A White Paper on

Debunking Myths and Misconceptions About Virtual Reality (VR) in Education

Advancing education and training in the metaverse

XR GURU®
Immersive Learning Hub

A White Paper on Debunking Myths and Misconceptions

About Virtual Reality (VR) in Education

Executive Summary:

Only a decade ago, technologies like virtual reality (VR) were thought of as futuristic, fancy sci-fi concepts we could see only in the movies. However, significant advances in technology have led to VR gaining prominence in numerous fields. According to a report, the virtual reality market size is expected to grow at a CAGR of 44.8% in the period of 2021-2028.

VR technology is transforming several industries, and education is undoubtedly one of them. VR can dramatically improve the educational experience by providing a computer-generated 3D environment students can explore and interact with. Many educational institutions have quickly realized the potential of VR and have adopted virtual reality into their curriculums. Despite this, some educational institutions and teachers still have reservations, based on myths and misconceptions, about using VR in the classroom. In this white paper, we will review and debunk several myths and misconceptions pertaining to using VR in the classroom.

What is VR?

Virtual Reality (VR) is the term used to describe a three-dimensional, computer-generated environment which can be explored and interacted with by a person. That person becomes part of this virtual world or is immersed within this environment and whilst there, can manipulate objects or perform a series of actions.

Virtual Reality

The concept of Virtual Reality was made popular by VR pioneer Jaron Lanier. Virtual Reality creates a completely computer-generated world, which can be interacted with and related to by the user. There is no connection with the physical world in Virtual Reality. While users cannot physically touch any objects in the virtual world, they can interact with virtual objects rendered within the virtual world.

While VR's most popular application is gaming and entertainment, that's not its sole use. VR has quickly grown in popularity and has made major inroads into several industries because of the benefits it provides.

Virtual Reality's unique value proposition is to educate and entertain users via an interactive and immersive, digital content experience. Though it started with gaming, Virtual Reality has now become a highly acceptable and valuable tool in many industries ranging from Education, Sales & Marketing, Sports, Construction & Engineering, Healthcare, and Teleconferencing, just to name a few.

Myths

According to the Merriam-Webster dictionary, a myth is defined as a usually traditional story of ostensibly historical events that serves to unfold part of the world view of a people or explain a practice, belief, or natural phenomenon. A popular belief or tradition that has grown up around something or someone. An unfounded or false notion.

Some of the more widely held myths pertaining to virtual reality are:

1. VR is too expensive
2. VR is distracting and counterproductive
3. VR is unhygienic
4. There are major health concerns linked to using VR
5. VR is just a passing fad
6. VR is just for gaming and entertainment
7. Using VR leads to addiction and social isolation
8. You have to be a computer wiz or have an IT support staff to use VR
9. VR takes too long to learn how to use, and I do not have the time
10. There is a lack of quality VR content
11. VR will replace teachers

Debunking Myths and Misconceptions

VR is Too Expensive

There are articles online indicating VR technology can be costly, depending on a variety of factors such as instructional design, creation, management, the production of customized content, and number of developers and headsets required. These articles estimate the average cost of a full VR training plan (2022) can cost from $50,000 up to $150,000. This just isn't affordable for most schools.

These estimates are based on the development of a customized full virtual reality training program. The reality is schools can begin to implement VR into their curriculum for far less.

The National Association of College Stores estimates that the average cost of a new textbook is $82 (using 2014 data). This number is accompanied by a caveat that the average includes all books assigned as textbooks, including low-cost novels and trade paperbacks. Therefore, the estimate most often quoted as the average cost for a new textbook is about $100.

An Oculus Quest 2 VR headset retails for around $300.

Yes, compared to the average cost of a textbook, an Oculus Quest 2 headset is 3x more expensive. A fair question to ask is "why should I pay 3x for an Oculus Quest 2 headset?"

