**Tip:** Encourage learners to verbalize their thought processes, either during or after the activity. This reinforces learning and helps others gain insights from their approach.



Leaderboard in a game.  
Source: Image by [freepik](#)

### Incorporate Regular Check-Ins

Immersive environments can sometimes lead to learners becoming overly focused on individual tasks, losing sight of the overall objective. Schedule regular check-ins to reorient learners and assess progress.



*Example:*

- Pause the activity at pre-set intervals to ask reflective questions, such as “What have you learned so far?” or “How does this apply to the real-world scenario we discussed?”
- Use these moments to address any technical issues or confusion about the activity.



*Tip:* Leverage these pauses to tie the activity back to the real-world skills or concepts it is meant to teach.

### Balance Autonomy and Guidance

While XR and gamified activities often encourage exploration, too much autonomy can lead to learners straying from the intended objectives. Provide guidance without micromanaging their experience.



*Example:*

- In a gamified learning module about customer service, allow learners to choose how to handle virtual customer interactions but guide them through post-activity feedback to discuss the outcomes of their choices.
- In XR, provide hints or prompts when learners appear stuck, ensuring they continue progressing through the activity.



*Tip:* Design activities with built-in checkpoints or milestones to help learners track their progress and stay focused.

### Foster Reflection and Discussion

Engagement doesn't end when the activity is over. Encourage learners to reflect on their experience, share their insights, and connect the activity to their future work.



*Example:*

- After a VR experience, facilitate a group discussion where learners compare their approaches, identify areas for improvement, and relate the activity to workplace scenarios.
- Use a debriefing worksheet or survey to collect individual reflections and feedback.



*Tip:* Highlight both successes and challenges during reflection to create a balanced discussion and reinforce key takeaways.

Ensuring learners remain engaged is vital, but using VR also brings unique considerations for their safety and well-being. The next section will focus on creating a secure and supportive environment for immersive learning experiences.

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## Step by Step: Safety and Well-being in VR

Integrating VR into the classroom requires careful consideration of both the learners' safety and their well-being. Below is a step-by-step guide that educators can follow to ensure a secure and supportive environment for VR learning experiences.

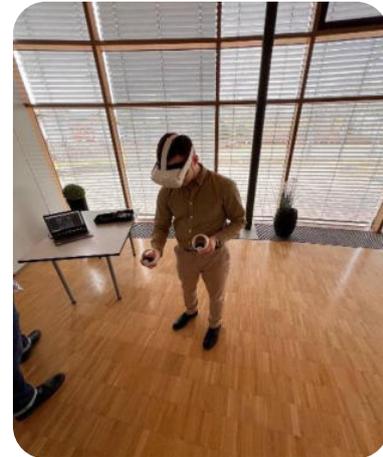


### Step 1: Creating a Safe Environment (Before VR Experience)

To start, **set up the VR stations** with enough space for learners to move safely. Ensure the physical space around each station is clear of obstacles, and there is sufficient room for the learner to move within the VR space.

Before the session begins, **configure the Guardian System** in the VR software. This system establishes a boundary in the real world that helps learners avoid stepping outside a "safe zone" during their experience. If the learner nears the boundary, the Guardian System will display a visual cue to alert them, preventing them from accidentally colliding with objects in the real world.

**Provide a chair at each VR station** so learners have the option to sit if needed. This can be useful if the VR experience is better suited to seated activities or if the learner feels fatigued during the session.



Source: Wisamar Bildungsgesellschaft gGmbH



Source: Wisamar Bildungsgesellschaft gGmbH

**Implement the Buddy System** to ensure safety throughout the experience. Pair each learner with a partner—while one learner is immersed in the VR experience, the buddy will monitor their safety. The buddy ensures that the learner remains within the designated VR space and helps keep others out of the action zone. It is also important to ensure that each station has a monitor where the VR session is streamed in real-time. This allows the buddy to provide tips and assistance while observing the VR experience, and also enables the buddy to learn from the experience by seeing what is happening in the virtual world.



### Step 2: Explaining the Virtual Environment (Before VR Experience)

Before engaging with the VR environment, take time to **assess and incorporate the learners' prior experience** with VR or similar technologies. This can help you tailor your guidance and adjust the level of detail in your explanations.

Provide learners with a **clear overview** of what they will experience, emphasizing familiarity and confidence-building. Use the streaming monitor to show the VR environment, giving learners a preview of the virtual world. This approach allows them to visualize the space and understand its layout and features in advance.

Explain how to navigate the virtual space, interact with objects, and complete tasks. If specific tools, controls, or gestures are required, demonstrate them using the streaming monitor, so learners can follow along. Highlight any unique features or challenges they might encounter and provide practical tips to address them.

Don't worry about revealing too much information—on the contrary, a detailed preview ensures learners know what to expect. This reduces anxiety, minimizes confusion, and allows learners to focus on the activity's educational goals. By equipping them with this understanding, you help them feel more comfortable and ready to engage effectively.



Source: Wisamar Bildungsgesellschaft  
gGmbH



### Step 3: Addressing Safety Guidelines (Before VR Experience)

Safety is paramount during VR sessions. Begin by explaining the **potential types of discomfort** or disorientation that can occur, such as dizziness, nausea, or eye strain. Reassure learners that these sensations are normal and part of the adaptation process when using VR. Encourage them to speak up immediately if they experience any discomfort.

Additionally, set **clear guidelines** for pausing the experience if necessary. Instruct learners to inform their buddy if they feel unwell, and guide them to remove the VR headset (with the buddy's help) and sit down. If discomfort persists, suggest placing palms flat on the floor, which helps signal to the body that the ground beneath them is real and steady, aiding in balance and reducing dizziness.

To avoid fatigue or overexposure, **limit each VR session to 15-20 minutes** before pausing and switching roles in the Buddy System. This rotation gives both partners a chance to rest while maintaining an engaging and safe experience.



**Step 4:**  
**Familiarization with VR Equipment**  
**(Before VR Experience)**

Before the immersive experience begins, make sure that all learners are **comfortable with the VR equipment**. Allow them to practice wearing the headset, adjusting it for comfort, and using the controllers. Provide guidance on how to move within the virtual environment and how to interact with virtual objects.



Allow learners to **ask questions** and raise any concerns during this initial period. Giving them time to familiarize themselves with the equipment and how it works reduces anxiety and prepares them for a smoother experience once they are fully immersed in VR.



**Step 5:**  
**Preparing for VR Interactions**  
**(Before VR Experience)**

Let learners know what kind of **interactions** they will encounter in the virtual environment. This could include tasks such as moving, reaching, or manipulating virtual objects. Provide instructions on how to handle these interactions effectively with the VR controllers.

It's also important to **restate the learning objectives** at this stage to ensure that learners understand the educational goals of the VR experience. This helps keep them focused on the purpose of the activity, rather than getting lost solely in the enjoyment of the virtual world. For example, if the VR session is aimed at practicing a specific vocational skill, remind the learners of this goal to help them stay on track and engage purposefully with the content.

Make sure there is ample opportunity for learners to **ask questions and clarify any uncertainties** before they begin the full VR experience. If any learner feels uncomfortable or unwilling to participate, reassure them that they should not feel pressured to engage in the VR activity. Even those in the buddy role can benefit from observing and offering tips during the experience. Encourage them to actively participate by providing feedback or insights.



**Step 6:**  
**Establishing Comfort and Well-being**  
**(During VR Experience)**

While learners are engaged in the VR session, continue to **monitor their comfort and well-being**. Encourage them to take breaks if needed and ensure that they are seated if they feel fatigued or disoriented. Remind learners to adjust their VR headset for comfort and to report any issues immediately.



The buddy should keep an eye on their partner's physical state, ensuring that the learner stays within the safe space and doesn't experience distress. If discomfort arises, the buddy can help the learner pause the session, remove the headset, and offer support.



**Step 7:**  
**Post-VR Reflection and Discussion**  
**(After VR Experience)**

Once the VR session is over, it's essential to conduct a **debriefing session** where learners can reflect on their experiences. Ask them to share any feelings of discomfort or any learning insights they gained from the experience.

This reflection time provides an opportunity to **link the virtual experience to real-world** concepts and skills. It also allows learners to express any lingering discomfort or issues they may have encountered, ensuring that any challenges are addressed and discussed. Encourage open discussion and allow time for feedback.

