Learning in Virtual Worlds
Tips and Tricks Version 7

By Craig Frehlich

To VR or Not To VR? Where do I start?

Imagine a student named Emily struggling in her introductory volcanology class. Despite her best efforts, she finds it challenging to grasp the relationship between plate tectonics and the danger of volcanic eruptions. The textbook diagrams depicting tectonic plates and subduction zones are too abstract, and the lectures, filled with geological terms and processes, leave her feeling lost. Emily knows she needs to understand how the movement of these plates can lead to volcanic activity and how scientists predict eruptions, but she can't form a clear mental picture of these complex interactions. Her teacher explains the concepts repeatedly, yet the imagery remains elusive. This inability to visualize the learning outcomes leads to frustration and a growing sense of inadequacy, making her question her capabilities and diminishing her enthusiasm for the subject she once found intriguing.

When teaching complex topics, educators often need additional support, tools, or even "superpowers" to effectively convey deeper conceptual understandings. While factual knowledge and lower-level understandings, such as what a volcano is, can be taught with straightforward explanations and simple visuals, more intricate topics require greater elaboration. For example, the relationship between plate movements and volcanic eruptions demands a nuanced approach. This deeper conceptual understanding involves comprehending the dynamic interactions between tectonic plates, subduction zones, magma formation, and eruption prediction. Such intricate topics benefit from interactive models, and immersive simulation approaches that provide students with multiple perspectives and hands-on experiences, helping them to visualize and internalize complex processes.

A common question educators face when considering the incorporation of VR into their curriculum is, "Where should I start, given that I can't address all learning outcomes?" The answer lies in identifying the difficult and complex conceptual understandings within your curriculum that require deeper contextual and hands-on experiences. Start with the topics that students find most challenging to grasp through traditional methods. For instance, intricate subjects like the relationship between plate tectonics and volcanic eruptions in a geology course are ideal candidates. These topics benefit immensely from VR's immersive capabilities, allowing students to explore, visualize, and interact with concepts in a way that traditional teaching methods cannot achieve. By focusing on these challenging areas first, you can leverage VR to transform abstract theories into tangible experiences, thereby enhancing student comprehension and engagement.

Have you ever been to an amazing restaurant?

Successful restaurants create extraordinary dining experiences by adhering to impeccable standards. They ensure excellence in every aspect, from exceptional waiter attention to high-quality dishes made with the freshest ingredients. This dedication to quality and service elevates the dining experience, resulting in memorable visits and unparalleled customer satisfaction and loyalty.

Just like good restaurants, VR programs must adhere to high standards for an exceptional user experience. They need seamless, immersive interactions that captivate and engage, much like a restaurant's ambiance enchants diners. High-quality, visually stunning, and intellectually stimulating content ensures users are fully absorbed in the virtual world. Intuitive and responsive user interfaces and support services, mirroring top-tier restaurant service, are also essential. By maintaining these high standards, VR programs can ensure satisfaction that keeps users coming back, just like patrons return to their favorite dining spots.

Here are 3 areas to pay attention to to ensure your VR program has high standards.

Ergonomics

Ensuring the ergonomics of a VR headset are top-notch is crucial for providing users with a comfortable and enjoyable experience. A well-fitting headset is essential, as it should accommodate various head sizes and shapes without causing discomfort or strain, allowing users to remain fully immersed for extended periods. Additionally, offering chairs for users who prefer to sit down can significantly enhance their comfort and stability during use. Ergonomic considerations such as adjustable straps, lightweight materials, and balanced weight distribution are vital in preventing fatigue and discomfort.

Wayfinding

Deploying easy-to-use VR learning experiences is crucial for effective education. These experiences should minimize extraneous cognitive load, allowing learners to focus on the core material without being distracted by complex interfaces. Intuitive navigation, clear instructions, and streamlined interactions help students engage seamlessly with the content. By reducing cognitive barriers, VR learning environments enhance comprehension and retention, making the educational experience more effective and enjoyable. Simplicity and usability in VR design ensure that technology aids learning rather than obstructing it.
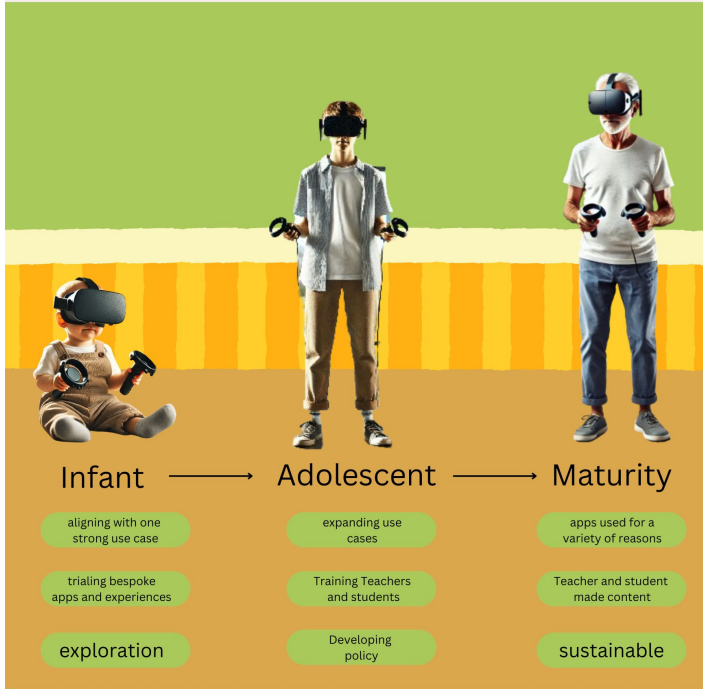
Confidence

Accounting for learners' confidence levels is crucial for positive VR experiences. Novices need clear instructions and intuitive interfaces to ease their transition, while experienced users require advanced options to stay engaged. Customizable settings and adaptive content cater to varying skill levels, ensuring all users find the experience rewarding and enjoyable. By addressing diverse confidence levels, VR programs create an inclusive and satisfying environment for everyone.

Life Cycle of a VR Program — From infancy to maturity. By Craig Frehlich

What stage is your VR program in?

The life cycle of most humans progresses from infancy to adolescence to mature adulthood. In infancy, humans experience rapid physical and cognitive development and exploring their environment. Adolescence brings significant physical changes like puberty, cognitive development, increased independence, and more complex thinking. Mature adulthood is characterized by full physical and cognitive maturity, stability in career and relationships, and continued growth in experience and wisdom. Each stage is essential for overall development and well-being.
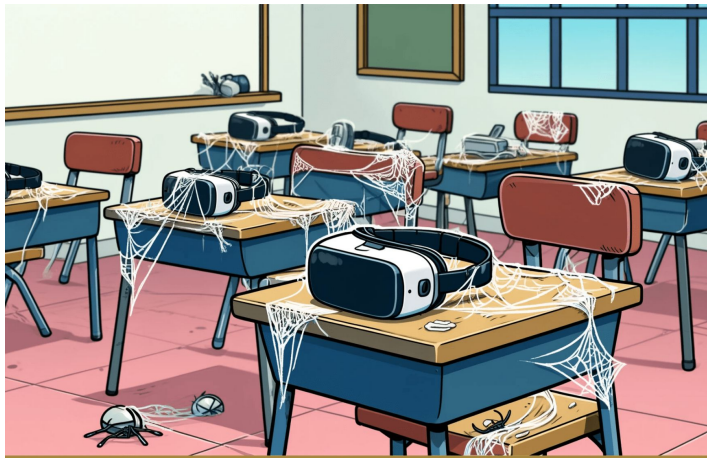
The life cycle of a VR program mirrors the gradual progression seen in the life cycle of humans, moving from an initial concept to a fully mature application. Here are some common characteristics of each stage.