Answer: a textbook is usually dedicated to one subject or topic (i.e., Algebra), whereas a VR headset can accommodate several subjects and topics. In addition, textbooks often fail to offer an immersive experience. In some cases, looking at a 2D image in a textbook may not provide a clear understanding of the subject matter. Virtual reality enables students to go on virtual 'adventures,' immerse themselves, and thoroughly explore the subject matter. For example, how does traveling to the moon to learn about the moon landing or meeting a dinosaur sound? These things are possible with VR. With VR, learners can be 'teleport' to unimaginable locations and 'time travel' back to the past.

However, with VR, you do need content. There are commercially available packages on the market today offering high quality VR content at reasonable prices (i.e., over 100 topics starting at around $70 per licenses on an annual subscription). These packages are usually priced based on a sliding scale, the more licenses purchased, the lower the cost per license.

VR learning is very cost-effective, especially if used at scale, and given its ability to transform learning into a fun, interactive, and engaging process. Once a VR program is obtained, institutions can re-use their content and hardware on an as-needed basis, reducing repeat costs. There are also several ways to mitigate VR learning costs, from using cardboard headsets to utilizing existing internal resources at an institution.

VR is a cost-effective, scalable learning modality despite the popular myth that this technology is unattainable for smaller budgets.

VR is Distracting and Counterproductive

A major critique of VR technology is that it distracts learners more than it engages them. VR is actually less distracting and improves skills more effectively than a traditional classroom learning environment.

In the context of education, VR provides the following benefits:

- VR provides stunning visual elements not possible with conventional learning methods. Using VR in classrooms offers interactive visual elements such as images, graphics, videos, etc., that help students learn faster and retain information longer.
- Virtual reality enables students to go on virtual 'adventures,' immerse themselves, and thoroughly explore the subject matter. For example, VR allows students to travel to the moon to learn about the moon landing.
- Since VR-based education is interactive, it motivates students to actively participate in lessons. Also, VR brings an element of fun to the classroom, so learning new information does not seem boring or tedious.
- With VR simulations, learners can practice multiple times and learn from their mistakes without worrying about the consequences. Image students excitedly mixing chemicals over and over in order to get the formula correct and prevent your virtual classroom from exploding! These engaging lessons not only break down complex topics in science, technology, and more, making them easier to understand for students, but can also inspire certain life-changing and fulfilling career paths.
- With VR, language is no longer a roadblock for student's educational plans in different parts of the world..

Since VR learning makes education immersive, it can greatly eliminate distractions which help students better conceptualize and understand.

A study published in the Journal of Media Education reported that students spent a fifth of their time in class performing activities on their devices that have nothing to do with their schoolwork. In fact, the study found that students check their digital devices an average of 11.43 times during class. Engaging students with VR technology could potentially eliminate this problem. Instead of spending idle time on their phones, students would instead engage with VR software for the lesson of the day.

VR is Unhygienic

Since a VR headset and its controllers come in direct contact with each learner, institutions need to ensure this hardware is kept clean to limit the spread of germs.

VR headsets can be and should be sanitized. Institutions can use solutions such as Cleanbox, a device that uses UVC light to decontaminate the headsets while causing no damage to the hardware itself. Other options include replacements with waterproof face pads so that headsets can be cleaned and disinfected to guarantee users' safety and hygiene.

In addition, it is recommended learners wash their hands prior to using VR equipment or wear gloves and use facial interface covers when wearing the headset.

Another option is for learners to provide their own headset.

There Are Major Health Concerns Linked to Using VR

Drinking too much coffee is bad for you. Drinking too much diet soda can make you sick. There are major health risks associated with eating too much red meat. Virtually anything we do has some element of risk involved. The key in most situations is moderation.

VR offers an engaging, fun, and interactive way of learning, but some learners can experience headaches, eyestrain, fatigue, and nausea when using VR for a prolonged period. Spending too much time in the virtual world can cause problems for your eyes, plus you may experience VR motion sickness. In addition, while you're wearing the headset, VR audio and video partially block out the environment around you, making it easier to trip and fall on nearby objects.

