# VR Learning Lab: Exploring the Possibilities of Virtual Reality for Teaching and Training

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**Virtual reality provides powerful new ways of learning and solving problems by means of immersive environments. In this case study, VR Learning Lab's founder Robin De Lange explains the use of VR in education together with its advantages, challenges, promotion of VR in education and his vision on the future.**

## VR – WHAT DOES IT MEAN?

Imagine yourself lost in a book or looking attentively at a picture or painting. In each situation, you find yourself stepping into another world, or another moment in time. Hereby, we experience some sort of virtual reality. However, here in this case virtual reality is about a reality generated by a computer, which you can explore as a 3D world and in which you can interact with the objects all around you. It will provide you with an immersive experience, in which you feel mentally and physically present. Books, films, pictures and paintings take you to another world inside your mind. Virtual reality, however, transfers this world from your mind into a 360° display right in front of your eyes. Its potential is simply enormous. [1]



*VR user wearing a head-mounted display and using controllers [17]*

## USE CASES OF VR

When thinking about VR, one might immediately think of its use in gaming. However, its potential doesn't stop there. Several known use cases are highlighted:

- VR is used as a simulation tool to practise behaviour in dangerous or risky situations, in which physical and psychological safety is important. Think about the **military, police or firefighting**.

- VR also has its use in **medical training**, by which the risk of harming or making mistakes on real patients during training is eliminated. The same applies to the handling of expensive equipment, by which the user can practise on a digital version of the apparatus before using it in real.

- VR can also be used as a **therapy** tool in treating anxiety, phobias, depression or post-traumatic stress. The traumatic event is simulated in VR whereby the patient can come to terms with the incident and heal. For patients with anxiety or stress, VR is used as a meditation tool and a place to come into contact with fears, while remaining in a controlled and safe environment. VR also provides the opportunity to place someone in someone else's shoes through his or her viewpoint and develop empathy for that particular person as a consequence.

- VR has its use cases in **sports**, which can help players to train more efficiently by repeatedly experiencing certain situations themselves and improve each time. It is said that players' cognitive abilities when injured could be improved. The viewer's experience of the sport can also be enhanced, by which the viewer steps into a virtual stadium and enjoys the live experience remotely.

- A lesser known use case is in **fashion industry**, by which retailers can use VR in order to completely design their stores beforehand without already using the real store displays. This can save precious time and resources. Popular brands like Tommy Hilfiger® and Coach® already experimented with virtual fashion shows and customer experiences. [8] [9]

- Apart from the use in particular domains such as military or medicine, VR is also applied in schools in order to enhance learning and teaching. Thanks to simulation training, pupils can apply their learnings in practice more effectively, experience enhanced visualisation of learning content and so much more. The use of VR in **education** will be further explained by Robin De Lange, founder of VR Learning Lab. [2] [3]

## THE LAB AND ITS ORIGINS

Robin De Lange is founder of VR Learning Lab, which aims to explore **the value of VR as a new form of learning** and solving problems. Based in the city

of Leiden in The Netherlands, VR Learning Lab conducts research, teaches several courses and develops prototypes together with students. They provide advice and share knowledge by organizing lectures, workshops and masterclasses towards teachers, schools, students, publishers, libraries and training companies. Apart from research and sharing knowledge, they also develop VR applications themselves and follow developments in the field closely. [6]

