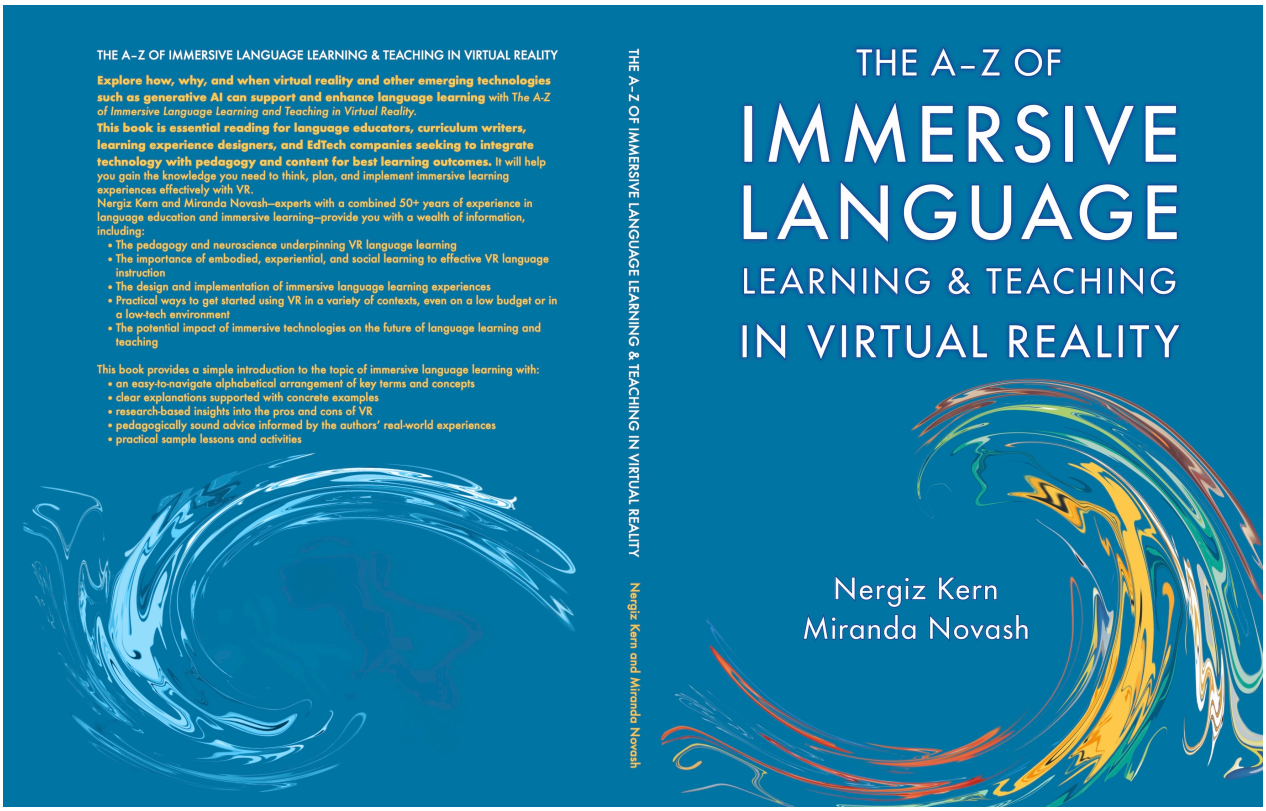
Extract from the book:



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▷ H is for Health and Physical Safety

Even people who have never tried using a VR headset may have heard that using one can cause dizziness and nausea. Why does it happen? Can it be prevented? What if it happens to the teacher or a student during a VR-based lesson? Are there any other health-related issues that can be caused by VR that I should be aware of? Are there any issues important for language learners in particular to know about?

These are all valid questions, and we'll look into them in this entry. But we'd like to start with a reminder that "VR" does not automatically equal "VR headset" if you define VR as we do in this book [➤ Virtual Reality]. This means that in many cases, one simple solution to health problems in VR is simply to choose a platform or app that can be accessed without a VR headset [➤ Desktop VR] or allows users to access the same space in different ways.

We have a separate entry on why accessing VR may be difficult for some individuals [➤ Accessibility]. This entry is focused on the reverse: issues that can be caused by VR.