Excessive screen time is known to cause digital eye strain—a condition also called computer vision syndrome (CVS). There's nothing unique about the LCD screens of a VR headset that would prevent digital eye strain, meaning regular VR use could lead to CVS and related symptoms, such as headache and visual fatigue. **Fortunately, taking frequent screen breaks can help to prevent CVS, and digital eye strain can also be reduced with specialized lenses.**

Those at the biggest risk of VR-related eye conditions are kids, whose eyes and eye-brain connections haven't fully developed yet. In an interview with CNN, University of California, Berkeley optometry professor Martin Banks stated that spending too much time in VR could put children at risk of developing conditions like myopia or nearsightedness.

Furthermore, several manufacturers warn that children under 13 should not use VR headsets because of the nature of some VR content and because the size of the headset is not intended for children.

However, a study published in 2020 found that young children tolerate "fully immersive" VR games without "noteworthy effects" on the coordination between visual perception and physical movement. Likewise, a study published in 2017 showed no serious deterioration of vision among children 8 to 12 who played a VR video game for 20 minutes. But two study participants did run into trouble detecting differences in distance.

Cybersickness can occur when you scroll on your smartphone or computer, use multiple screens, or attend a virtual meeting in which someone else is controlling the screen. It all has to do with orientation. You need your senses to get a feel for where you are and how you're moving in the world. When your senses report contradictory information to the brain, it results in disorientation and physical symptoms.

Cybersickness remains a challenge for the immersive industry. *But most of the time it happens because of the incorrect optimization and development for that device. Sickness can appear due to a bad frame rate, misunderstanding of the locomotion or how to move the user within the VR experience/space.*

While VR has the potential to cause eyestrain and make learners feel sick, there are remedies to lessen these risks.

To combat these risks, institutions have several options, including:
• Create alternative access options for VR learning, including desktop and mobile
• Reduce overall screen time (e.g., keep VR activities to 20 minutes)
• Take frequent breaks to rest your eyes, stretch, and change positions (e.g., 10-15 minute breaks every 30 minutes)
• Periodically focusing your eyes on something stable other than the screen
• Invest in high-quality VR content with minimal disruptions (e.g., lags and blurry images)
• Provide adequate hardware training to ensure learners know how to use the equipment
Creating and managing an advanced VR learning development process can greatly reduce risks associated with VR. In addition, it is paramount teachers and parents moderate and supervise the usage of VR.

VR is Just a Passing Fad

Remember when years ago people used to say: "Why do I need a smartphone to search the internet when I have a computer at home?"

Today, most of us would be loss without our smartphones. We rely on and use them every day. As is the case with all new technologies, skepticism is expected.

Virtual reality (VR) has entered the mainstream after years of development and enhancements. With tech behemoths such as Google, Facebook, HTC, and Samsung entering the VR scene and the widespread availability of 5G technology, the popularity of VR devices and content is soaring. According to a study, the global VR market is projected to grow from $6.3 billion in 2021 to $84 billion by 2028.

The size of the VR in education market is also projected to experience significant growth. A Fortune BI report predicts the global VR in education market size to grow from USD 656.6 million in 2018 to USD 13,098.2 million by 2026, exhibiting a CAGR of 42.9%.

These trends prove that the long-term benefits of immersive learning are a new way forward. VR learning is significantly more engaging and productive, as well as being an efficient way to learn.

The education industry is quickly realizing the potential of VR and adopting it into the teaching process. Incorporating VR in the education process makes learning immersive, fun, and interactive. With visualized learning and life-like simulations, students can grasp complex concepts easier and retain information for a prolonged period to achieve higher scores.

With endless possibilities in education, virtual reality is here to stay.