## Aspects of Inclusion

As a vocational education and training teacher incorporating XR and gamification into your teaching, it's essential to ensure that your lessons are inclusive and accessible to all learners. Diversifying your approach helps meet the needs of students from various backgrounds, abilities, and learning styles. This includes accounting for linguistic and cultural diversity, as well as varying levels of reading comprehension and learning abilities. In this chapter, we'll explore how you, as an instructor, can apply inclusion and diversity principles when selecting, introducing, and facilitating XR experiences. We'll also discuss considerations for the classroom environment and post-experience reflection to ensure that all learners benefit from these innovative technologies.



*Made by pixelmart1*

### Selecting Applications with Inclusivity in Mind (Before VR Experience)

When selecting an XR or gamified application for your learners, it is crucial to understand their specific needs and preferences to choose tools that provide an inclusive experience.

- **Understand Learners' Needs:** Use your familiarity with your learners to guide your decisions, or gather relevant details beforehand. Consider not only physical and sensory needs but also linguistic abilities, cultural backgrounds, and learning preferences. For example, you might ask whether learners require content in multiple languages, simplified text, or additional visual aids.

- *Evaluate Accessibility Features:* Choose applications with built-in accessibility features such as subtitles, audio descriptions, or options to display instructions in various languages. Ensure that culturally sensitive and inclusive content is available to reflect the diversity of your learners.
- *Assess Content Design:* Review the content for cultural relevance, avoiding stereotypes and ensuring that themes, symbols, and narratives resonate positively with your learners' backgrounds.
- *Focus on Learning Modality Support:* Select tools that cater to a range of learning styles. For learners with reading difficulties, prioritize applications offering auditory instructions, interactive visuals, or hands-on simulations.
- *Customization Options:* Applications with adjustable settings—such as text size, difficulty levels, or multilingual interfaces—help tailor the experience to meet individual learners' needs.

By proactively considering at least some of these factors, you can select applications that foster an inclusive and equitable learning environment.

### **Setting Up the Classroom Environment (Before VR Experience)**

Preparing the physical classroom environment is a vital step in ensuring that all learners, regardless of their abilities, feel comfortable and supported during the XR experience.

- *Physical Setup for Diverse Needs:* Arrange the VR stations to provide ample space for movement while considering the physical requirements of all learners. For those with mobility challenges or physical disabilities, ensure that the stations can accommodate wheelchairs or allow for seated use. Provide adjustable seating options and ensure that necessary tools or devices are within easy reach. If learners have specific sensory needs, such as a preference for quieter or dimly lit areas, make these accommodations part of the setup.
- *Assistive Tools and Modifications:* Include assistive devices as needed, such as ergonomic controllers, audio amplification tools, or tactile aids, to ensure learners can fully participate. Ensure all necessary modifications are in place so learners feel empowered to engage with the activity without additional stress or discomfort.
- *Buddy System for Inclusive Pairing:* Pair learners thoughtfully to maximize mutual support. For example:
  - Skill Level: Match more experienced learners with those new to XR, allowing the former to guide and reassure the latter.
  - Language Support: Pair learners who share the same native language if linguistic support might be necessary.
  - Learning Styles: Partner individuals with complementary skills or learning preferences, ensuring a balanced exchange of ideas and support.

When making these preparations, it is important to do so thoughtfully, but only to the extent that they align with the specific needs and circumstances of the learners in your class.

### Supporting Learners During the XR Experience (During the Experience)

During the session, maintain a focus on inclusivity while ensuring learners remain safe and engaged:

- *Safety and Accessibility:* Monitor learners closely, especially those who may be at greater risk of discomfort or difficulty. Encourage communication, so learners feel empowered to express concerns or ask for assistance.
- *Language and Navigation Support:* Offer real-time language assistance where needed, and ensure learners can navigate the XR environment confidently.
- *Inclusivity in Participation:* Provide alternatives for learners who choose not to engage directly in the XR experience. Encourage them to contribute as buddies, offering observations and insights to the VR user.

### 4. Post-VR Reflection and Discussion (After the Experience)

Once the session is complete, facilitate a reflective debrief that accounts for inclusivity:

- *Encourage Reflection on Inclusivity:* Ask learners for feedback on whether the experience felt accessible and inclusive. Use their input to refine future sessions.
- *Reinforce Learning Objectives:* Highlight how the XR or gamified session aligned with the lesson's goals, ensuring that learners understand the educational purpose behind the activity.
- *Address Unmet Needs:* If any students struggled with the experience due to linguistic, cultural, or accessibility barriers, work with them to identify alternative ways to meet the learning objectives.



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***While this chapter has outlined key steps for delivering XR and gamification-based training, it's important to remember that successful implementation is a learning process for educators as well. Taking the first steps with curiosity and openness is what truly matters. With each attempt, supported by learner feedback and a growing understanding of their needs, the delivery will become more effective, more inclusive, and more intuitive over time.***



## Digging Deeper

### Erasmus+ Project TeachINVR (2020-2023)

This project combined methodology, guidelines, and practical steps to equip VET educators with all the necessary information and a VR practice simulator to effectively integrate Virtual Reality into their teaching.

- Short **intro video** on the website: <https://teachinvr.eu/>
- Link to the **Manual** “How to Use Immersive VR for Teaching and Learning in Vocational Education and Training (VET)?”: <https://teachinvr.eu/wp-content/uploads/2023/04/TeachINVR-Virtual-Reality-Teaching-Learning-Manual-English.pdf>
- Link to the **Guide for Teachers** (TO-DO list): <https://teachinvr.eu/wp-content/uploads/2023/04/TeachINVR-Immersive-VR-Learning-Teaching-Guide-English.pdf>
- Link to Meta Store to download the **free VR application**: [https://www.meta.com/de-de/experiences/teachinvr/5907629996002157/?ranking\\_trace=1825275284404586\\_5907629996002157\\_SKYLINEWEB\\_77a156ca-8d35-40be-b51b-0975fe227332&utm\\_source=www.google.com&utm\\_medium=oculusredirect](https://www.meta.com/de-de/experiences/teachinvr/5907629996002157/?ranking_trace=1825275284404586_5907629996002157_SKYLINEWEB_77a156ca-8d35-40be-b51b-0975fe227332&utm_source=www.google.com&utm_medium=oculusredirect)

### Virtual Reality Safety Tips from Meta Safety Execs

Video on YouTube: [https://www.youtube.com/watch?v=9\\_DrvmfwX3I](https://www.youtube.com/watch?v=9_DrvmfwX3I)

## References

TeachINVR Project Team (2023): *Methodology. How to Use Immersive VR for Teaching and Learning in Vocational Education and Training (VET)?* <https://teachinvr.eu/wp-content/uploads/2023/04/TeachINVR-Methodology-English.pdf>

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## 5. Assessment

By Daugavpils Technical School  
of Technologies and Tourism



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### Summary

*This chapter will line out the possibilities of evaluating participants' learning and understanding of certain contents with XR and gamification elements, how to collecting feedback with XR/gamification, and how to evaluate educators' performance and teaching process. In the rapidly evolving landscape of education, integrating immersive technologies into assessments offers an innovative approach to evaluating learners' learning and understanding. They provide unique ways to measure progress, gather feedback, and enhance the teaching process. In this chapter, we will detail our strategy for incorporating these tools into self-assessment, peer assessment, teacher-led assessment, and feedback collection while also ensuring thorough evaluation of educators' performance. The goal is to provide a comprehensive way to measure, analyze, and improve educational outcomes for both learners and educators.*

## Evaluating participants' learning and understanding with XR and gamification elements

Before diving deeper into the ways XR and gamification can be used for assessment, it is necessary to understand when various types of assessment could be used within a training process.

### Progression of Training Assessments



#### Before Training – Diagnostic/Pre-Assessment

Before the start of a training programme, XR and gamified elements can be used to assess learners' existing knowledge and practical skills in a motivating and interactive way. This helps identify baseline competencies in key areas and allows for a more targeted and effective course design.