In the infancy stage of a new VR program, it is a time of exploration and experimentation, where educators trial many "one-off" bespoke experiences to find what works best. This period is marked by uncertainty among teachers, as they navigate the unfamiliar terrain of immersive technology. Curriculum alignments are minimal, often leading to a lack of clear educational objectives and outcomes. The usage of VR headsets experiences ups and downs, with some days seeing heavy engagement and others where the equipment sits idle. Despite these challenges, the program is usually anchored on one strong use case, which serves as a foundation for demonstrating the potential of VR in education and guiding further development and integration into the learning environment.

In the adolescent stage of a VR program, the focus shifts towards expanding use cases and integrating the technology more deeply into the educational framework. This phase involves training teachers and students to become proficient in using VR, and even empowering them to create their own content. There is a concerted effort to align VR experiences with curriculum standards and instructional practices. Educators explore the use of VR for project-based learning (PBL) and retrieval practice, leveraging its immersive capabilities to foster deeper understanding and retention of knowledge. Additionally, this stage sees the development of policies and guidelines to standardize VR usage, ensuring safe, effective, and consistent application across various educational contexts.

In the maturity stage of a VR program, the focus is on sustainability and consistency of use cases. The technology becomes a staple in the educational environment, with well-established applications that reliably enhance learning outcomes. Teachers and students engage in robust content creation, producing high-quality, curriculum-aligned experiences that enrich the educational process. Policies and best practices are firmly in place, ensuring the safe, effective, and consistent use of VR. This stage is marked by ongoing refinement and adaptation, maintaining the program's relevance and impact over time.

4 STRATEGIES TO PREVENT "THE LONELY VR LAB"

1. Promote "Overlearning"
2. Market the Benefits of "Spaced Practice"
3. Emphasize that "Variety" is important to learning.
4. Preach that learning in "Context" is valuable

By Craig Frehlich

Have you ever gone on a date that didn't go well because you found out that you were really not that compatible with your prospective partner? First impressions are hard and often shouldn't be the sole determinant of whether you will create a long-term relationship or continue to be lonely.

Just as in dating, the same principle applies when integrating new technologies like VR into educational settings. Initial setbacks or misunderstandings don't mean that the partnership is doomed to fail. It requires patience, open-mindedness, and continuous effort to truly understand the potential and benefits. This process of gradual familiarization and adjustment can turn initial doubts into lasting, fruitful relationships, whether they be in personal or professional spheres.

So how do we foster a positive relationship between the use of immersive learning tools like VR and teachers? One key factor is helping them understand the proven methods from learning science. Here are four principles related to how we learn that might support a strong, ongoing relationship between VR and teachers.

1) Promote "Overlearning"

Overlearning, practicing a skill beyond initial mastery, solidifies knowledge and makes it more resistant to forgetting. VR supports overlearning by providing immersive environments for repeated practice. With VR, students can engage in realistic simulations and scenarios, offering endless practice opportunities without time, resources, or safety constraints.

2) Marketing the Benefits of "Spaced Practice"

Spaced practice, spreading learning sessions over time, greatly enhances long-term retention and understanding by allowing periodic review. Unlike cramming, it consolidates information and skills more effectively. VR is an excellent tool for implementing spaced practice. Educators can use VR to create immersive experiences that revisit key concepts at optimal intervals, keeping students engaged and reinforcing learning dynamically.

3) Emphasize that "Variety" is Important to Learning

Having a variety of learning engagements is crucial for addressing diverse needs and keeping students motivated. Different activities make learning more accessible and enjoyable. Virtual Reality can be one of these, offering immersive, interactive experiences that complement traditional methods. With VR, students can explore complex concepts through simulations, virtual field trips, and hands-on practice, providing a dynamic alternative to textbooks and lectures, and unlocking new perspectives.

4) Learning in "Context" is Valuable

Learning in contextually relevant environments is invaluable as it helps students understand real-world applications, making material more meaningful and memorable. VR can greatly facilitate this by creating immersive environments where students can apply their knowledge. VR simulations of historical events, scientific phenomena, or complex systems allow students to explore and interact with concepts firsthand.

4- PITFALLS TO AVOID WHEN LAUNCHING IMMERSIVE LEARNING PROGRAMS

1 The "One Hit Wonder"

2 Sidelining Teachers

Poor Infrastructure

The Wrong Metrics

4

3

By Craig Frehlich

Have you ever bought something without fully understanding the steps necessary to ensure it will be fully utilized?

Imagine buying a boat, a common example of where this happens. Many people purchase a boat with the best intentions, only to find they use it just a few times a year. Why is that? Not everyone in the family has a boating license, limiting who can take the boat out. Additionally, the infrastructure to get the boat into the water might be lacking, such as insufficient dock space or a reliable trailer. Maintenance and storage issues further complicate the situation, making it more challenging to enjoy the boat regularly.

Similarly, schools often invest in immersive learning technologies without fully understanding the requirements for successful implementation, leading to underutilization and missed opportunities.

Implementing immersive learning programs in schools can transform education, engaging students in novel ways and enhancing learning outcomes. However, the journey to successful integration is often fraught with challenges. Here are four common mistakes schools make when first starting immersive learning programs and how to avoid them.

1) The One-Hit Wonder

One of the most significant pitfalls schools encounter is becoming overly reliant on a single app or VR experience for the entire year. This approach, known as "The One-Hit Wonder," limits the scope of immersive learning. By focusing solely on one app, schools miss the opportunity to expose students to a variety of experiences.

2) Sidelining Teachers

Another common mistake is the lack of teacher engagement. Often, the responsibility for the immersive learning initiative falls on a small group of tech-savvy teachers or administrators, while others remain uninvolved. This "It's Not My Problem" attitude can lead to a fragmented and less effective program Foster a culture of collective responsibility. Regularly engage all teachers in professional development sessions focused on immersive learning.

3) Measuring the Wrong Thing

Schools often fall into the trap of measuring the success of immersive learning programs using traditional metrics that do not align with the unique strengths of VR and AR. This mistake can lead to misguided conclusions about the program's effectiveness.

4) Ignoring the Infrastructure

A less obvious but equally critical mistake is neglecting the necessary infrastructure to support immersive learning. Schools might invest in VR headsets and software without considering the technical requirements, such as adequate internet bandwidth, hardware maintenance, and technical support.

By avoiding these common mistakes, schools can create a robust and dynamic immersive learning program that truly enhances the educational experience for students.
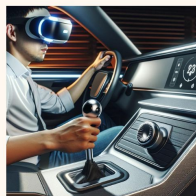
THE ROAD TO EFFECTIVE IMMERSIVE LEARNING
(Overcoming 4 Obstacles)

1 STUCK IN THE MUD

2 LOST

3 ONLY ONE GEAR

4 TOO MUCH TRAFFIC

By Craig Frehlich

Do you remember your first few months driving a car? Was it smooth, or did you run into several challenges?

Just like those early driving experiences, adopting an immersive learning program in schools can be fraught with obstacles. From navigating through overwhelming traffic to getting stuck in the mud, schools often encounter several roadblocks that can hinder the smooth implementation of these innovative programs.

Here are 4 common obstacles educational institutions might encounter in their first few months of implementation:

Stuck in the Mud

Imagine driving a car that's stuck in the mud—no matter how much you rev the engine, the wheels keep spinning without making any progress. This is akin to a teacher who struggles to shift their instructional practices and pedagogy to fully embrace the potential of immersive learning experiences. Despite their best efforts, these educators find themselves bogged down by traditional methods, unable to leverage the dynamic and interactive nature of immersive technologies. Teachers need guidance to adapt their strategies, enabling them to harness immersive learning and drive meaningful educational outcomes.