Key insights

- VR, particularly when experienced through a headset, can cause a variety of health and safety issues or other unpleasant physiological side effects.
- Solutions to some of these issues already exist or likely will become available.
- Proper risk assessment and policies are advisable.

What do we mean by health and physical safety in VR?

In this entry, we cannot provide a comprehensive list of health issues or safety risks associated with using VR. In fact, some of the long-term effects on health that excessive or long-term VR use might have are not even known yet, as the technology hasn't been in widespread use for long. The technology is also developing, which means some existing issues could get resolved while new ones might still crop up.

Our main aim, then, is really to raise awareness among educators in particular. Nowadays it's commonplace for learning institutions to have risk assessment policies in place, even for some relatively mundane activities. Therefore, if you will be using VR with your students on school premises, create a risk assessment protocol for this purpose. And if you work with students remotely, create a handout that makes them aware of the risks and what they can do if they experience issues during class.

So, what are some of the health risks and physiological side effects?[68]

- Using a VR headset for even a short time can cause some people nausea, dizziness and headache. This is known as "cybersickness" or "virtual reality sickness." Three main factors contribute to cybersickness: the hardware (i.e. VR headset), the content (for example, the design of the VR platform), and human factors (for example, age and gender).

- Headaches can come from wearing a VR headset for an extended time. Most widely used headsets can still feel heavy and put pressure on the head, nose and cheeks.
- VR experiences can trigger epileptic seizures in some individuals.
- The eyes can also get strained and dry if the headset lenses aren't adjusted correctly. Because the headset can press on the cheeks, the eyes are 'pulled' open, making it more difficult to blink. Users may also blink less during an exciting activity in VR.
- Certain disorders can get triggered in some apps due to fast-paced activities, color changes, and so forth. Being immersed in colorful scenes full of moving objects and avatars can be disorienting and cause anxiety and confusion or make it difficult to focus.
- Research suggests that our brain does not distinguish well between physical reality and virtual reality. This is often cited as a reason for why VR works so well for learning. On the downside, it can cause confusion in our memories. This seems to be particularly problematic with children, whose brains are still developing.
- The visual and psychological development of young children in particular might get affected negatively. There are no long-term studies yet.
- People in VR headsets can't see their physical surroundings, and they can be so immersed in the virtual world and activities that they can trip and fall in their physical world[69] (the internet is full videos of such falls). Users could actually get hurt.
- Some people might get addicted to VR as an escape into an alternative world and life.

In addition, there could potentially be other neurological, developmental, or psychological effects that are not yet well known.

How do health issues impact the use of VR for immersive language learning?

One impact of these potential issues is on the educational professionals responsible for deciding to use immersive VR. Quite simply, teachers may decide not to use immersive VR at all out of concern for the risks. That would be a shame, as VR can be a valuable and motivating tool for language learners and has been shown to improve learning outcomes in a number of ways. Deciding not to use it would be similar to deciding never to take your students on field trips, or even have them engage in role-plays in the classroom, out of fear they might trip and fall. As with everything you do with your learners, you simply need to be prepared.

We recommend the following:

- **Conduct a risk assessment.** Do you have learners who may be more prone to health issues as a result of using immersive VR? Do you have sufficient space in your classroom to set up an obstacle-free zone large enough for a headset VR user to move around in safely?
- **Make sure your students are properly trained.** Do they understand how to use all the adjustments on the headset to achieve the best fit and maximum comfort? Have they learned how to set up the safety boundary feature built into the headset? Can they recognize the early warning signs of cybersickness? Have you given them abundant time to become comfortable with the controls and navigation before expecting them to engage in learning activities in VR?
- **Clearly communicate that alternatives are available** to any student who experiences discomfort in immersive VR or does not wish to wear a headset. Do you have an alternative way for students not wearing headsets to participate in the activity [➤ Casting]? Have you made it abundantly clear that students are not required to wear headsets and are free to take them off at any time without fear of missing out on the activity or losing participation points?

Some solutions to the issues themselves

These issues and side effects might gradually decrease as the technology develops. Headsets are gradually becoming lighter and more comfortable to wear, which should reduce some of these effects.

In the meantime, there are practical workarounds for some frequent issues.