#### Examples:

- XR-based simulations with branching scenarios can be used to evaluate how trainees would respond to real-life situations, such as dealing with difficult passengers or managing emergency protocols.
- Gamified quizzes, featuring elements like leaderboards or achievement badges, make it possible to assess theoretical knowledge in a way that increases motivation and engagement.
- Virtual skill audits can simulate work environments, such as a depot, where trainees are asked to identify potential safety violations or procedural errors, offering insights into their current awareness and readiness.



### During Training – Formative Assessment

Throughout the training process, XR and gamification can provide ongoing, low-pressure feedback that helps learners stay on track and remain engaged. These tools support real-time monitoring and allow trainers to adjust instruction based on observed progress.



#### *Examples:*

- VR-based roleplays, such as ticket inspections or managing passenger conflicts, offer real-time scoring or immediate feedback to help trainees improve specific behaviors and decisions.
- Mini-games can target particular skills like route navigation, operation of ticketing systems, or effective communication, allowing for focused, repeatable practice in an engaging format.
- AR overlays during on-site or simulated fieldwork provide instant visual feedback, for example when practicing correct bus stop procedures or safety checks.
- Trainer dashboards linked to in-game decisions and performance data enable instructors to monitor progress, identify learning gaps, and adapt their teaching strategies accordingly.



### After Training – Summative Assessment

At the end of the training, XR and gamified assessments can help determine whether trainees have achieved the required level of competence. These tools offer realistic, performance-based evaluation methods that reflect actual job demands in the public transport sector.



#### *Examples:*

- Final VR driving simulations can test trainees' ability to handle challenging conditions, such as night operations, adverse weather, or managing a fully occupied vehicle.
  - Gamified assessment challenges require participants to reach a defined score or complete key tasks successfully in order to pass, adding both motivation and structure to the evaluation process.
  - Digital portfolios compiling completed XR scenarios, unlocked achievements, and performance data offer a transparent overview of each trainee's learning journey.
  - Recordings of trainee sessions within XR environments can be reviewed and assessed by trainers to provide structured feedback and formal evaluation.
-



### Post-Training – Confirmative Assessment

After the formal training ends, XR and gamified tools can support the long-term transfer of learning into daily work routines. These approaches help confirm that skills are retained and correctly applied in real-world settings over time.



#### Examples:

- Periodic VR refreshers introduce new scenarios to reinforce critical topics such as safety protocols and effective passenger communication.
- Gamified refresher modules keep engagement high through incentives like digital badges or team-based competitions, encouraging continuous learning.
- Mobile AR tools offer real-time support and short micro-assessments during actual work tasks—for example, verifying correct equipment handling on the spot.
- Simulation performance data can be connected to real-world KPIs, such as route efficiency or the number of safety-related incidents, to measure lasting impact and identify areas for further support.

During these evaluation phases, various types of assessment mentioned further can be used depending on the trainer's experience, preferences, or trainee's foreseen learning outcomes.

### Self-assessment with XR and Gamification

Self-assessment is necessary in the training process to help participants objectively assess their progress, understand their strengths and identify areas for development. It promotes critical thinking, self-directed learning skills and motivation, allowing participants to engage more actively in the learning process and improve learning outcomes through interactive tools and methods such as XR and gamification. The self-assessment with XR and gamification can be used in the following situations:



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#### a) Assessing the level of understanding



#### Examples:

- Teachers can use XR-based simulations to allow students to reflect on their understanding of procedures or scenarios — for example, by observing how students respond in virtual situations to see if they have grasped and internalized the correct routines.
- Gamified quizzes and tasks can help students evaluate their own comprehension and identify how much knowledge they have retained from the training topics.
- Interactive reviews and challenges enable students to recognize their own blind spots by revisiting themes covered in the training that may not have received sufficient attention.

## b) Analysis of learning effectiveness:



### *Examples:*

- Through the use of various XR and gamification tools, students can reflect on whether the training process is effective in helping them achieve the expected learning outcomes, such as understanding if the course difficulty matches their needs.
- Students can evaluate whether the training methods used are suitable for developing the required competences and if these approaches fit their individual learning style and pace.

### **Boosting engagement and accuracy in self-assessment with XR and gamification**

To make the most of XR and gamification tools for self-assessment, mentors and developers should consider how these technologies can support autonomous learning, critical thinking, and sustained motivation. The following questions can help evaluate and improve the effectiveness of such tools in training:

- How accurately can learners assess their own knowledge and skills using XR and gamified environments?
- How do immersive simulations support the development of critical thinking and self-reflection?
- In what ways do gamified elements—such as points, badges, or leaderboards—encourage learners to reflect on their performance and stay motivated?
- How can XR and game-based tools provide meaningful feedback that helps learners improve?
- How can learners use interactive scenarios to identify their strengths and areas for improvement?
- What recommendations can be drawn from current practice to enhance the design of self-assessment tools and simulations?
- How realistic and relevant are the scenarios learners engage with—and how do they support meaningful learning?

"Effective objective self-assessment" means that the participant is able to accurately measure his/her level of competence against specific criteria or standards. XR technologies and gamification elements help to create an interactive and engaging environment that encourages not only motivation but also critical reflection.

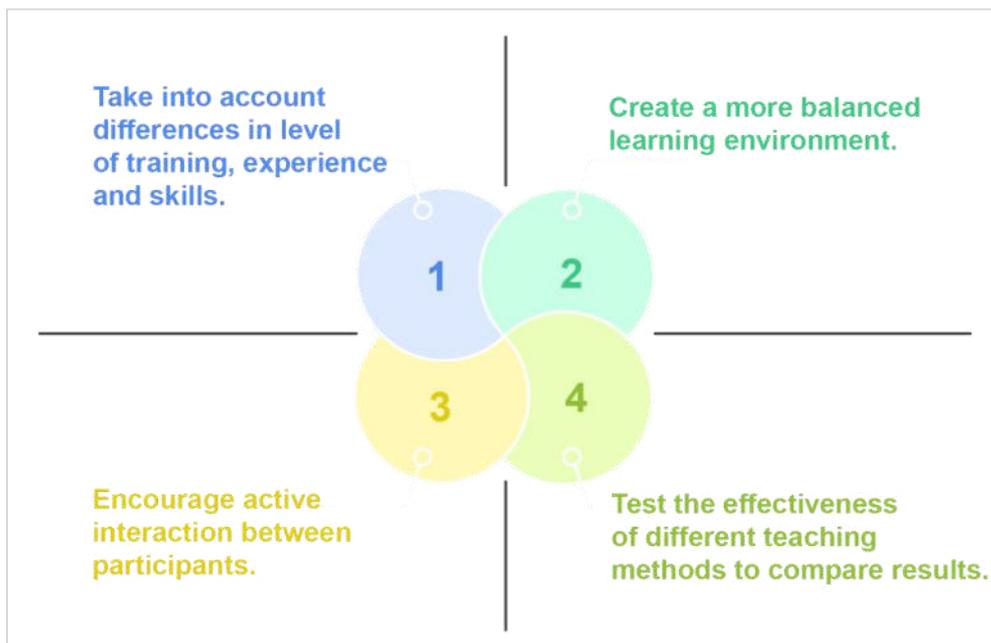
### Methodology:

It is possible to evaluate the effectiveness of using gamification tools both by individual selection and analysis of the behavior of a specific participant, and by analysing groups. Of course, the most widespread way is individual self-assessment. Yet, the self-assessment on its main level or in the very initial phases of training can be performed also in groups, especially with students who lack self-confidence either as a psychological or technological drawback. This approach can boost their level of confidence and promote successful further training.

In addition, the self-assessment performed in groups, yet led by a teacher can also be used. The main objective of this particular way of implementing self-assessment in groups is to show the students the difference in their assessment results when the self-assessment is performed with XR methods and with more traditional methods. This in particular may be used in student groups having difficulties with trusting new technologies.

In the latter case the most accurate and complete data will be possible only by creating experimental and control groups, with a sufficient number of participants for qualitative and multifactorial comparison.