Lost

Picture a new driver who struggles to understand road signs and navigate unfamiliar routes—every turn is confusing, and every decision fraught with uncertainty. This mirrors the experience of a teacher who grapples with aligning a multitude of curriculum outcomes and learning objectives to purposeful immersive learning experiences. Without a clear roadmap, the teacher finds it challenging to integrate immersive technologies in a way that meaningfully enhances student learning. Teachers require targeted training to seamlessly map their curriculum goals onto immersive learning opportunities, ensuring that every educational journey is effective.

Only One Gear

Driving a car with only one gear limits your progress and makes adapting to different conditions difficult. Similarly, a school using only one type of VR experience restricts its potential. For long-term success, it's crucial to integrate diverse VR experiences, such as simulations, serious games, retrieval practice, and project-based learning. Each type enhances different skills, creating a more comprehensive and effective learning environment. Just as a multi-gear car adapts to various terrains, a varied VR program equips students to tackle real-world challenges dynamically.

Too Much Traffic

Driving a car in heavy traffic can be overwhelming, with constant decisions about which lane to choose and how to navigate the congestion. Similarly, institutions face a barrage of choices when implementing immersive learning programs. The multitude of options for headsets, content, and platforms can create a sense of being stuck in traffic, making it difficult to move forward smoothly. Institutions need a well-defined plan and guidance to effectively select and integrate the right tools and content for their immersive learning initiatives.

QUALITIES OF A GOOD AI ASSISTANT

Report Back

Personalized

Memory

Elicit Deep Thinking

SCHOOL

By Craig Frehlich

Have you ever had to tutor someone? What was it like? Were you effective? Did you make it interesting by providing stories? Were you patient but challenging? Did you connect your explanations to what the student was interested in? Did you take the time to build background knowledge around what the student already knew? Sounds hard, right?

Tutoring can indeed be a challenging task, requiring a blend of patience, creativity, and adaptability. It's not just about conveying information but about making that information resonate with the student. The key is to be both a guide and a motivator, helping students navigate through the complexities of learning while encouraging them to push their boundaries.

With the advent of AI and its capability to support students as a tutor, whether as a text-based chatbot on a 2D screen or as an AI avatar in a 3D virtual world, what qualities should we look for in the right one for our students and their learning journey?

Here are a few:

1. Does the AI tutor have a Memory?

Having a memory allows the AI to track and understand a student's progress over time, providing personalized and effective support. With memory, the AI can recall previous lessons, identify areas where the student struggles, and adapt its teaching strategies accordingly.

2. Can the AI tutor be Personalized?

It is key for an AI tutor to have a persona related to the learning situation because it enhances the educational experience. For example, an AI tutor adopting the persona of a Greek philosopher when studying ancient Greece makes learning more vivid and relatable. This simulation provides insights and perspectives that enrich the learning process, bringing the subject matter to life in a way that purely factual teaching cannot achieve.

3. Can the AI tutor Report Back to the Teacher?

It is crucial for the AI tutor to report back to the teacher on student progress during learning sessions to ensure a cohesive and informed educational approach. These reports provide valuable insights into the student's strengths, weaknesses, and overall progress, allowing teachers to tailor their strategies more effectively.

4. Can the AI Tutor Elicit Deep Thinking?

By encouraging students to think deeply and elaborate on their responses, the AI tutor helps them develop and leads to a deeper understanding and better retention of the material. By prompting more detailed answers, the AI tutor can identify and address knowledge gaps, ensuring a more thorough learning experience.

AI assistants are not meant to replace teachers but to act as valuable aids in lightening the heavy load that master teachers bear. In our complex world, effective teaching and learning require immense effort and dedication. AI assistants can support teachers by handling routine tasks, providing personalized student feedback, and offering supplementary instruction.

The Race to Learn in VR

Fast and Efficient

Slow and Steady

VS

START

By Craig Frehlich

## Should learning something fast in VR be the gold standard?

Do you remember the story of the tortoise and the hare? In this classic fable, the swift hare, confident in its speed, races against the slow but steady tortoise. In the end, it's the persistent tortoise who crosses the finish line first, teaching us a valuable lesson: slow and steady wins the race.

Much like the hare, we often find ourselves enamored with the myth that fast learning is better learning. It's part of human nature to crave speed—we want fast cars, quick workers, and rapid learners. Living in an era of impatience, we easily fall prey to advertisements boasting swift results, from losing weight in a week to reading a novel in an hour. These claims, even if true, rarely address the sustainability of the weight loss or the depth of comprehension in speed reading. The allure of fast results can overshadow the value of genuine, long-term understanding. In learning, the brain needs time to process, build connections, and reflect. Rushing through material may lead to superficial knowledge at best. True learning, like the tortoise's journey, requires patience and persistence. By slowing down, ensuring comprehension, and integrating new concepts thoughtfully, we ultimately achieve a deeper and more meaningful understanding.

Learning in VR is no different when it comes to the fallacy of speed equating to better outcomes. We often encounter headlines boasting statistics like "we learn 4x faster in VR," which, while impressive, shouldn't be the ultimate goal. Such claims can mislead us into believing that the faster we absorb information, the better our learning experience is. However, just like traditional learning, effective VR learning demands time for reflection, connection-building, and deep understanding. The immersive nature of VR offers unique opportunities for experiential learning, but rushing through these experiences can lead to shallow comprehension. Furthermore, learning that is slightly challenging tends to be more engaging and rewarding than learning that comes too easily. Challenges stimulate cognitive processes and keep learners actively involved, promoting deeper and more meaningful learning. Instead of focusing on speed, we should prioritize the quality and depth of learning, ensuring that the immersive environments foster true mastery and meaningful engagement. Just as in the story of the tortoise and the hare, it's the steady and thoughtful approach that ultimately leads to lasting knowledge and success.

LEARNING IS A NON-LINEAR JOURNEY

Expert Learner

Novice Learner
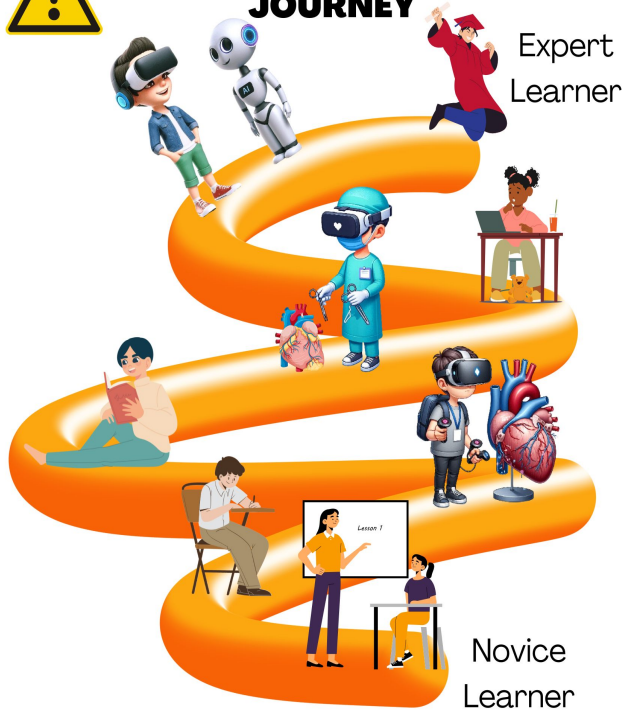
By Craig Frehlich

When you teach or learn do you focus on just one method and pathway?