VR is Just for Gaming and Entertainment

In the past, VR has been primarily associated with the gaming and entertainment industries. However, advancements in technology, the high level of internet connectivity, and cheap bandwidth have paved a way for its application and acceptably across multiple industries.

VR has quickly grown in popularity within the learning and development space largely because of the benefits it brings to education.

Potential use cases:

• **Experiential Learning with VR:** VR enables students to interact and connect with the subject matter on a deeper level. It also presents a safe environment for learners to train and hone their skills. With immersive simulations, students can practice high-risk activities such as heavy machine training, fire drills, and medical surgeries without worrying about the risks involved.

• **Create Immersive Lessons:** Thanks to the highly immersive nature of VR, students can become completely immerse in lessons. Extended reality presents 3D visuals and interactive digital elements that make teaching complex concepts considerably easier. Also, these simulations and visual 3D models help learners better comprehend the subject. Imagine traveling back in time to study history. Immersive technology makes this possible. With VR learning, you can recreate historic events and bring history to life, making it more interesting and engaging.

• **Facilitate Exhilarating Field Trips:** We know field trips require lots of planning and organizing; in addition, they can be expensive. However, with VR, field trips become more affordable, accessible, and engaging. Immersive technologies make traveling to distant or hard to reach locations a reality. For example, if you want to take your students on a trip to the moon or see a white rhino on an African game safari, you can do so from the comfort of your classroom.

● **Enhance Soft Skills:** Virtual reality can prove to be very beneficial in soft skills training. Let us consider public speaking as an example. When it comes to the art of public speaking, becoming more confident and practicing is crucial to delivering better speeches. VR tools help people practice speaking in a more realistic, immersive environment. With immersive simulations, you can master your oratory skills by practicing in front of a large virtual audience, getting feedback, and monitoring your progress over time.

Beyond the gaming and entertainment space, VR is proven to have a profound impact on engagement rates, knowledge retention, student confidence, and more when used as part of a learning program.

Using VR Leads to Addiction and Social Isolation

Apart from being a great source of entertainment, virtual reality provides almost real-world experiences. Users can enter worlds where they can be whoever they want to be and have those around them behave how they want them to. This can be highly addictive, particularly for those who may prefer their virtual reality lives to their own.

Virtual reality can also be a medium to interact with other individuals too, anywhere in the world – which may increase its attractiveness. Those who spend too much time in virtual reality could do so at the detriment to their real lives.

VR offers an engaging, fun, and interactive way of learning, but spending too much time in the virtual world can increase the risk of addiction and social isolation. If a student finds the virtual more interesting than the real world, they may end up getting addicted to the world of simulation. Therefore, it is paramount teachers and parents moderate and supervise the usage of VR.

However, there is a flip side to this. Several articles have been written on how virtual reality helped curb social isolation among senior citizens and families amid the Covid-19 global pandemic.

It's a bit ironic: people initially opposed VR because of how it would discourage in-person interaction, but it is proving to be a viable option for socialization. VR provides an opportunity to partake in new activities with friends and share new experiences, like dancing at a packed club or playing a pickup game of soccer. Even before the pandemic, some predicted that socialization would be the future of VR, but it's only because of coronavirus that people were forced to view it as a viable option. It's a way to safely participate in missed social activities without the risk.

Students can make use of VR to connect with each other more easily. This means they could make friends in other countries and feel as close to them as they do to their in-person friends.

You Have to Be a Computer Wiz or Have an IT Support Staff to Use VR

Beginners may hesitate to jump into VR because the technology seems so advanced. Although the graphics and experiences are far more advanced than any other type of technology, the user interface is extremely user-friendly.

With the advancement of technology also comes the advancement of intuitive design. And since VR tries to replicate real life, the hardware simply becomes an extension of your body, and the software becomes an extension of your environment.

To use the hardware, simply turn it on and follow the on-screen prompts. The hardware will guide you through setup and will give the user physical clues (through vibrations) along the way.

To access software in the VR device, simply select an app as you would on a smartphone. The app will open and will prompt you to begin the experience.