To learn more about the origins, watch this short video:
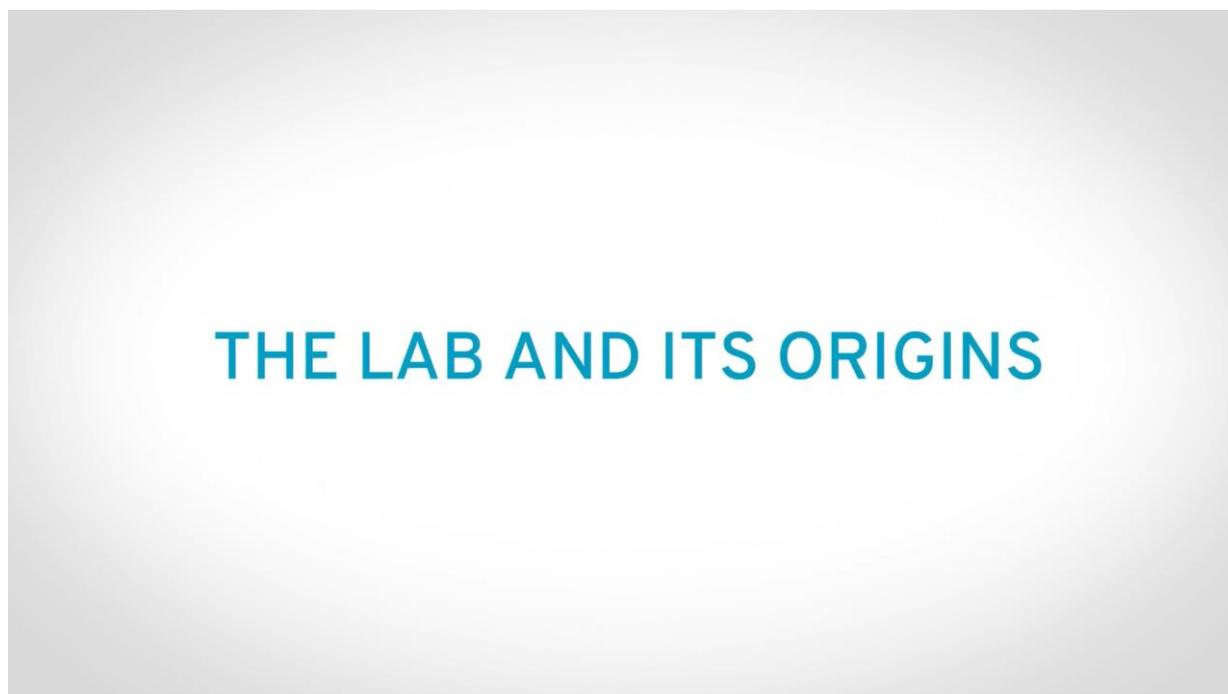


▷  [Watch online - VR Learning Lab: The lab and its origins!](#)

### THREE METHODS OF EDUCATIONAL VR

There are three methods of using VR in an education or training program:

- The first method is looking at **which content is already available** and use it in the program, which is the easiest way. However, the existing content should match the teacher's didactical approach, since many different approaches exist and teachers often have their favourite ones.

- The second method is **creating the learning material yourself** either by using manageable and generally cheaper tools or by collaboration with companies to create the desired simulated training. The latter is generally quite expensive however.

- The third method is having students **experience the design process itself**, which is often overlooked. Hereby, students can effectively learn what VR actually means and what it entails to create a virtual environment themselves. Hereby, students' digital skills are trained which is an added value.

To learn more about the three methods, watch this short video:



THREE METHODS OF EDUCATIONAL VR

▷   Watch online - VR Learning Lab: Three methods of educational VR!

**INNOVATION PRACTICES**

VR Learning Lab aims to be innovative at all times. Especially during Covid-19, when social distancing has become the new standard and schools experience the Lab's lectures, workshops and masterclasses remotely. Looking for partners all the time, the Lab focuses on **innovation by collaboration**. Students' and teachers' feedback are taken into account, as they are valuable assets in order to continuously improve user-friendliness and widespread accessibility of VR settings in educational institutions. Continuous innovation is also reflected by **fulfilling teachers' personal teaching methods and specific needs.**

To know more about the innovation practices of VR Learning Lab, watch this short video:



INNOVATION PRACTICES

▷   Watch online - VR Learning Lab: Innovation practices!

## ADVANTAGES OF EDUCATIONAL VR

There are several advantages on the use of VR in education and training. The major ones are the following:

- When trying to **mimic a real life situation** as closely as possible, in which the trainee practices a certain skill, the user does that in the best possible way without being in the actual real life situation.