In life, several phenomena exhibit a linear nature, where changes occur in a straight-line fashion and are proportional to the input.

The passage of time, which progresses steadily and uniformly, is linear.

Bamboo, often follows a linear pattern, with a consistent and predictable height that increases over time.

The inherent simplicity and direct correlation of linear relationships make them particularly intuitive and comfortable to understand due to their ease of predictability.

Learning is not linear! And is very unpredictable because much of the learning process is hidden within the minds of our learners.

Learning is a dynamic journey, not a straight path. As novices, we start with curiosity (sometimes!), facing setbacks and obstacles that force us to rethink our approach. Progress involves practice, regression, and finding new strategies, making the process complex and non-linear. This journey requires resilience, patience, and adaptability.

Using a variety of different experiences when learning is crucial because it helps unlock points where we may be stuck or regressing and allows us to see things from different perspectives. Diverse experiences expose us to various contexts and problem-solving approaches, enriching our understanding and broadening our cognitive toolkit. When we encounter obstacles, drawing from a range of experiences enables us to find alternative solutions and make connections that might not be apparent through a single method. Additionally, experiencing different perspectives fosters critical thinking and adaptability, helping us approach challenges with a more flexible and open mindset.

Using a variety of instructional strategies, such as lectures, textbook readings, VR simulations, practice tests, and AI avatar chatbots, may prove effective in helping students learn. These diverse approaches provide a rich tapestry of experiences that help unlock points where learners may be stuck or regressing, and they offer multiple perspectives on the subject matter. Lectures and textbook readings lay the foundational knowledge, while VR simulations offer immersive, hands-on practice. Practice tests help reinforce and self-assess mistakes in learning and identify areas needing improvement, and AI avatar chatbots provide interactive, personalized feedback.

Just like expert climbers who navigate the windy and challenging path to the summit of Mount Everest, experiencing several ups and downs to acclimatize safely, successful learning requires a similar journey. This approach ensures that learners can adapt, persevere, and ultimately reach their goals, much like climbers reaching the peak.

"The Struggle Shouldn't be Real"

LEARNING FROM MISTAKES

VS

REAL WORLD

- Shame
- Judgement
- Fear

VIRTUAL WORLD

- Courage
- Growth
- Expanded Comfort Zone

BY CRAIG FREHLICH

Remember the saying "The struggle is Real"? But for a Novice Learner should it be?

Have you ever been to a workshop and asked to partner up with someone to practice a skill? Who did you pick—a friend or a stranger? Often, we gravitate towards friends because the comfort of familiarity makes the fear of making mistakes less intimidating.

In the context of learning, "the struggle is real" acknowledges that the challenges and difficulties encountered are genuine and significant. It highlights the reality that acquiring new skills or knowledge can be tough and frustrating, but it also validates the learner's experience and effort in overcoming these obstacles.

We know that practice is essential for learning, and deliberate practice—where we actively engage with and reflect on our mistakes—is crucial in this process. Unfortunately, most humans are conditioned from an early age to view mistakes as negative, leading us to struggle with embracing them. This mindset hampers our ability to learn effectively, as we miss opportunities to understand and correct our errors. By reframing our perspective on mistakes and recognizing them as valuable learning experiences, we can enhance our growth and mastery in any field. Embracing mistakes allows us to break free from the fear of failure and unlock our true potential through continuous improvement and reflection.

Mistake Making in the Real World

Our perceptions, feelings, and dispositions when making mistakes in the real world often differ significantly from those in a virtual learning environment. In the real world, mistakes can be accompanied by feelings of embarrassment, frustration, or even fear of judgment from others. This fear of failure can stifle creativity and hinder the learning process, as individuals may become overly cautious and avoid taking risks that are essential for growth.

Mistake Making in the Virtual World

In contrast, virtual worlds offer a more forgiving and controlled environment where mistakes can be viewed as part of the learning journey. Virtual environments often provide immediate feedback, allowing learners to quickly understand and correct their errors without the same emotional weight or social repercussions. The immersive and engaging nature of virtual worlds can also make the learning process more enjoyable, reducing the stress associated with making mistakes.

While transitioning to real-world settings is ideal for learning something new, practicing in a virtual world offers a valuable intermediate step. This virtual practice provides a comfortable environment that can ease the path toward achieving mastery in real-world scenarios.

Digital Native Vs Immersive Learner

VS

Digital Native
- Highly Connected
- Instant Access
- Actively Engaged

Immersive Learner
- Requires Orientation
- Context Dependent
- Subject Specific

BY CRAIG FREHLICH

Are Digital natives automatically good at Virtual Reality?

Imagine two individuals: one who has lived near the sea all their life, and another who explores its depths as a diver. The first person, a digital native, is familiar with the sea's surface—the way it shifts with the tides, the feel of the water, and the rhythm of the waves. They navigate this environment effortlessly, having grown up surrounded by its sights and sounds. The diver, however, experiences the sea in an entirely different way. Equipped with scuba gear, they plunge beneath the surface to discover a world teeming with life and wonder. This deeper exploration allows the diver to interact with the ocean in a more profound and immersive manner, uncovering layers of beauty and complexity that the surface dweller may never fully grasp. While both individuals share a love and comfort with the sea, the diver's journey beneath the waves offers a richer, more encompassing experience, akin to the difference between merely using digital technology and fully engaging with virtual reality.

A digital native is someone who has grown up immersed in the digital age, seamlessly integrated into the networked world. They are inherently active online, effortlessly navigating social media, digital platforms, and virtual communities. Constantly connected, they communicate, collaborate, and share information with ease, feeling a strong sense of belonging and engagement within the digital landscape. Their lives are intertwined with technology, making them adept at leveraging digital tools for both personal and professional purposes, and feeling at home in a world where online presence is a natural extension of their identity.

Being a digital native, with their inherent fluency in navigating online platforms and digital networks, does not necessarily translate to proficiency in virtual reality (VR) experiences. While they are adept at using social media, apps, and various digital tools, VR requires a different set of skills and awareness. VR experiences are highly immersive and designed with specific learning outcomes and contextual interactions in mind. This environment demands a deeper level of engagement, spatial awareness, and the ability to interact with virtual objects and scenarios in a meaningful way. Unlike the familiar, flat interfaces of traditional digital platforms, VR immerses users in a three-dimensional space where learning is experiential and context-driven, necessitating a unique approach to interaction and comprehension that goes beyond the typical digital native's skill set.

Suggestions For Teachers

1. Give a proper Tutorial before the VR experience

2. Provide learning and questions before the VR experience to reduce cognitive load.

3. Have a debrief after the VR experience to allow for reflection

Teaching and Learning in VR Using Gestures

3DOF Teaching and Learning

6DOF Teaching and Learning

Implications

- Diminished Conceptual Understanding
- Reduced Memory Retention
- Higher Cognitive Load

- Enhancing Conceptual Understanding
- Greater Memory Retention
- Lower Cognitive Load

By Craig Frehlich

Reasons Why 6DOF VR Might be a Better Medium than 3DOF For Teaching and Learning

Have you ever tried to teach or explain something with your hands behind your back? Hard, right? That's because gestures play a crucial role in communication and learning. In a 6DOF VR environment, the ability to use natural hand and body movements enhances multi-modal learning by engaging multiple senses and learning pathways, making the experience richer and more effective. This immersive, interactive approach leads to higher motivation and better learning outcomes, as students can interact more naturally and intuitively within the virtual world.

Why is Gesturing so Effective in the Learning Process?