Experiences in VR are held to high standards, so the user has a positive interaction with minimal understanding of technology.

Although it is easy to use for beginners, VR service providers are eager to help users operate hardware and engage with experiences so everyone can enjoy immersive technology.

VR Takes Too Long to Learn How to Use and I Do Not Have the Time

Teaching is not easy!

Teaching is one of the hardest professions because it requires dedication of heart and mind. It is one of the most rewarding professions in that it gives you an opportunity to make an impact on a future generation, but it is also extremely difficult and draining. Being a teacher takes patience, dedication, passion, and the ability to do more with less. Those committed to the profession do so simply because they want to be difference makers.

With teachers working on average 47 hours a week, which can fluctuate with after-school hours to tutor and accommodate students, as well as time needed to grade papers, homework, and tests, a teacher's time is precious.

Teachers must maximize the time they have with their students. Every minute with them should matter. One of the hardest aspects of teaching is that you only have them for a short period of time to prepare them for the next level. You do the best you can when you have them, but in the scope of things, you have only a small amount of time to give them what they need. No teacher feels like they ever have enough time to accomplish everything that they needed or wanted to.

Teachers also know every student is different. They have their own unique personalities, interests, abilities, and needs. Gauging these differences can be extremely difficult. In the past, teachers have taught to the middle of their class. This practice did a disservice to those students with higher and lower abilities. Most teachers now find a way to differentiate and accommodate every student according to their own individual needs. Doing so benefits the students, but it comes at a price for the teacher. It is a difficult and time-consuming task. Teachers must be adept at utilizing data and observations, finding the appropriate resources, and meeting every student where they are.

One of the many benefits provided by VR is its ability to allow students to choose the appropriate lessons and learn anytime from anywhere at their own pace.

VR allows you to put the student's learning needs at the center of every experience. By understanding their learning needs and addressing these in an engaging way, you will be putting them at the heart of your VR learning program. This is crucial for both the successful adoption of VR as a learning tool, as well as the long-term impact of your teaching process.

Don't overwhelm them with long and complex experiences as this will be counterproductive. By taking a modular approach and producing short experiences that concentrate on a single topic, learners can get fully immersed in the topic at hand, facilitating a deeper learning experience. Too much information received in a short period of time can easily overwhelm students. As a result, they become bored, disengaged, and usually not sure why they are learning about a topic in the first place.

VR can reduce the burden on teachers by helping students learn faster and retain knowledge longer, as well as boosting student engagement and helping students to easily understand complex concepts.

In traditional classrooms, teachers are typically using only images and auditory materials to teach their students. Unfortunately, the average student only remembers 30% of what they hear and 20% of what they see. VR can bring static concepts to life. VR-based learning taps into the power of interactive, visual 3D models to augment the learning experience. According to a study by Thermopylae, we respond and process visual information at a high rate. The study shows 90% of information transmitted to the brain is visual, and humans process images 60,000 times faster than text.

Immersive education not only helps mitigates distraction, but by making learning fun and effortless, has been found to boost student engagement with and retention of the material. By allowing students to perform practical tasks to deepen their learning, the educational material moves past the abstract and into the physical. Students aren't confined to classroom lectures anymore – they can actually practice surgery, build bridges, and travel to different parts of the globe or universe.

Teaching complex concepts using traditional tools such as textbooks can be a challenging task. In addition, it can be difficult for students to understand complex subjects by only reading or listening to lectures. Using VR can help solve these issues. VR helps teachers explain complex topics easier by offering powerful 3D visuals that empower students to explore different realities and challenges their perception.

It is challenging within a conventional classroom setting to present 3D images and models. It is a proven fact our brains process images faster than text, and pictures help us better comprehend information. VR teaching facilitates visual learning that helps students understand complex concepts quicker and easier.