- It increases **emotional involvement.** People using VR are more emotionally involved in comparison to watching a video, for example.

- It **makes content less abstract by building context.** Studying the behaviour of all types of people who wandered within the castle walls during the Middle Ages can still be quite abstract. VR offers the possibility to take students centuries back to that specific period and make it less abstract.



*VR application for language learning which mimics a real life situation [16]*

*"Our brains are not isolated things in a vat. We are embodied beings who use our bodies to learn and we are emotionally involved. Hereby, VR can make the learning process way better than watching a video or reading about it theoretically."*

Robin De Lange – founder of VR Learning Lab

To learn more about the advantages of VR in education, watch this short video:



▷    Watch online - VR Learning Lab: Advantages of educational VR

## CHALLENGES OF EDUCATIONAL VR

Despite the advantages educational VR brings with it, there are some challenges which must be taken into consideration as well:

- Some users might experience **motion sickness**. This could be partly due to technical problems such as using a phone which does not keep up with the frame rate.  Another reason is simply that some people are more vulnerable to motion sickness.

- Many people are **not familiar with the technology** yet. Students who never experienced VR before might not be focusing on the learning material and instead explore the possibilities of the technology itself. On the other hand, teachers and training companies need to become more familiar with the possibilities of the technology as well. Hereby, the cost of training staff exceeds the cost of the headsets themselves.

- Simulations could be **expensive** to create, as some have to mimic the real world as closely as possible.

To learn more about the challenges of VR in education, watch this short video:



CHALLENGES OF EDUCATIONAL VR
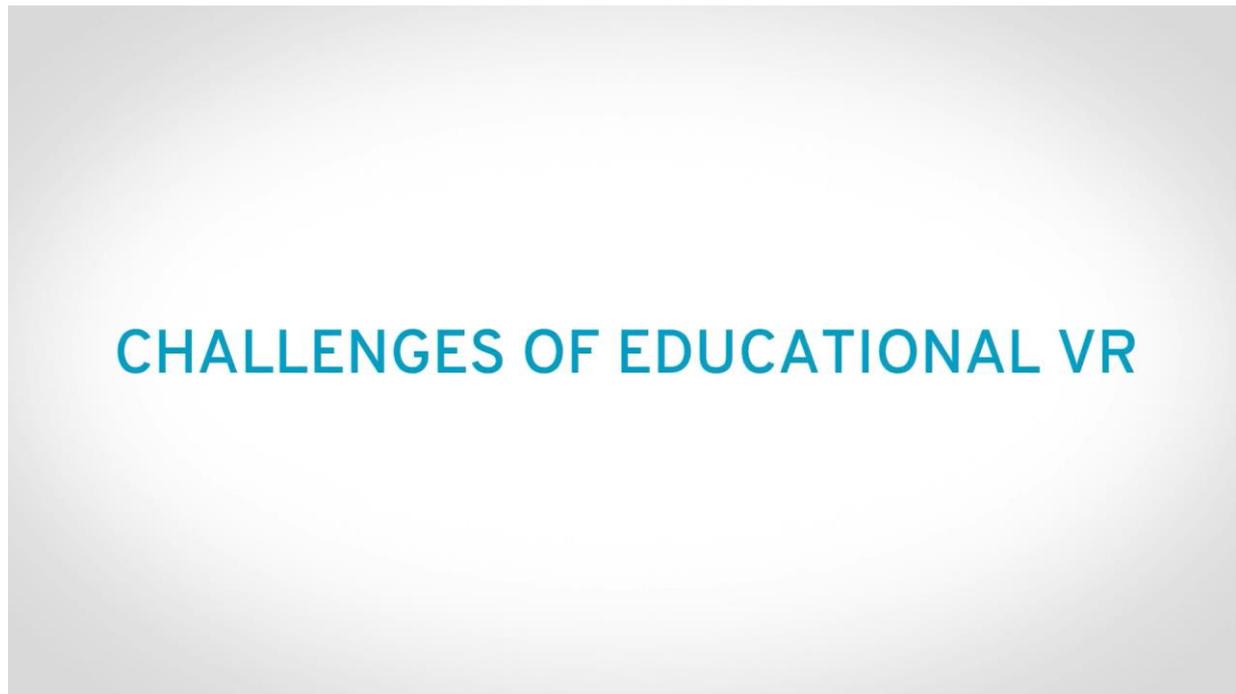
▷ Watch online - VR Learning Lab: Challenges of educational VR