1) Enhancing Conceptual Understanding

According to Cook, Yip, and Goldin-Meadow (2010) and Goldin-Meadow, Cook, and Mitchell (2009), gestures help in concretizing abstract concepts. When teachers use gestures to illustrate concepts, students can better visualize and grasp these ideas, leading to deeper comprehension.

2) Facilitating Memory Retention:

Gestures aid in memory retention by creating additional memory traces. Goldin-Meadow et al. (2009) found that students who used gestures while learning a new concept were more likely to remember it later compared to those who did not use gestures.

3) Freeing Up Cognitive Resources:

Gestures help reduce cognitive load by offloading some of the mental processing onto physical movements. Goldin-Meadow and Wagner (2005) and Paas and Sweller (2012) highlight that when teachers use gestures, they help distribute the cognitive demands of processing verbal information and coordinating understanding.

Practical Implications for Teaching in VR

3 Degrees of Freedom (3DOF) VR limits gesture use to basic head orientation and pointing, as it only tracks rotational movements (pitch, yaw, roll), restricting the ability to perform complex gestures. In contrast, 6 Degrees of Freedom (6DOF) VR tracks both rotational and positional movements, allowing for natural and immersive interactions with accurate hand and full-body gesture tracking, thereby enabling a wider range of gestures and more interactive experiences in virtual environments.

In a 6DOF VR environment, incorporating gestures leverages multi-modal learning by engaging multiple senses and learning pathways. This immersive, multi-sensory approach aligns with how the brain processes and integrates information, making learning experiences richer and more effective.

Using gestures in 6DOF VR makes lessons more dynamic and engaging. Students are more likely to stay attentive and interested in the material when it is presented in an animated and interactive manner, leading to higher motivation and better learning outcomes.

3 Types of VR Experiences

SUPPLEMENTARY

Completes an existing learning topic, often by providing what is missing or lacking.

COMPLEMENTARY

Enhances a learning topic by adding additional value or offering a different perspective.

SUBSIDIARY

Is related to the main learning topics but considered less important because it is not directly connected to learning outcomes.

By Craig Frehlich

Not All Learning Experiences are Equally Valued by Educators

Recently, I had a conversation with a teacher interested in incorporating VR into their new Medieval Studies unit. I suggested several ideas, including a 360-degree VR tour of castles showcasing their evolution over time, and a castle-building game where students could assemble various pieces to create the strongest fortress to protect the villagers. The teacher was thrilled about both possibilities and so was I—until I learned that they wanted to use these experiences only on the last day of the unit as a celebration.

When it comes to learning engagements, we can often group them into three categories: Supplementary, Complementary, and Subsidiary. The first two are immensely valuable in helping learners progress from novice to expert, while the last one does not offer the same level of benefit. Here are three possible definitions:

Supplementary VR: A VR experience designed to enhance or complete an existing learning topic, often by providing what is missing or lacking. Example: VR simulations that offer practical applications of theoretical concepts.

Complementary VR: A VR experience that augments or enhances a topic by adding additional value or offering a different perspective. Example: VR tours inside the digestive system to provide an immersive understanding of biological processes.

Subsidiary VR: A VR experience that is related to the main learning topic but considered less important because it is not directly connected to learning outcomes. Example: Allowing students to play a "Beatsaber-like" math game

Upon, reflecting on my conversation with the teacher I should have provided more guidance and wisdom regarding these 3 definitions and stood my ground in explaining that the two activities I proposed were not "Subsidiary" in nature.

When considering the integration of VR into a unit, it's important to recognize that VR is not just an additional task to be tacked onto the end of the curriculum. Instead, VR should be seen as a complementary or supplementary tool that enhances and deepens the learning experience throughout the unit. By incorporating VR strategically throughout the unit, students can immerse themselves in a variety of environments and scenarios, exploring complex concepts and real-world applications. This active engagement can spark curiosity, foster deeper understanding, and provide a rich context for their projects. Waiting until all project work is over misses the opportunity to use VR as a dynamic, interactive resource that can make concepts more tangible and memorable, thereby enriching the entire learning journey rather than simply supplementing it at the end.

When was the last time you learnt from an expert? How did it go?

Learning from an expert can elevate an educational experience to an extraordinary level. Imagine studying theoretical physics under the tutelage of Albert Einstein, whose revolutionary theories of relativity transformed our understanding of time and space. The opportunity to gain insights from his visionary approach and firsthand experiences would be invaluable. Or would it?

While learning from experts has its benefits, it also comes with challenges. Experts might skip crucial foundational steps, assuming they are widely known, which can confuse beginners trying to grasp basic concepts before tackling advanced applications. Additionally, their deep familiarity with the subject may make it hard for them to simplify complex ideas for novices, potentially leading to an overwhelming rather than enlightening learning experience.

In top-down learning, the teacher, who is typically an expert, imparts knowledge starting from the highest level of conceptual hierarchy. This could include broad principles that give a wide perspective on the subject. The learner is then expected to fill in the lower-level details progressively, which can be challenging without sufficient foundational knowledge. A top-down teacher is like a swim instructor who starts by taking a learner directly into the deep end of the pool to demonstrate and target advanced techniques.

In bottom-up learning, students begin by mastering small, discrete units of information or skills, which are seen as the building blocks of more comprehensive knowledge. This approach is especially beneficial for beginners, as it ensures that they develop a solid understanding of the fundamentals, which are critical for grasping more advanced topics. A bottom-up teacher leads students to the shallow end of the pool and starts with simple strokes.

There is an emerging trend in education involving the use of expert AI avatar tutors. These conversational bots offer transactional support for learners, enhancing the educational experience. However, the key challenge lies in deploying them effectively to ensure that they do not overwhelm students.

Programming your Ai avatar chatbot as a top-down expert or a bottom-up teacher is key:

Top-Down Expert- Ideal for advanced learners who already have some foundational knowledge and can handle abstract concepts without needing step-by-step guidance on the basics.

Bottom-Up Teacher-Ideal for beginners and those new to a subject area. The chatbot can effectively answer specific questions about basic concepts, guide learners through and ensure that foundational knowledge is solid.

Understanding the current stage of your learner is crucial. Introducing a novice learner to complex topics by an expert can be overwhelming. Instead, equip them with water wings and start with a teacher who specializes in the basics, ensuring a gradual and more manageable learning progression.

PUT THE **HORSE**

before the CART

Run a VR Pilot

Create an Immersive Learning Policy

Build an Implementation Roadmap

VR Program

By Craig Frehlich

Have you heard the expression "Don't put the cart before the horse"?

Imagine someone booking flights and hotels for a two-week trip to Europe, only to discover afterwards that they can't get the time off work or that the trip is far more expensive than they can afford. Or, buying a new high-performance sports car without first learning how to drive.

In educational technology, the allure of the next shiny new toy can be incredibly strong, tempting educators and administrators to adopt the latest gadgets or software without fully assessing their educational value or compatibility with existing systems. This often leads to hasty investments that may not actually enhance the learning experience or improve outcomes,

The expression warns against rushing to integrate new educational technologies without first ensuring that foundational elements, such as teacher readiness and curriculum alignment, are properly established.

And this is certainly true for the adoption of VR.

So, how can we ensure that schools and districts prioritize getting the horse ready before they attach the cart?

Here are three simple steps to take to ensure successful implementation:

1. Start a small pilot- Starting a small pilot program with VR allows educators to test its effectiveness in a controlled setting. This approach helps gather important data on how VR impacts student engagement and learning, providing insights for broader implementation in educational contexts.

2. Develop an Immersive Learning Policy- Once a school has gained insights into VR's potential through a pilot program, the next step is to develop an immersive learning policy. This document should outline the purpose, methods, and objectives of using VR in the educational setting. It needs to detail why the school is adopting VR, and what educational goals it aims to achieve with it.