Schools can save time and money by providing travel experiences without having to leave the classroom. With school budgets being increasingly squeezed, the cost savings associated with travel, tickets, and time cannot be ignored. Apart from the initial installation cost and the minimal teacher training, virtual field trips are largely free. What's more, there's no need for teachers to spend time writing and obtaining permission slips.

As well as reducing cost spent on field trips, virtual trips allow students to experience locations that would be otherwise too expensive and impractical for schools to visit. Being able to allow the entire class to experience the colosseum, is now possible.

When teachers say they don't have the time, energy, desire, or training to introduce the effective use of tech in the classroom, what they may be saying is that they're scared. I get it—classroom technology can require huge instructional and mindset shifts that can be overwhelming to many teachers. Learning something new can incite a range of emotions because the prospect of failing your students is daunting. Plenty of teachers, regardless of age or experience level, harbor doubts about their ability to successfully use classroom technology.

Thankfully, there are effective VR classroom tools available that are designed to be intuitive and easy to use and troubleshoot.

There is a Lack of Quality VR Content

Today, there are commercially available packages on the market offering high quality VR content at reasonable prices (i.e., more than 300 modules available in Biology, Physics, and Chemistry, meeting STEM guidelines and AP curriculum standards).

In addition, there are authoring tools available today that allow teachers to easily create and distribute engaging VR content with no coding experience required. Some of these authoring tools offer access to an expansive library of 3D models or allow you to import your own to enhance your content.

VR Will Replace Teachers

In-person learning remains an important part of the educational process, and I doubt it will ever go away. Learning during the pandemic further established that students learn best when they are physically present in the same classroom, and when they're engaged in meaningful and energizing ways. However, the introduction of new technologies to the in-person classroom experience means there will be new innovative ways to complement traditional modes of learning, such as Virtual Reality Learning.

It is important to remember that Virtual Reality is designed to be a tool to augment and enhance the current teaching process, not replace it!

Conclusion:

VR not only helps mitigates distraction, but by making learning fun and effortless, has been found to boost student engagement with and retention of the material.

Virtual reality enables students to "learn by doing" rather than "learn by reading." In other words, with VR the focus shifts to learning through practice rather than theory. By "doing" students gain a greater understanding and retain information for a longer period. VR teaching supports a practical learning method and presents a safe environment for students to practice. VR greatly reduces the risks involved in traditional training methods and gives learners a safe environment to practice and learn from their mistakes without worrying about the consequences.

Utilizing cutting-edge technologies such as VR can make education fun, interactive, and engaging. Virtual reality has the potential to revolutionize the way we teach and learn.

The education industry is quickly realizing the potential of VR and adopting it into the teaching process. Incorporating VR in the education process makes learning immersive, fun, and interactive. With visualized learning and life-like simulations, students can grasp complex concepts with ease and retain information for a prolonged period to achieve high scores.

Deepens Student Understanding

The interactive 3-D content library has engaging and easy to understand, lectures with quizzes. Optimized lesson plans and micro-learning-based quizzes to help students test their knowledge & deepen their understanding.

Learning Assisted Environment

Sort, search, & filter your topics. Bookmark your lectures. Read video transcripts. Select your custom theme and learn at your own pace.

Cutting-edge Technology

Immersive learning using Augmented Reality and Virtual Reality engages both sides of your brain. It helps you understand faster and retain better. Choosing your own lessons in a non-linear way helps build natural curiosity to learn new concepts.

Device Agnostic Platform

Use across Android, iOS, and Oculus Devices with a single XR Guru account. Create an account in one platform and seamlessly sync across platforms.

Sources:

https://fotonvr.com/benefits-of-vr-in-education/
https://lifehacker.com/is-vr-gaming-bad-for-your-health-1848282540
https://roundtablelearning.com/debunking-top-6-myths-about-virtual-reality
-training
https://aixr.org/insights/7-myths-and-misconceptions-about-vr-training/
https://startupsavant.com/news/vr-app-reduce-isolation