#### Dividing participants into groups helps

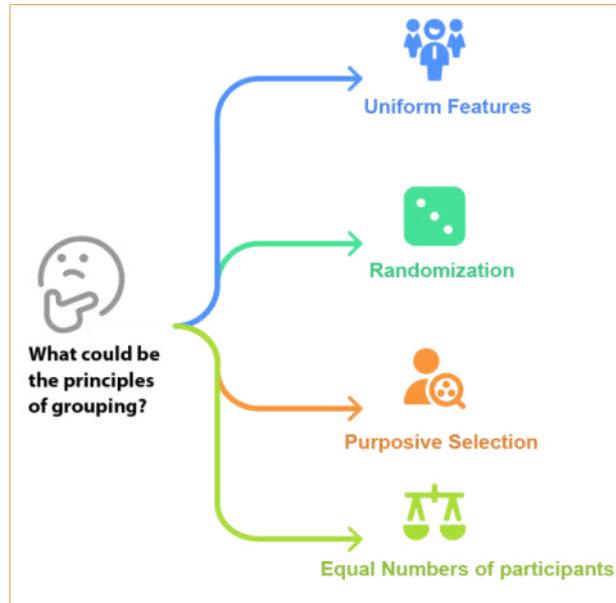


a) **Selection of the participant group:**

- Select participants of different skill levels to ensure diversity and comparability of data.
- Create two groups: an experimental group (using XR and game elements) and a control group (using traditional methods).
- This differentiation helps to avoid random factors that could influence the results and allows the true effectiveness of a particular approach to be assessed.

### What could be the principles of grouping?

Grouping should be based on the objectives of the research or learning, ensuring a balance between participants:



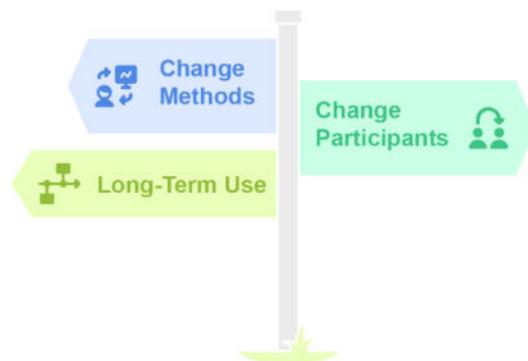
### Why is it not advisable to assess everyone in the same way?

Evaluating all participants in the same way can lead to: inaccurate results; inadequate recommendations; stereotyped conclusions.

### What will the results be if we change the groups?

#### Changing methods between groups

If traditional methods are applied to the experimental group and XR technologies to the control group, it will be possible to discover how the methods affect different participants. It is possible that XR will be more effective with more experienced technology users, while traditional methods will be more effective with those who have a more conservative approach.



#### Changing participants between groups

It will reveal whether the effectiveness of the method is related to the composition of the group (e.g. level of knowledge, motivation).

Will help to understand whether certain methods are universally effective or only effective for certain groups.

### Without changing groups, but continuing in the long term

It is possible to observe how the long-term use of one or the other method affects the accumulation and persistence of knowledge.

#### a) Introduction of XR and gaming elements:

- XR-Enabled Quizzes: Designing immersive environments where students can answer questions through real-world scenarios. For example, in a virtual lab setup, learners identify scientific errors or solve engineering puzzles, gaining instant feedback.
- Gamified Skill Challenges: Creating personalized learning paths where each challenge is progressively more difficult, ensuring that students accurately gauge their capabilities.
- Interactive Progress Monitoring: Implementing dashboards displaying learning milestones to motivate learners by visualizing their achievements.



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#### b) Development of self-assessment tools:

- Develop a set of questions and tasks that assess both knowledge and skills
- Include self-reflection questions that allow participants to be aware of their progress.

#### c) Optimal periods for using self-assessment tools

1. Short-term activities (e.g. 1-day training, lecture, workshop)
  - VR/gamification before the start (diagnostic testing).
  - Dynamic self-assessment during the tasks.
  - Final assessment with gamified feedback (e.g. interactive reports, avatar reactions).
2. Medium-term programs (e.g. a course lasting several weeks)
  - Weekly self-assessment through VR cases or game quizzes.
  - Final comparison of results at the end of each module.
3. Long-term educational programs
  - Periodic VR assessments (once a month/semester).
  - Gamified achievement system (badges, leaderboards).
  - Final VR exam or quest.

#### d) Combination of methods for self-assessment

1. VR modeling (creating situations that require decision assessment).
2. Gamified tests (points, levels, competitions).
3. Interactive checklists (personalized tips).
4. Achievement system (badges, rewards for progress).
5. VR progress diary (digital journal with growth visualization).

Using these methods at the right time allows not only to increase the accuracy of self-assessment, but also to increase engagement and learning efficiency.

### Peer assessment in XR-Based Learning Spaces

Peer-assessment in the XR learning environment is necessary for participants to be aware of their contribution to the team and to identify where they can improve their skills. It encourages reflection on the learning experience, improves communication and collaboration, and helps participants learn to give and receive constructive feedback, which is essential for effective teaching and learning development.



Picture by Freepik

#### Objectives:

- a) **Promoting mutual understanding (Foster collaboration and communication skills):**
- Understand how well participants are able to express and perceive information in an XR environment.
  - Assess how XR and gamification elements affect the quality of communication between participants.
  - Leverage collective intelligence for a more comprehensive evaluation.



#### Example:

A group of students take part in a learning simulation in the XR environment, where they have to solve a problem related to public transport in the future. The challenge is to design a new transport system that is environmentally friendly, efficient and accessible to all.

##### *The Process:*

1. Group allocation of roles;
2. Joint problem analysis;
3. Mutual evaluation;
4. Feedback.

##### *Results:*

- Group members learn to collaborate and share ideas better.
- Reflection helps participants to identify strengths and weaknesses in communication and collaboration.
- Fosters a respectful and productive environment where participants can learn from each other.

b) **A feedback system:**

- Develop a structured method for peer feedback between participants.
- Promote the use of feedback to improve the learning process.

**Methodology:**

a) **Organisation of classes:**

- Collaborative Problem Solving in XR: Use and/or design virtual challenges that teams must solve together. Peers then evaluate each other's contributions and teamwork using predefined rubrics embedded into the platform.



*Example:*

**Description:**

Develop virtual challenges in which the team has to deal with complex situations in public transport, such as planning a new route or dealing with emergencies. Each team member takes a specific role (planner, driver, passenger service specialist) and together they create a solution.

**Tasks:**

The XR simulation shows a situation in which a tram breaks down and passengers have to be diverted to alternative transport at the same time. The team develops a temporary solution taking into account the number of people, the transport capacity and the available resources. The members divide responsibilities: one supervises the deployment of the vehicles, another organises passenger information and a third coordinates the rescue.



**Peer assessment:**

Participants use a rubric built into the platform after completing a task to evaluate team members' contributions, such as communication, ability to find effective solutions and collaboration. Points are awarded for strategic thinking and overall team performance.

- **Task design** : Design activities that require teamwork and communication.



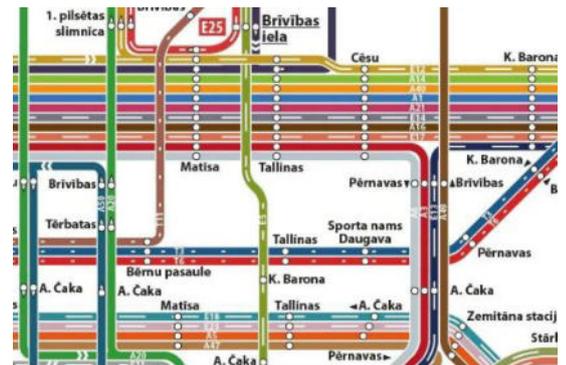
*Example:*

**Description:**

Practical tasks requiring teamwork, communication and problem solving in public transport. Activities should be interactive and encourage discussion between participants.

**Tasks:**

In the XR environment, a city plan is given and the team has to prepare a new public transport route to reduce congestion in certain areas. They need to take into account factors such as the number of passengers, the availability of buses and trams, and budget constraints. Participants should mutually agree on priority zones and methods to optimise the route.



**Peer assessment:**

Participants evaluate their peers on criteria such as the usefulness of the ideas proposed, clarity of communication and contribution to the task. The platform automatically collects this information to provide feedback.

**Evaluation mechanism**

- **Questionnaires and surveys:** After each session, participants fill in questionnaires on the communication skills of the other participants and the effectiveness of the tasks.
- **Peer Feedback Portals:** Allowing students to leave structured feedback on their peers' work through the XR environment, providing constructive input based on individual or group tasks.