3. Build a Roadmap- To build a roadmap for implementing VR in an educational setting, follow some of these key areas and ideas:

a) Resource Allocation: Determine the budget required for VR hardware, software, and maintenance.

b) Professional Development: Implement training programs for teachers to effectively use VR in their teaching.

c) Sustainability and Growth: Plan for the long-term sustainability of VR resources, including updates and upgrades.

d) Evaluation and Adjustment: Regularly evaluate the effectiveness of VR programs against the set educational goals.

8 Popular Metaphors for Learning

By Craig Frehlich

When did you first encounter a metaphor that helped clarify something for you?

For me, it happened in church. Many biblical stories use parables to aid our memory and comprehension. One of my favorite examples is "The Parable of the Sower." In the Parable of the Sower, a farmer sows seeds on different types of ground, representing varied responses to God's word: seeds on a path are eaten by birds, on rocky ground they wither, among thorns they're choked, but on good soil, they flourish and yield a rich harvest. This illustrates how people's reception of spiritual messages can lead to different outcomes, with only those like good soil truly understanding and benefiting from the teachings.

It's fascinating how metaphors and parables like "The Parable of the Sower" can make complex ideas more relatable and memorable. They illuminate how we learn by transforming abstract educational concepts into familiar experiences. Here are 8 of my most popular metaphors that have truly resonated with readers.

1. The Multicolor Pen-Using a multi-colored pen as an analogy, diverse teaching strategies in education—like different pen colors—make learning more engaging and cater to various student needs, enhancing understanding.

2. Fill the Bucket-Imagine a bucket with water leaking from small holes, much like how new information often starts to fade from our memory. Deliberate practice acts like tape, patching these leaks and ensuring that knowledge is retained and mastered.

3. Recipe of A VR Lab-Maintaining a VR-based educational program poses sustainability challenges, notably in content provision and funding. Creating your own content should be one of your main ingredients, like flour when making a cake.

4. A Marriage of Necessity-VR aligns seamlessly with andragogy, the theory of adult learning, by catering to the unique needs of adult learners who value practical, real-world applications and self-directed learning.

5. Learning is a Marathon, not A Sprint-Learning is likened to a marathon, involving deep understanding and long-term retention through spaced-out, varied practice that slowly builds lasting neural pathways

6. Pinch Runners for Learning-The progression from novice to expert mirrors advancing bases in baseball, each step—from acquiring basic knowledge to practical application. And, using "Pinch Runners" can provide a unique advantage, especially in learning.

7. Can you Take a Punch- Receiving feedback can feel like a sudden punch, prompting instinctive self-defence. However, like a boxer learning to handle hits, effectively processing feedback requires emotional resilience and the humility to accept mistakes.

8. How do You Water Your Garden-Spaced practice in learning, akin to watering a lawn intermittently rather than all at once, results in more effective retention and a deeper understanding. This approach involves spreading out learning sessions and reinforcing information over time.

How much variability do you have in your life? Most of us are accustomed to routines and hate change.

When it comes to our diet and food, variability is essential for good health. Maintaining a varied diet is essential for good health because it ensures a balance of necessary nutrients, which supports overall bodily functions. A diverse intake of foods provides vitamins, minerals, and antioxidants that help strengthen the immune system, support growth and development, and reduce the risk of chronic diseases such as heart disease, diabetes, and cancer.

Just as varying our diet introduces our bodies to a wide range of nutrients, diversifying our practice as we are learning exposes us to different perspectives and skills, enhancing our adaptability and understanding.

Deliberate practice involves receiving constructive feedback to refine skills and correct errors. It is aimed at improving specific aspects of learning through targeted exercises.

According to Daniel Druckman & Robert A.Bjork - In the Minds Eye, Enhancing Human Performance(1991), practice that is varied in type, context and spaced out over time is highly effective.

Alas, teachers sometimes struggle to find ways to provide variability. VR can be a great tool to help provide greater variety based on 3 findings about what we know works when engaging in practice.

Here are 3 ways to vary practice when we are learning with the help of VR:

1. Vary the type of Practice-Varied practice involves changing the training conditions and methods. To effectively learn heart anatomy, a student might start by studying foundational concepts in a textbook, then reinforce this knowledge by answering questions about a detailed heart poster, and finally deepen their understanding through an immersive VR simulation.

2. Space out the Practice- Spaced practice spreads learning sessions over time, allowing for better long-term retention and understanding by giving the brain intervals to consolidate information. Providing variety in how students engage in the material as they space out their practice may lead to greater engagement and motivation. For example, A student studying economics could practice sample questions from a book on Monday, then take notes from a video or engage in a VR experience on Tuesday or Wednesday. On Thursday, they could reinforce their learning by participating in a study group.

3. Vary the Context of the Practice-Varying the environmental context of practice enhances the transfer of learning by promoting adaptability and preventing context-dependent memory. For example, A student begins studying frogs in the classroom using textbooks to learn about their anatomy and ecology. They then deepen their understanding through a hands-on dissection in the science lab. Finally, in a virtual reality simulation of a tropical rainforest, the student observes frogs in their natural habitat, connecting anatomical knowledge with ecological behaviors for a holistic understanding.

Do you remember your first time in VR? Was it overwhelming?

The first time I rode a bike, it was nothing short of overwhelming. It had everything you could imagine—bright neon lights twinkling along the frame, colorful tassels fluttering from the handlebars, a shiny bell that chimed with a cheerful ring, and a sturdy kickstand that clicked reassuringly when I parked. At first, I was dazzled by all these features, excited to have such a fancy ride. But as I wobbled down the street, trying to maintain my balance, the extras began to distract me. The lights blurred my vision every time I glanced down, the tassels flicked my face with every shaky turn, and the constant temptation to ring the bell took my focus off the path ahead. It was supposed to be a simple ride, but all these features made it a juggling act I was hardly prepared for.

Much like my first ride on that overly accessorized bike, introducing learners to virtual reality for the first time can be similarly overwhelming. VR environments, rich with immersive visuals and interactive elements, are designed to captivate and engage. However, for newcomers, the flood of sensory information can be just as distracting as neon lights on a bicycle. They might find themselves marveling at the vivid details of the virtual world or trying to interact with every element they encounter, which, although exciting, can detract from the educational objectives at hand. Just as the bells and whistles on my bike made it difficult to focus on simply pedaling, the dazzling features of VR can make it challenging for learners to concentrate on the learning goals the technology is supposed to facilitate.

To mitigate the overwhelming features of VR and reduce extraneous cognitive load, teachers play a crucial role in setting the stage for an effective learning experience. Before students even put on their VR headsets, teachers can guide them through a detailed debriefing. This session should include simple, clear instructions on navigating the virtual environment, highlighting what aspects are crucial for the lesson and which can be momentarily ignored. By explicitly outlining what to focus on and demonstrating how to use the controls, teachers help students prioritize their cognitive efforts on the learning objectives. This approach not only streamlines the experience but also ensures that students are not lost in the spectacle, allowing them to engage with the content meaningfully and efficiently. This preparatory step is akin to adjusting a bike before a ride—ensuring everything is tuned to support the rider's journey, not distract from it.

Here is a small sample of some of the slide shows I have used to help guide students before going into VR learning experiences:

https://lnkd.in/gMRkH5GQ

HARNESSING ATTENTION IN VIRTUAL WORLDS

1 Give them something to do

2 Know your learners

3 Make it meaningful

4 Ensure they feel successful

5 Provide feedback

by Craig Frehlich

Do you struggle with paying attention? Especially in situations when you need to learn?