**ACCEPTANCE IN EDUCATION**

In general, the whole field is **steadily growing**, with the global VR consumer and enterprise market size expected to increase from less than five billion U.S. dollars in 2021 to more than 12 billion U.S. dollars by 2024. [4]
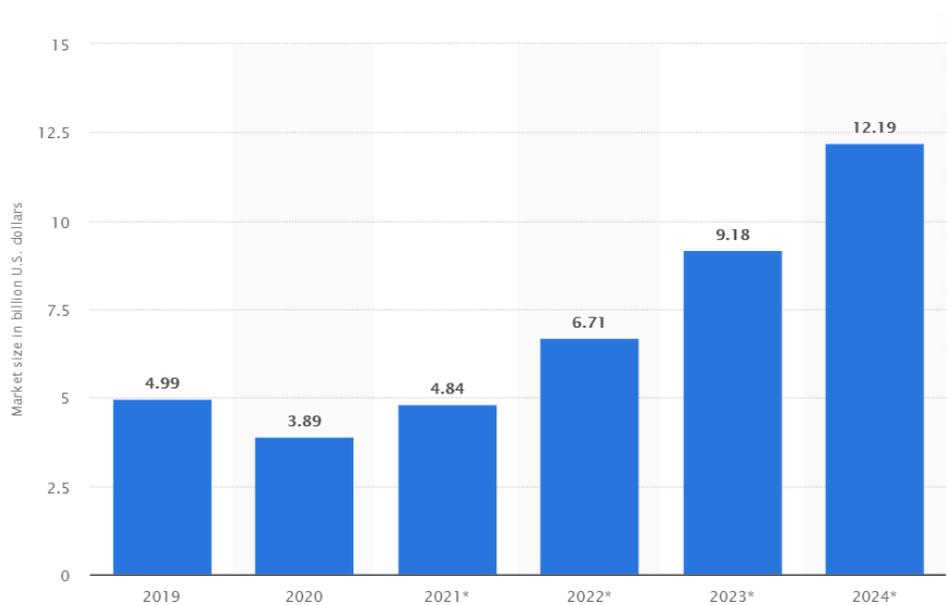


*Worldwide consumer and enterprise VR market revenue, from 2019 to 2024 (\* = forecast) [4]*

The market of **educational VR** stood at USD 656,6 million in 2018 on a global scale. It is projected to reach USD 13.098,2 million by 2026, which is a CAGR of 42,9% during the forecast period (2019-2026). Market drivers for this growth are:

- **Increased adoption** of virtual learning environment and advancements in VR headsets.

- **Partnerships** with education and corporate industries to deliver VR based education and training.

The applications for educational VR can be found at all levels of education, i.e. **K-12, higher education and vocational training**. The higher education segment is expected to be the leading application in the market during the forecast period. Geographically, Europe is likely to hold a significant share in this market, followed by North America and Asia Pacific. The Middle East, Africa and Latin America expect to exhibit a moderate growth during the forecasting period. Factors restricting market growth are lack of in-house expertise and specialization, skills and IT infrastructure. [5]

## PROMOTION OF VR IN EDUCATION

By organizing **lectures, workshops and educational consultancy** for long periods, VR Learning Lab shares the various possibilities of educational VR as well as upcoming features of the technology. The fact that **10 year olds** can design their own virtual reality games is still largely unknown. According to Robin, it does not always have to be complicated or expensive.