**Teacher-led assessment: Gamified Learning Modules**

Teacher-led assessment is necessary in the learning process so that students can evaluate their progress and understanding of the skills they have learned. It encourages active participation, helps identify learning gaps and allows teachers to adapt their approach, providing individual feedback and improving teaching effectiveness.

**Objectives:**

- Provide educators with deeper insights into students' competencies.
- Allow teachers to adapt instructions based on precise data collected through these tools.
- Develop/define methods to improve student engagement and interactivity.

### Methodology:

- **Virtual Simulations for Assessment:** Creating comprehensive simulations where teachers assess students' problem-solving and analytical skills in real-time. They can intervene, modify scenarios, and deliver instant feedback.
- **Performance Analytics:** Analysing gameplay data such as time spent on tasks and success rates, helping teachers identify learning gaps and customize their instructions.
- **Scenario-Based Evaluations:** Assessing students' ability to apply theoretical knowledge to practical situations presented in the XR environment.
- **Recording lessons** for behavioural and interaction analysis and further evaluation by observing teacher and student work in XR and gamification activities.
- **Include different types of tasks** - practical, creative and analytical - to assess learning and explore pupils' improvement, using both formal and informal forms of assessment

## Collecting feedback with XR and gamification

Using XR and gamification to collect feedback allows for quick, accurate insights into the learning process, benefiting both learners and educators. These tools help identify potential learning barriers and support the adaptation of teaching strategies to meet individual needs. The interactive and engaging nature of XR and gamified environments also encourages continuous participation, helping learners stay motivated and progress at their own pace. Moreover, these technologies make it possible to gather feedback in a less intrusive and more natural way, contributing to a more personalised and effective learning experience.



Picture by Freepik

### Objectives:

- Gain holistic insights into students' and teachers' experiences.
- Identify bottlenecks and refine the educational strategies.
- Enable faster and more effective learning through interactive and personalised solutions that capture users' attention and motivate them.
- Provide a safe environment to develop practical skills and competences by simulating real-life situations that would be difficult or dangerous to replicate in real life.
- Provide the opportunity to receive detailed and tailored feedback quickly, so that the learning process is adaptable and based on real user successes and mistakes.
- Allow users to learn at their own pace and adapt the content to their level of knowledge and learning style.

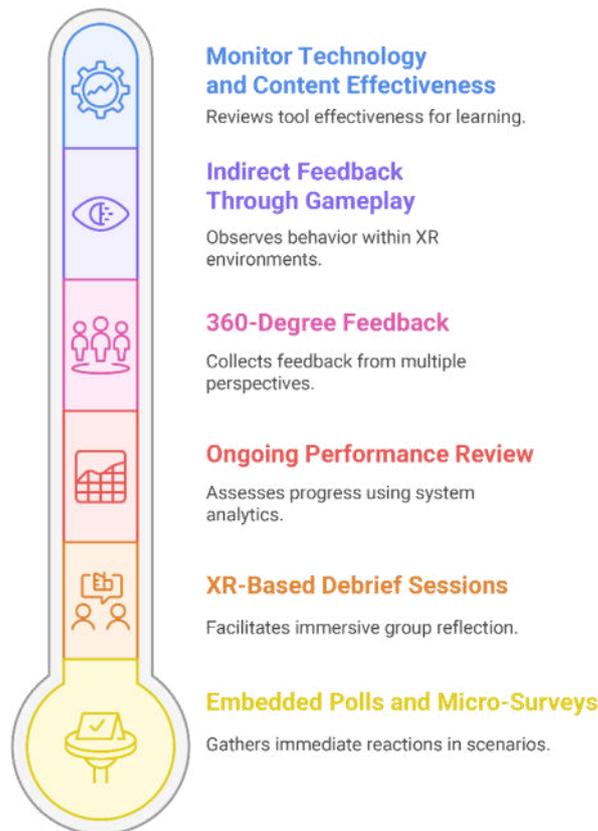


### Example:

An example is a virtual reality (VR) simulation used in a logistics training session, where key elements—such as route complexity, number of passengers (both on the bus and at stops), and the range of unexpected scenarios—are gradually introduced. These scenarios might include

overtaking by other vehicles, sudden acceleration or braking, sharp turns, disruptive passengers, a crash ahead, sudden passenger exits, or ticket inspections. The simulation is adapted progressively based on the learners’ age, prior knowledge, interest in the topic, and cognitive abilities, allowing for a tailored and manageable learning experience.

**Methodology:**



- **Monitor Technology and Content Effectiveness:** Regularly review how well the XR tools and gamified content support the intended learning outcomes. Adjust scenarios and interfaces where necessary to ensure accessibility, relevance, and inclusivity.
- **Indirect Feedback Through Gameplay:** Observe how learners interact with XR environments—such as how they respond to emergency situations or navigate route planning tasks. These behaviours can offer valuable indirect feedback on their level of competence and understanding.
- **360-Degree Feedback:** Use XR environments to collect feedback from multiple perspectives—students, trainers, and even simulated peers or supervisors. This provides a well-rounded view of performance and learning engagement.
- **Ongoing Performance Review:** Use XR system analytics to periodically assess learners’ progress and identify patterns in engagement, success rates, or repeated mistakes. This data can inform targeted interventions.

- **XR-Based Debrief Sessions:** Create virtual or augmented spaces for structured group reflection, where learners can discuss their experiences, highlight challenges, and suggest improvements in a more immersive and open setting.
- **Embedded Polls and Micro-Surveys:** Integrate short polls or survey questions directly into gamified XR scenarios to collect immediate reactions and reflections. For example, after a conflict-resolution simulation on a bus, learners can rate the clarity or realism of the scenario.

## Evaluating teacher's performance and teaching process

Evaluating a teacher's or educator's performance and teaching is necessary to improve the quality of teaching, adapt teaching methods to the needs of learners and promote teachers' professional development. Regular evaluation helps to ensure that teaching is effective, motivating and in line with educational standards, and contributes to improved student achievement and engagement.

### Objectives:

- Identify effective and engaging teaching methodologies in XR- and game-based settings.
- Provide constructive, targeted recommendations for continuous professional development.
- Improve learner engagement and comprehension by ensuring that teaching approaches meet learners' actual needs.
- Create interactive learning environments that promote problem-solving and critical thinking through realistic simulations.
- Adapt learning experiences to support different knowledge levels, interests, and learning styles.

### Methodology:

- **Teaching Efficiency Metrics:** Develop indicators to evaluate completion rates, learner engagement in XR scenarios or gamified tasks, and responsiveness to individual learner progress or difficulties.
- **Learner Feedback Loops:** Collect structured feedback from students to understand which formats and instructional styles help them learn most effectively in XR and gamified contexts.
- **Virtual Observations:** Record and review teaching sessions conducted in XR environments to reflect on communication, clarity, and facilitation strategies. **Peer Review in XR:** Enable teachers to observe one another's sessions in XR environments and exchange feedback on engagement, pacing, and content delivery.
- **Gamified Collaboration Metrics:** Analyse how well educators facilitate teamwork and collaboration by using in-game elements that require group problem-solving or shared decision-making.

By using XR and gamification elements in learning and assessment processes, we are able to create more diverse, interactive and motivating learning environments. "Many studies have shown that XR and gamification technologies not only improve student engagement, but also lead to deeper understanding and personalisation of learning processes." (Deterding et al., 2011) These technologies not only make learning materials more accessible, but also help students and teachers to assess progress and understanding more effectively and enhance the learning experience.

Self-assessment, peer assessment and teacher-led evaluation methods, which include XR and game-based elements, provide detailed data on teaching effectiveness, identifying strengths and areas for improvement for both students and teachers.

With XR and gamification, we not only motivate participants, but also give them the opportunity to learn at their own pace, tailor content to individual needs and get immediate feedback. This approach fosters deeper understanding, enhances collaboration and promotes critical thinking, which is essential in modern education.

Overall, the integration of XR and gamification into learning and assessment processes offers new opportunities to improve the quality of education that focus on student engagement, personalisation and higher motivation, as well as giving teachers the tools to tailor learning approaches to the needs of each participant.