Our attention span plays a pivotal role in shaping our learning. In an era dominated by digital devices, smartphones are often singled out as the main culprits behind dwindling attention spans. Many educational organizations attribute the challenge of maintaining student focus and engagement to the constant presence of these devices.

As a result, there have been steps by many governments to put an all-out ban on the use of phones in learning institutions. Alas, the burden of responsibility and the issue of attention span is more complex than a phone. The way we choose to engage with technology can exacerbate or alleviate these issues.

Our failure to pay attention should also be influenced by the quality of conditions established by teachers and instruction. The introduction of VR in educational settings offers a promising solution to the challenges of maintaining student focus in traditional learning environments.

While VR presents exciting possibilities for enhancing student engagement, it is crucial to recognize that simply substituting cell phones with VR headsets won't automatically solve the underlying issues affecting attention spans. If we do not address the broader complexities of attention, such as cognitive overload and individual motivation, VR could very well follow the same trajectory as smartphones—initially hailed as a panacea, but eventually becoming just another distraction. Therefore, for VR to truly enhance learning, it must be integrated thoughtfully, considering all aspects that influence how students pay attention and engage with educational content.

Here are 5 ways to ensure students are able to focus their attention on learning inside a VR experience:

1. Give Them Something To Do- Giving learners active tasks within a VR environment can significantly increase their attention spans by engaging them in hands-on, interactive experiences that require continuous cognitive involvement and decision-making.

2. Know Your Learners-Understanding whether learners are novices or experts is crucial in VR settings because it allows for the tailoring of experiences to match their skill levels and cognitive loads, preventing both boredom and overwhelm.

3. Make the Experience Meaningful-Ensuring that VR learning experiences are meaningful and contextually relevant is vital for maintaining attention spans because it helps learners see the direct application and value of the knowledge they are acquiring.

4. Ensure Students Feel Success- Crafting VR learning experiences that strike a balance between success and challenge is essential because manageable challenges motivate learners and stimulate cognitive growth, keeping engagement high.

5. Provide Feedback-Providing ongoing feedback in VR experiences is key to maintaining attention spans as it helps learners understand their progress in real time and adjust their strategies accordingly.
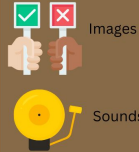
3 WAYS OF ACCEPTING FEEDBACK IN VIRTUAL WORLDS

1 Outcome feedback — Right or Wrong — Images — Sounds

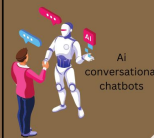**2** Corrective feedback — How to Fix Right or Wrong — 3D Recordings with SME

3 Open feedback — Transactional Dialogue — Ai conversational chatbots

By Craig Frehlich

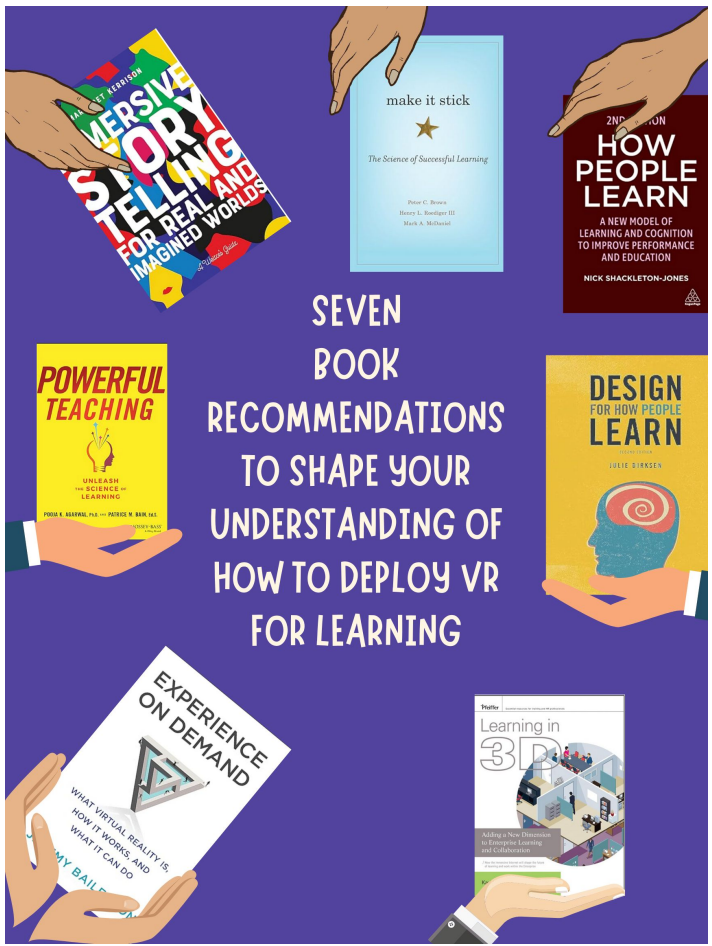Feedback is essential for learning. How well do you take feedback?

Receiving feedback can often be a daunting experience, akin to the physical and emotional shock of a sudden punch in a boxing match. Most people find it challenging to accept feedback due to a natural defensive response that guards their self-esteem. This reaction can be compared to the body's reflex to brace or recoil in the face of a physical blow. Just as it takes skill and conditioning to absorb and respond constructively to a punch in boxing, processing and utilizing feedback effectively requires emotional resilience and a willingness to engage with the potentially painful humility that we got something wrong.

Virtual worlds offer a unique sanctuary for learners to navigate their educational journey, providing a multitude of opportunities to apply feedback in a secure, non-judgmental environment. This setup helps to internalize lessons and build confidence, much like a boxer who spars in the safety of a gym to prepare for the actual challenges of the ring. This virtual setting removes the fear of embarrassment that often accompanies learning in physical spaces where everyone's progress is visible and scrutinized. Learners (and boxers) can experiment, make mistakes, and grow at their own pace, without the pressure of peers or instructors watching every step. This protective buffer fosters a sense of safety and freedom, encouraging learners to explore and learn more confidently and effectively.

Here are three ways you might use virtual worlds for feedback:

1. Outcome feedback-provides learners with clear indications of correctness, such as whether their answers or actions are right or wrong. In a virtual world, this type of feedback can be implemented by allowing learners to make selections or decisions through pressing buttons. Following their choice, an immediate response is given in the form of a sound or visual cue, signaling whether their action was correct. This method offers instant and direct feedback that helps learners self-adjust and learn from their actions effectively.

2. Corrective Feedback-provides learners with detailed explanations of the reasons and methods behind their right or wrong actions. In some virtual worlds, this can be achieved through 3D recordings of avatar subject matter experts. These avatars can appear within the virtual world scene to offer personalized coaching on specific actions or behaviors following a learner's attempt.

3. Open-Ended Feedback-involves engaging learners in meaningful dialogues on a topic, which can take the form of debates or conversations. In certain virtual worlds, this can be facilitated through the use of AI avatars that are linked to advanced language models like ChatGPT. These avatars can interact dynamically with learners, offering them the opportunity to explore topics deeply and refine their understanding through continuous, transactional dialogue.

Special Thanks to Scott Young for the "punch" metaphor.

SEVEN BOOK RECOMMENDATIONS TO SHAPE YOUR UNDERSTANDING OF HOW TO DEPLOY VR FOR LEARNING

7 Book Recommendations to Learn More about Applying VR to Learning

For educators and technologists keen on integrating Virtual Reality into learning environments, here are seven insightful books that I have found useful and therefore might guide this journey. They are in no particular order.

Interestingly, out of the seven recommended titles, a significant number focus predominantly on the cognitive and psychological aspects of learning rather than the technological specifics alone. Notably, none of these books carry 'Metaverse' in their titles.