To learn more about how VR Learning Lab promotes educational VR, watch this short video:



▷ Watch online - VR Learning Lab: Promotion of VR in education

## VISION ON THE FUTURE

Looking into the past, VR was much more **bulky**. The default setup comprised sensors, suits, larger headsets and so on. Over the past years, setups have become **smaller,** with standalone systems as a result. On the low end of the scale, ease of use remains a challenge. On the immersive end of the scale, full motion sensing in simulations is used to make the experience even closer to reality. Such use cases still remain a **niche** and may not be generally used in school or at home.

According to Robin, **augmented reality (AR) will gain a more prominent role** in the coming years. AR is a technology by which the user sees the real-life environment with a digital augmentation overlaid on it, typically by using a camera or AR glasses. [13] Hereby, digital objects are integrated into the real world. For example, the user might see a UFO landing in the garden or gnomes crawling all over ones dinner. With VR, the user is completely isolated from reality and generally uses VR for a short duration. With AR, users can wear AR glasses for longer durations such as whole working days.

In education, AR can add digital 3D elements to textbook information or to the classroom setting in order **to visualize concepts more easily**. It can also be used the other way around, by which AR applications capture images from a real-life object and add a **detailed, digital description of the object**. This enables more interactive classes by which students gain insight through rich visuals in an immersive setting while remaining close to reality. [14]
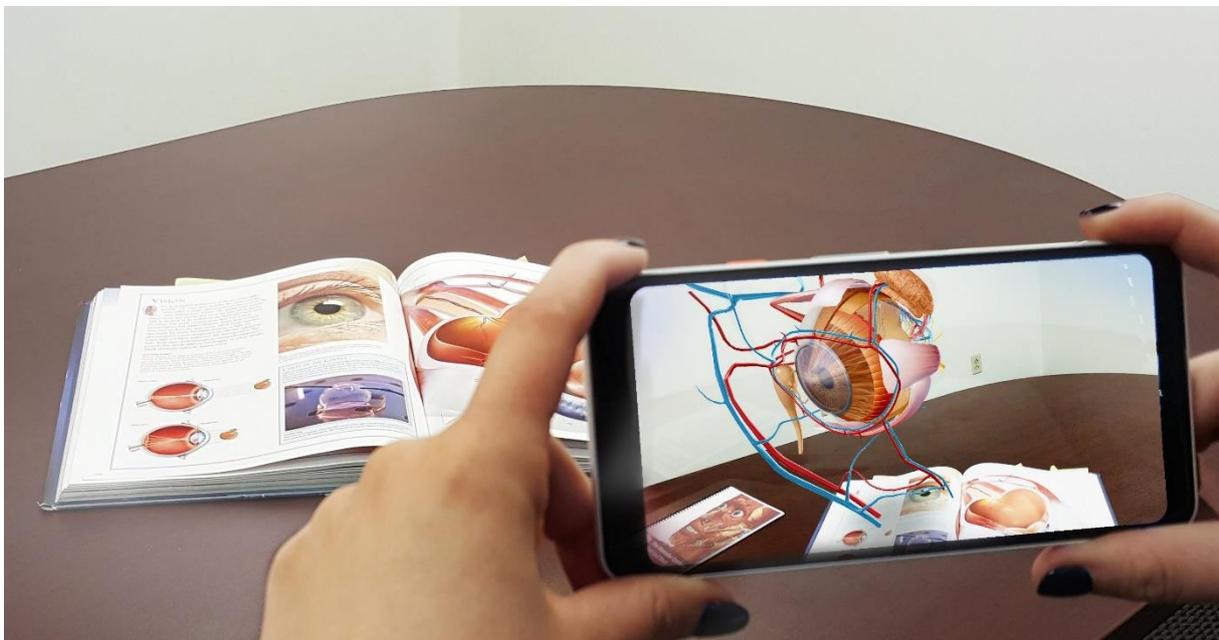