- VR headsets come with training materials for protecting health and physical safety. Require your students to watch all the tutorials pertaining to their health and safety.
- VR headsets have a built-in boundary feature for safety. If the user steps out of the boundary, the headset's passthrough cameras will come on to allow the user to see their surroundings. For students who will use VR headsets while standing, ensure they have created safety boundaries.
- VR headsets can be used from a seated position! This may reduce cybersickness for some or increase it for others. It will reduce the likelihood of tripping for all users, but it is still important to keep furniture, walls, and other obstacles (and people) out of arm's reach to avoid smashed hands or knuckles and accidental punches.
- Move furniture, other objects, and cables out of the way before students put on their headsets. Make sure you have enough space between the students. This is necessary for their safety, but also for technical reasons. If standing is not necessary, have

them sit down, but keep enough distance so they don't hit each other or objects when gesturing with their arms.

- Try out VR apps before you ask your students to use them. Ideally, have several colleagues try them out as well and make notes. Avoid apps that seem prone to making users cybersick, anxious, or overwhelmed, or that seem to require a lot of physical movement that might knock your students off balance.
- Young children generally shouldn't be exposed to VR through headsets. There are child-friendly VR experiences, even some developed specifically for children, that can be accessed through a tablet or computer [➤ Young Learners].
- Inform your students about potential risks and provide some guidelines on what to do if they feel unwell. They should not feel guilty or hesitant to immediately stop and take off the headset if they start feeling unwell. **Never pressure anyone to use a VR headset.**
- Correct adjustment of lenses can go a long way towards minimizing motion sickness and headaches. Avoid headsets with poor quality lenses that can't be adjusted. Make sure your students understand how to adjust their lenses and headsets properly for the correct fit.
- Most VR experiences have options in the "Settings" that let users control the way they move through the scenes, such as by teleporting rather than sliding or by snap turning rather than smooth turning. For many users, the teleporting and snap turning options are far less likely to cause cybersickness.
- Research, and our own experience, show that users can train themselves to get less dizzy by starting with short sessions and slowly increasing their time in VR.[70]
- Keep your VR lessons simple. Don't try to make use of all the VR bells and whistles in every lesson. Choose simple, uncluttered virtual environments and tasks that don't require much movement until your students have become familiar with the VR technology and controls, the virtual world, and learning in VR. Introduce complexity in the language tasks and environment gradually and only where necessary for achieving a good learning outcome. You can still follow the immersive learning experience design principles for language learning in virtual reality [➤Learning Experience Design for VR Lessons].

Put your knowledge into action!

Language educator

Before implementing VR full scale, experiment with colleagues and students. Borrow a set of VR headsets for a day, and try out different apps. Make notes of any health issues or risks that you notice or think could arise. Follow up by discussing if and how these issues could

be eliminated or reduced. Look for apps and platforms that are also available on computers and tablets [➤ Desktop VR ➤ WebXR] so everyone can participate.

Read our entry on [➤ Accessibility] in this book.

If you have already planned and conducted lessons for VR (especially the first couple of lessons), analyze them for ways to simplify them so they require less complex use of the VR controllers and navigation, and less movement initially, while still following the [➤Learning Experience Design].

Language learner

If you are new to VR headsets, adjust the headset to sit as comfortably as possible. Adjust the lenses to your eyes so that you can see clearly. Do not choose a roller coaster experience as your first app. :) Keep the first sessions short and gradually increase the time.

It has been reported in some user forums that the following can help reduce cybersickness: pointing a small fan at your face while in VR (feeling the breeze helps your body stay grounded in the physical world), chewing gum, and staying well hydrated.

If you experience even the slightest bit of headache or motion sickness, remove the headset immediately and give it another try later.

If you still don't feel comfortable using a VR headset, find apps that don't require a headset [➤ Desktop VR ➤ WebXR]. The experiences can still be immersive because technology is not the only factor determining how immersed you feel and consequently how well you learn [➤ Immersion].

EdTech company

Your VR developers are very likely aware of what causes cybersickness[71] and will be familiar with techniques that can be used to reduce dizziness or nausea in your VR experience.

Is your app/platform accessible through different devices without a VR headset? If not, how difficult would it be to make it possible? See also the entries on [➤ Accessibility] and [➤ Privacy and Physical Safety].