## Digging Deeper

[How does desktop virtual reality enhance learning outcomes? A structural equation modelling approach - ScienceDirect](#)

More information on the control and experimental group split can be found here:

[https://study.com/learn/lesson/experimental-group-examples.html?utm\\_source=chatgpt.com](https://study.com/learn/lesson/experimental-group-examples.html?utm_source=chatgpt.com)

Lern more how to use feedback to improve the learning process:

[https://learning.northeastern.edu/three-principles-for-using-peer-feedback-among-learners/?utm\\_source=chatgpt.com](https://learning.northeastern.edu/three-principles-for-using-peer-feedback-among-learners/?utm_source=chatgpt.com)

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## 6. COMP+ in Practice

By Straeto



Source: Wisamar Bildungsgesellschaft gGmbH

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### Summary

*This chapter will give practical advice on how to implement a COMP+ training in an organization. Based on the experiences from development with the partners and the pilotings over the past few years, this part of the methodology will provide information on how best to prepare the workshops, usable but adaptable lesson plans, as well as lessons learned from the development.*

## Creating effective VR and gamification learning experiences with the COMP+ D/I materials

This chapter is designed to help teachers and trainers make the most of the COMP+ and COMP D/I materials. Whether you're working in a classroom, delivering a workshop, or running a blended learning course, the aim is to strengthen essential soft skills, like communication, stress management and inclusion within the context of public transportation. This chapter outlines important aspects to consider when preparing for a COMP+ and COMP D/I training or workshop.



### PART 1: Getting started – preparing for implementation

To ensure a successful and meaningful learning experience, thorough preparation is essential before implementing COMP+ D/I. Start by clearly communicating the goals and added value of the training to engage your learners and create a positive learning environment.

The structure and delivery of your training may vary depending on your audience – whether you're working with public transport **employees** or **trainees** (e.g., apprentices or vocational students). While the core content remains the same, the approach should be tailored to match the group's background, experience level, and learning needs.

Here are four key steps to consider:

#### A. Know your participants

Understanding who your learners are is the foundation of good training design. Employees and trainees bring different expectations, motivations, and levels of experience to the table:

- **Employees** typically have extensive real-world experience and may take part in the training voluntarily as part of their professional development. Their motivation is often linked to improving their soft skills, handling specific workplace challenges, or expanding their qualifications. To engage them effectively, it's important to show the relevance of the training for their daily work and invite them to share their own perspectives.
- **Trainees**, on the other hand, usually participate in the training as a mandatory part of their vocational curriculum. They may still be developing their professional identity and workplace understanding. Since they are often more open to digital tools, you can lean into gamified and immersive elements to raise motivation and make complex topics more tangible.

**Tip:** Adapt your communication approach based on the group. With employees, highlight real-life value and flexibility. With trainees, emphasize practical skill-building and interactive methods to boost their engagement.

## B. Tailored introduction

Begin the course with an introduction that clearly outlines the objectives, structure, and relevance of the training. This first impression sets the tone and helps participants connect to the topic. Adapt your introduction to match the group's background: experienced staff may appreciate practical relevance and links to real situations, while trainees benefit from clarity on what they will learn and how it connects to their future role.

Make sure the introduction encourages curiosity and engagement right from the start. Depending on your group, this can include short storytelling, thematic visuals, or a simple check-in round.

Further information on designing the start of the course, including icebreakers and tools for determining needs, can be found in Chapter 3: Course Design.

## C. Choosing the right delivery format

Select a delivery format that aligns with your participants' learning styles, prior experiences, and professional context. The COMP+ D/I training is designed to support a blended learning approach, combining in-person workshops with self-paced digital learning elements. This format offers flexibility but also requires careful planning, especially when addressing the differing needs of public transport employees and trainees.

When planning the online and self-directed phases, keep in mind:



**Time flexibility** is a major advantage, but not all learners may be equally experienced in managing their own learning schedule.



**Access to technology** may vary. For instance, some VR elements may not be suitable for home use without the proper equipment.



**Digital readiness and gaming familiarity** differ: younger participants might adapt more quickly, while others may need more support to engage with interactive formats effectively.

A well-balanced course design builds on these strengths and supports all learners in progressing at their own pace, while fostering shared reflection and dialogue in the group setting.

Selecting the right mix of training methods is also crucial. Consider how each group's background may influence their learning preferences and needs:

- ⇒ **Employees** often bring valuable real-world experiences. It is essential to create space for them to share and reflect on their own cases and challenges. Their stories can enrich the group's understanding and serve as practical case studies for collaborative analysis.
- ⇒ **Trainees**, on the other hand, may be more open to exploring immersive tools like VR and gamification. They are usually more familiar with digital formats and benefit from clear guidance and structured reflection activities to connect virtual content to real-life applications.

**Suggested delivery methods include:**

- **Self-learning phases** using online modules, videos or interactive tools, allowing learners to progress at their own pace.
- **Group discussions and peer exchange**, both in-person and online, to foster reflection, collaborative learning and shared experience.
- **Real-case analysis and scenario-based reflection**, especially for experienced employees, allowing them to bring in their practical knowledge and critically reflect on past situations.
- **Immersive VR sessions** for training key soft skills in realistic, low-risk environments – ideal for building confidence and reinforcing correct behavior.
- **Digital game scenarios** to increase engagement, simulate decision-making and provide feedback in a motivating, playful way.
- **Thematic reflection exercises**, designed to help participants draw connections between virtual experiences and real-world situations.
- **Ongoing feedback and formative assessment** using interactive tools (e.g., quizzes, dashboards, short reflection tasks).
- **Final evaluation and summative assessment** to measure learning outcomes and support continuous improvement.

**Part 2: How to use the COMP+ D/I materials**

The COMP+ D/I project offers a wide range of digital and interactive tools that support different teaching styles, learner backgrounds, and training formats. These resources are designed to strengthen soft skills in the context of public transport and are freely available in English, Spanish, German, Greek, Slovenian, Latvian, and Icelandic.



**A. COMP+ D/I eLearning Platform**

The eLearning platform enables self-directed, flexible learning through structured modules, each focusing on one key competence area:



**Environmental Awareness** – Understanding ecological responsibility in everyday work and promoting sustainable practices in public transport.



**Stress Management** – Recognising stressors and applying techniques to stay calm and focused on the job.



**Moral Courage** – Building confidence to take ethical action, even in difficult or uncertain situations.



**Conflict Management** – Preventing and de-escalating conflict situations with passengers or colleagues effectively and professionally.



**Diversity & Inclusion** – Promoting respectful interactions and understanding individual needs in a diverse workplace.

Each module includes:

1. An introductory video
2. Interactive, engaging content tailored to adult learners
3. A short self-assessment to review and reinforce key learning points

The platform is suitable for both independent learners and integration into blended learning or classroom sessions.

#### **Trainer's Corner:**

This section provides additional materials for educators, including guidance on using the platform in workshops, tips for adapting content to the group's needs, and downloadable resources.

### **B. VR Experience**

The COMP+ D/I VR experience consists of five immersive training scenarios, each aligned with one of the core competence areas. These simulations place learners in realistic public transport environments where they must react, make decisions, and reflect on their actions in a safe, controlled space.

- All scenarios are designed for the Meta Quest and available for free download via the Meta Store.
- The experiences are ideal for use in workshops, training centres, or during structured self-learning sessions.

#### **VR Tutorials:**

To support the effective use of VR scenarios, dedicated tutorials are available on the COMP+ YouTube channel. These walk learners and trainers through the VR interface, navigation, scenario flow, and key functions.

### **C. Game-Based Scenarios**

To complement the VR content and lower technical barriers, the COMP+ D/I game-based scenarios offer a user-friendly way to explore soft skills through a digital game format. These can be used independently or as part of group learning.

- Cover the same five competence areas as the eLearning platform and VR.
- Structured into multiple levels, each with increasing complexity and focus.
- Designed to support progressive learning through scenario-based tasks and decision-making moments related to real-world challenges.

The game is particularly helpful for learners who are less familiar with VR but still benefit from immersive and playful learning formats.

#### **D. Support Materials for Trainers**

To ensure successful implementation, COMP+ D/I provides comprehensive guidance for trainers, covering both technical and didactic aspects.