*AR application visualizing the anatomy of the human eye [15]*

Besides its potential use cases in education, the technology is also used in industry. The domain of logistics is an example of an **industrial AR use case**, more specifically in order picking. Hereby, smart glasses are used to augment workers' cognitive abilities which can improve their daily operations in terms of productivity, speed and prevention of mistakes. DHL® explores and expands the use of AR in order to improve their warehouse operations. [7] [11]

Nowadays, AR has its **technical challenges** such as hardware issues, limited content or physical safety risks when distracting the user, although the technology has **promising potential**. [10]

To learn more about Robin's vision on VR and AR's future, watch this short video:



▷    Watch online - VR Learning Lab: Vision on the future

**GETTING IN TOUCH**

VR Learning Lab creates a network through collaboration with **like-minded teachers**, who teach programming and lessons on 3D creation. On the other hand, the Lab also offers **internships** for students doing programs such as computer sciences, applied cognitive psychology or multimedia design.

To learn more about VR Learning Lab's collaboration, watch this short video:
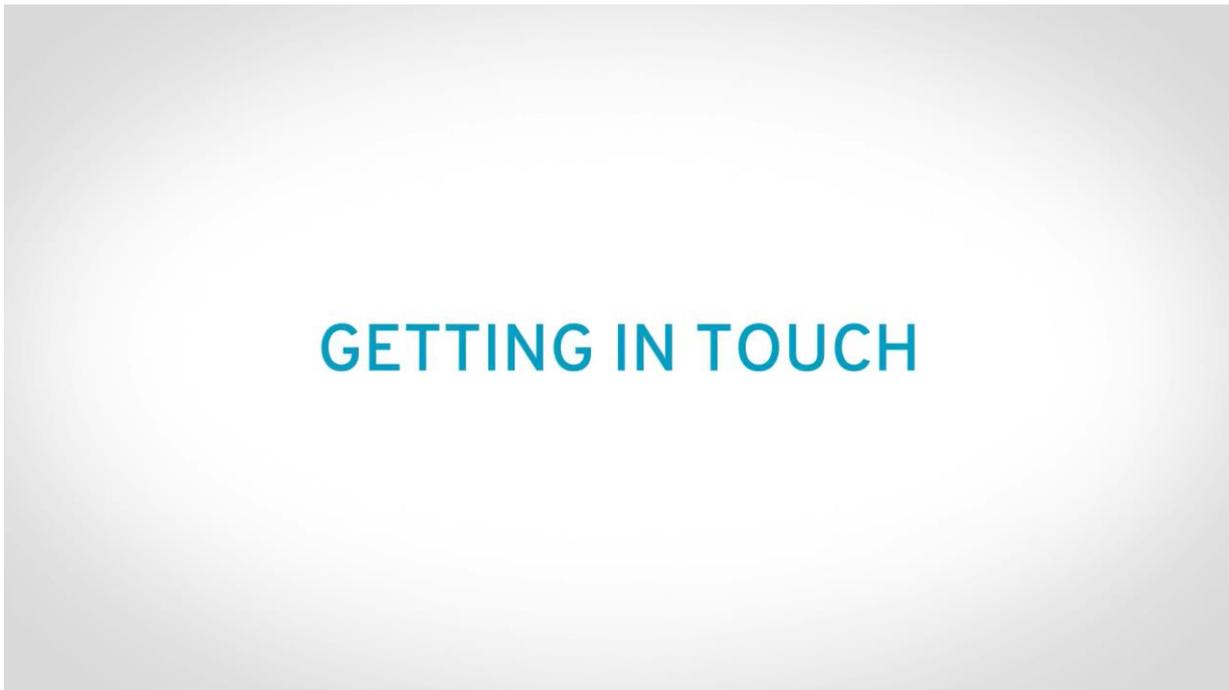


▷   Watch online - VR Learning Lab: Getting in touch

Want to know more? Check out https://vrlearninglab.nl/?lang=en

## ADDITIONAL MATERIAL & SOURCES

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