##### **Trainer's Handbook**

- Guidance on structuring sessions
- Tips for leading discussions
- Advice on adapting content for different learner groups

##### **VR Implementation Guide**

- Technical setup instructions for Meta Quest headsets
- Best practices for facilitating immersive sessions
- Tips for combining VR with other workshop elements

## **Examples for COMP+ D/I lesson plans**

This section presents adaptable lesson formats designed to help trainers effectively integrate COMP+ D/I materials into their teaching. These examples are not fixed lesson plans but flexible templates that can be adjusted to meet the specific needs of different learner groups, contexts, and timeframes. The COMP+ D/I materials are modular by design, allowing trainers to combine topics and formats in ways that suit their educational goals.

Whether you work with apprentices or experienced employees in the public transport sector, these lesson examples aim to demonstrate how digital and interactive tools—such as the COMP+ D/I game, VR experiences, and blended learning phases—can be purposefully integrated throughout the learning process.

---

### Example Formats: Using COMP+ D/I in Different Learning Settings

- ⇒ **Diversity & Inclusion + Conflict Management** workshop, supported by the COMP+ D/I game
- ⇒ **Diversity & Inclusion + Moral Courage** workshop, using VR scenarios to explore values and behaviours
- ⇒ **Stress Management + Conflict Management** modules, delivered in a blended format with face-to-face and online phases supported by the COMP+ D/I game
- ⇒ **Full COMP+ D/I experience**, with all five topics covered through a blended learning journey, including one session with immersive VR content

#### A. Starting with Core Concepts

Each training session should begin by introducing and defining the key concepts related to the chosen topic(s). This shared understanding is essential before learners can meaningfully engage with simulations or apply their skills. Depending on the group, this phase can include:

- Interactive presentations or short explainer videos
- Group discussions to collect prior knowledge and expectations
- Scenario-based icebreakers using short clips from the game or VR simulations to provoke initial reactions

Establishing this foundation allows participants to recognize relevant situations in their daily work and reflect on their potential responses more effectively.

#### B. The Value of Combining Topics

The COMP+ D/I modules are modular and designed to be flexibly combined. By linking topics, trainers can foster both awareness and readiness to act.

Some valuable combinations include:

- **Diversity & Inclusion + Moral Courage**  
Learners reflect on inclusive values and explore how to intervene in unfair or discriminatory situations.
- **Diversity & Inclusion + Conflict Management**  
This pairing promotes awareness of diversity while equipping learners to navigate interpersonal tensions in heterogeneous teams.
- **Environmental Awareness + Moral Courage**  
Participants consider how to advocate for sustainability in real-life work settings, even when facing resistance.
- **Stress Management + Conflict Management**  
This combination supports learners in developing self-regulation skills under pressure and handling conflicts with calm and clarity—particularly relevant for public transport settings where challenging customer interactions are frequent.

Trainers can choose topic pairings based on their learners' needs and the specific workplace context. The COMP+ D/I resources offer the flexibility to address individual or organisational priorities in a focused yet integrated way.

### C. Sample Lesson Plans

Below are four adaptable lesson plans, each structured to reflect the modular and interactive nature of the COMP+ D/I materials.

#### 1. Workshop: Diversity & Inclusion + Conflict Management (3 hours, Face-to-Face)

**Target group:** Apprentices or new hires

**Focus:** Respectful communication and inclusive teamwork

- **Kick-off (20 min):** Icebreaker and group reflection on diversity in everyday life
- **Introduction (30 min):** Define core terms (inclusion, microaggressions, conflict triggers)
- **Scenario Work (45 min):** Learners play relevant levels in the COMP+ D/I game and discuss decisions
- **Case-based Discussion (45 min):** Apply the COMP+ D/I method to real workplace examples
- **Wrap-Up (30 min):** Group discussion and evaluation with feedback tools

#### 2. Workshop: Moral Courage + Diversity & Inclusion (Half-Day)

**Target group:** Public transport staff

**Focus:** Recognising critical situations and acting with confidence and clarity

- **Start (30 min):** Peer exchange on past moments of silence or inaction
- **Input & Values Mapping (30 min):** Interactive exercise on personal values and courage
- **Game-Based Practice (45 min):** Play scenes in the COMP+ D/I VR experience to explore behaviour in simulated scenarios
- **Discussion (45 min):** Compare responses, explore the impact of (in)action
- **Real-Case Reflection (30 min):** Group work: "What would I do in this situation?"
- **Wrap-Up (30 min):** Evaluation and reflection worksheet

#### 3. Blended Module: Stress Management + Conflict Management (1 week)

**Target group:** Public transport staff

**Focus:** Self-regulation and communication in high-pressure situations

- **Day 1 (Face-to-Face):**
  - Welcome and introduction to COMP+ D/I approach
  - Overview of key topics: stress triggers, emotional responses, conflict escalation
  - Group activity: Collect and cluster personal “stress and conflict” situations from the workplace
  - Overview of learning tools (eLearning platform, game, optional VR)
- **Midweek (Online Self-Study + Optional Exchange):**
  - Complete the Stress Management and Conflict Management modules on the eLearning platform
  - Apply insights in the COMP+ D/I game (2D), navigating selected scenario levels
  - Optional online drop-in sessions for peer exchange and support
- **End of Week (Online Live Session, 90 min):**
  - Group reflection on learning experiences and game decisions
  - Sharing of workplace applications and strategies for real-life situations
  - Evaluation and wrap-up

#### 4. Full COMP+ D/I Blended Training (5 Sessions, incl. VR)

**Target group:** Apprentices

**Focus:** Developing key competencies across all areas

- **Session 1:** Kick-off, introduction to COMP+ D/I, Environmental Awareness (self-study + group work)
- **Session 2:** Stress Management, with game-based scenarios and peer reflection
- **Session 3:** Conflict Management, using group exercises and role play
- **Session 4:** Diversity & Inclusion, introduced via a selected **VR scenario** (Meta Quest) and reflected upon in group discussion
- **Session 5:** Moral Courage + final reflection: learner presentations, feedback, and evaluation

## Lessons learned during the pilotings

... will follow ...

Based on the pilotings and testings of the COMP+ material from both projects, this chapter will summarize the lessons learned from the partners' perspective and include tips and tricks for an effective training.

This chapter has outlined how educators and trainers can effectively implement the COMP+ D/I materials in diverse training settings. With a flexible, modular approach, the resources support both self-directed and group-based learning, combining eLearning, VR, and game-based scenarios to strengthen key social and personal skills in the context of public transport. Trainers are encouraged to adapt the methods and combine topics to best meet the needs of their learners.

All materials – including access to the eLearning platform, VR scenarios, COMP+ D/I game, and tutorial videos – are freely available for use in multiple languages via the website:

[www.competenceplus.eu](http://www.competenceplus.eu)

## Annex: Lesson Plan Moral Courage Workshop

Module 4: Moral Courage	
Duration (Online + f2f)	<p>Introduction; 30 Min max.</p> <p>Workshop: 4 hrs</p> <p>Follow-up: 1 hour (voluntary)</p>
Content	<p>3 Units to increase the sensitivity for acting with Moral Courage, to expand individual helper competences on different levels and to enabling the participants to develop Moral Courage. Additionally, the participants should reflect on their own and cultural values and moral understanding as the basis for Moral Courage and their ability and willingness to step in.</p> <ol style="list-style-type: none"> <li>1. <b>Basic concepts: What is Moral Courage and why do we need it?</b></li> <li>2. <b>Self-efficacy and Self-confidence: Moral Courage in Action</b></li> <li>3. <b>Tips for Moral Courage and examples of good practices</b></li> </ol>
Learning Outcomes	<ul style="list-style-type: none"> <li>• Knowledge <ul style="list-style-type: none"> <li>What is Moral Courage and why is it important for me and in public transport?</li> <li>What are my helper competences?</li> <li>How can I recognize situations where I should apply Moral Courage?</li> <li>What are ways to apply Moral Courage</li> </ul> </li> <li>• Skills <ul style="list-style-type: none"> <li>Identifying situations that require Moral Courage</li> <li>Activating ones individual helper competences</li> <li>Choosing an appropriate response</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• Competences (Responsibility and Autonomy)               <ul style="list-style-type: none"> <li>- Self-management and reflection skills</li> <li>- Communication skills</li> <li>- Social skills</li> <li>- Assertiveness/self-efficacy</li> <li>- Conscious influence</li> </ul> </li> </ul>
Participants	There are no specific requirements for the participants to take part in this module.
Educator	The educator should be familiar with the concept of Moral Courage. They should also be able to handle and moderate potentially controversial discussions on moral values and political views.
Facilities & Equipment	Internet access for the introduction and further online learning; a big enough workshop space that allows multiple groups or pairs to role play; materials for role playing scenarios.

Unit	(Learning) Objectives	Methodology	Type of Activity	Implementation	Materials and Resources	Duration
1. Basic concepts	<p>VET students and employees should be able to:</p> <p>1.1 Understand the concept of Moral Courage</p>	<input checked="" type="checkbox"/> Online  <input type="checkbox"/> F2f	<p>Video</p> <p>Quiz</p>	<p><b>Preparation:</b> The trainer provides instructions via email for the participants.</p> <p><b>Course work:</b> The learners are introduced to the topic via a video and a quiz/reflection questions.</p>	<p>Video: A world without Moral Courage</p> <p>Online quiz: What is Moral Courage?</p> <p>[Additional/Optional: Short film „Schwarzfahren“ <a href="https://www.youtube.com/watch?v=swJ0zhVJ8DU">https://www.youtube.com/watch?v=swJ0zhVJ8DU</a>            → Reflection questions: How would you have reacted? How could people have helped? Are you amused by the ending? Why?]</p>	30 min
2. Moral Courage in Action: Developing Helper Competence	<p>VET students and employees should be able to:</p> <p>2.1 recognize and analyse conflict that requires Moral Courage</p> <p>2.2 Become aware of one's own individual helper competences</p>	<input type="checkbox"/> Online  <input checked="" type="checkbox"/> F2f	Activities 1-4			

Unit	(Learning) Objectives	Methodology	Type of Activity	Implementation	Materials and Resources	Duration
	2.3 Apply Moral Courage in action according to own helper competences					
	Activity 1: Understanding the concept of Moral Courage and recognizing situations it applies; reflecting own experiences		<b>Activity 1:</b> Defining Moral Courage	<p><b>Preparation:</b> The trainer prepares flash cards with examples of situations</p> <p><b>Course Work:</b> Building on the introduction, the participants brainstorm to find definition for Moral Courage. --&gt; For online implementation use an online brainstorming or mind map tool</p> <p>They then chose situations that require Moral Courage from a pool of examples or from their own experience (if they volunteer). They do not have to come up with strategies of how to help/act, yet!</p>	<p>Flashcards with scenarios</p> <p>Working definition of Moral Courage that the participants work towards</p> <p>For online meeting: Prepare a survey with scenarios and let the participants decide whether that is a situation they would think requires Moral Courage (i.e. in zoom)</p>	30 min

Unit	(Learning) Objectives	Methodology	Type of Activity	Implementation	Materials and Resources	Duration
	Activity 2:		<b>Activity 2:</b> Game “Value hike”	<p><b>Value Hike.</b> See game description</p> <p>The goal is to reflect on their own values and beliefs</p> <ul style="list-style-type: none"> <li>• get to know different value concepts</li> <li>• identify commonalities in value concepts</li> <li>• develop awareness of the fact that values are justified in different ways</li> </ul> <p>"Discarded" values are not lost, but reflected upon. Their meaning is changed by the compromises that become necessary in the group. During the game it should become understandable that the meaning of individual values can shift against the background of different situations. However, the "own" values should always remain in the consciousness</p> <p><b>Online:</b> Use zoom breakout rooms for group sessions</p>	<p>Activity 2: Value sheet → Game description</p> <p>Online: provide value sheet via email or chat</p>	30 min
	Activity 3: Understanding different roles in conflict situations (victim/aggresso)		<b>Activity 3:</b>  <u>Face to Face workshop:</u> <b>Stop Game</b> and/or <b>Blocks</b>	<p><b>Stop Game (+ Shouting Exercise)</b></p> <p>or <b>Blocks Game</b></p>	<p>See games’ description</p> <p>Blocks Game: small building blocks or something similar (small items that do not harbor any risk of injury)</p>	1.5 hours

Unit	(Learning) Objectives	Methodology	Type of Activity	Implementation	Materials and Resources	Duration
	r/bystander/helper)		<p><b>Game</b> to understand victim/aggressor or dynamic</p> <p><b>Online Alternative:</b> Debate Club</p>	<p><b>Stop Game:</b> Participants learn that they can and should set necessary boundaries</p> <ul style="list-style-type: none"> <li>- Participants recognize their own abilities or inhibitions to set boundaries</li> <li>- How difficult is it when everyone shouts "STOP"? And how hard is it to do it alone?</li> <li>- Participants experience the difficulty of using body language, facial expressions, gestures, and voice in public.</li> <li>- Participants learn that the above must be practiced in order to be able to use it in everyday life.</li> </ul> <p><b>Blocks Game:</b> Reflecting on one's own aggression potential</p> <p><b>Evaluation:</b> After each activity, the trainer gives the possibility to summarize and reflect on the experience. Particularly in situations that simulate aggression, a debriefing is central to ensure the well-being of the participants.</p> <p><b>Online alternative:</b></p> <p>Shout exercises (microphones can be turned off) in combination with power</p>		

Unit	(Learning) Objectives	Methodology	Type of Activity	Implementation	Materials and Resources	Duration
				<p>posing/breathing; exercises for confident body language (vs. aggressive gestures or submissive behavior)</p> <p>→ use examples (pictures/videos) or have participants pantomime different conflict roles</p>		
	<p>Activity 4:</p> <p>Develop behavior guidelines and ways of resolving conflict</p> <p>Practice behavioral routines</p>		<p><b>Activity 4:</b> Role plays</p>	<p><b>Preparation:</b> Discussion guideline and hand out for activities; cards with role play scenarios.</p> <p><b>Course work:</b> Based on the experiences of the previous activities, participants develop guidelines of behavior for Moral Courage and resolving conflict.</p> <p>Role plays: The participants engage in role play scenarios according to the provided cards (either simultaneously in small groups or 1 role play at a time, depending on the group size and facilities). They try to apply the guidelines developed previously.</p> <p><b>Reflection:</b> The session ends with a feedback round and evaluation.</p> <p><b>Online alternative: Debate Club</b></p>	<p>Activity 4: Role play scenarios on cards → use from Activity 1</p> <p>Handout List of Useful Helper Behaviors</p> <p><b>Online: Use personal experiences</b></p> <p>Ask the participants to (anonymously) share experiences where they had or should have had Moral Courage. In the group (or in sub groups), reflect and discuss the situations and (alternative) actions. Pay special attention to the different roles in the</p>	1.5 hours

Unit	(Learning) Objectives	Methodology	Type of Activity	Implementation	Materials and Resources	Duration
				<p>The group of participants is split into 2 groups (or more, if the group is very large)</p> <p>For a given scenario, one group prepares arguments for stepping in, and one group prepares arguments against it.</p> <p>The group then discusses the ways one could step in and what, possibly, stand against that. Try to find a solution for the situation according to individual helper competences.</p> <p>Important: No judgment if a participant is not feeling equipped to step into a conflict situation. Try to find alternative ways of action.</p>	<p>situation (aggressor/victim/bystander)</p> <p>Combine w/ debate club exercise, if the group dynamic allows it</p>	
<b>3. Moral Courage in practice</b>	<p>VET students and employees should be able to:</p> <p>Transfer the course work results into their own context</p>	<input checked="" type="checkbox"/> Online <input type="checkbox"/> F2f	<b>Activity 5:</b> Discussion round	<p>Preparation: Previous to the session, the participants are asked to reflect upon what they have learned in the module and to come up with examples of how they can use and implement Moral Courage in their daily lives and work.</p> <p>This can be done individually or in small groups or pairs.</p>		

Unit	(Learning) Objectives	Methodology	Type of Activity	Implementation	Materials and Resources	Duration
				<p>Course Work: In the session, the participants present their ideas and discuss how the module has influenced them in thinking about moral courage.</p> <p>Reflection: The trainer collects the ideas and visualizes them in a digital way. This document is then shared with the group for future reference.</p>		