How People Learn by Nick Shackleton-Jones: Nick Shackleton-Jones presents the Affective Context Model, which emphasizes that emotions drive learning more effectively than traditional cognitive approaches. He advocates for instructional designs that focus on creating emotional connections rather than just delivering content.

Design for How People Learn by Julie Dirksen: This book offers practical guidance on improving learning experiences, focusing on understanding learning challenges, motivation, and the importance of practice and feedback. It's targeted at instructional designers and educators.

Learning in 3D by Karl Kapp: Karl Kapp explores the benefits of virtual reality in learning, arguing that immersive 3D environments enhance engagement and retention. He discusses the design and application of VR in training and education.

Experience on Demand by Jeremy Bailenson: Jeremy Bailenson examines the capabilities and ethical considerations of virtual reality, discussing its potential to create impactful experiences for training, education, and empathy development.

Make It Stick by Peter C. Brown, Henry L. Roediger III, Mark A. McDaniel: This book challenges conventional learning techniques and introduces more effective methods based on cognitive psychology, such as spaced repetition and retrieval practice, aimed at students and educators.

Powerful Learning by Pooja K. Agarwal, Patrice M. Bain:Agarwal and Bain present evidence-based teaching strategies derived from cognitive psychology to enhance student learning, focusing on practical, impactful classroom techniques.

Immersive Storytelling for Real and Imagined Worlds by Margaret Kerrison: Margaret Kerrison discusses the craft of creating immersive narratives in environments where audiences can live through the story, using examples from theme parks and exhibitions to illustrate techniques that engage and connect deeply with people.

MENTAL MODEL BUILDING FOR LEARNING

TEXT BASED	
2D IMAGE	
3D ASSET (NO CONTEXT)	
3D ASSET IN CONTEXT	

When you start to learn something new where do you go first? A book? A video? A poster? Maybe a 3D Model?

Building mental models is indeed a crucial aspect of learning, as they help individuals understand and anticipate how parts of a system interact. Various mediums offer different advantages and challenges when it comes to building these models.

1. Text-Based Learning- a versatile and easily accessible medium that allows for detailed explanations and the sequential structuring of information. A drawback is that it requires the learner to construct their mental images, which can be a barrier if one struggles with abstraction.

2. Image-Based Learning- can simplify complex information, making it easier to grasp quickly. Since images are only in 2D learners may struggle to build a complete mental model of a process or entire system.

3. 3D Objects Out of Context-3D models allow for interaction and exploration, which can enhance understanding through tactile engagement. Without contextual information, 3D objects might not provide enough insight into how they function within a system. Learners may struggle to see how these objects interact with other elements or apply in real-world scenarios.

4. 3D Objects in Context-When placed in context, 3D objects can offer a holistic understanding of how individual parts fit and work within a system.

Is one approach better than another?

Determining the "best" medium for helping learners understand concepts depends significantly on the nature of the content being taught and where the learner is at in the learning journey.

Beginners with minimal or no familiarity with the subject may find it advantageous to explore a range of different mediums.

For example, a brand new medical student might first read about the cardiovascular system (text-based), then study diagrams of the heart (image-based), handle a heart model (3D object out of context), and finally examine a full-body anatomical model showing the heart in situ (3D object in context). This layered approach reinforces understanding through multiple sensory pathways to help the novice student build shema and stronger conceptual understanding.
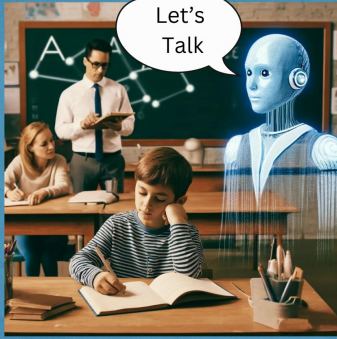
The Use of Virtual Worlds to Support Overlearning

How do we know when to stop learning something? How much practice is enough?

I used to love practicing hockey, but overlearning took the joy out of it for me. Day after day, I drilled beyond exhaustion, perfecting the same moves until they were mechanical. The endless repetitions, intended to make me a better player, instead made each practice feel like a scripted performance where spontaneity and passion were lost. I began to dread going to the rink, feeling like a machine rather than an athlete.

"Overlearning" involves practicing or studying beyond initial mastery to enhance retention and automaticity, making information recall or skill execution more reflexive and less effortful.

Alas, the research on the effectiveness of overlearning in education is mixed at best.

While overlearning may be valuable in educational settings for ensuring long-term retention and application of complex subjects, educators must balance its benefits with the risk of student boredom and inattention.

Overlearning can lead to boredom due to its repetitive nature. When learners feel they have already mastered the content, continued exposure without new challenges or variations can diminish engagement and motivation. This boredom can stem from a lack of perceived progress or the monotony of encountering the same material repeatedly, potentially leading to disinterest and a decrease in learning effectiveness.

Virtual reality technology might help play a role in preventing students' disinterest and combating the boredom associated with overlearning. Here are two potential ways:

1. A Change of Scenery- VR offers an immersive, dynamic environment that can transform traditional learning spaces, providing diverse and engaging virtual settings that stimulate curiosity and interest. By doing so, VR may help combat the boredom and repetition often linked with overlearning, making educational content more lively and memorable.

2. Personalize the Journey- AI avatars in virtual worlds that can engage in two-way conversations present a novel approach to learning by interacting directly with students in a personalized manner. These avatars can adapt discussions and learning materials based on the student's responses, ensuring that the content remains challenging and engaging. This dynamic interaction helps to maintain student interest and motivation, effectively combating the boredom associated with repetitive learning tasks.

The Importance of Varied Practice For VR Learning

By Craig Frehlich

The VR Learner

Novice Learner

Learning

Learning

Practice

Varied Practice
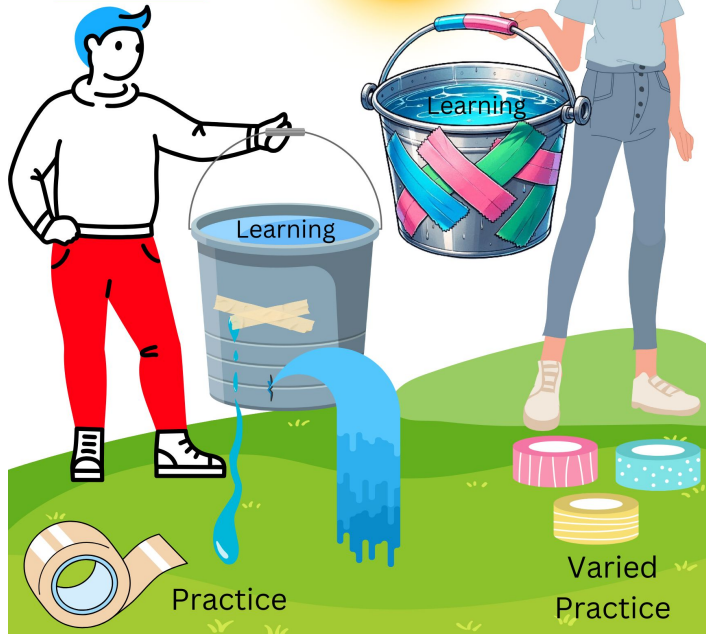
Have you ever tried to fill a leaky bucket? It can be very frustrating.

Imagine a bucket filled with water, slowly leaking from several small holes. This is analogous to the process of learning, where our initial exposure to new information often begins to 'leak' or decay from our memory over time. Just as one might use tape to patch the holes in a bucket to prevent water from escaping, in the realm of learning, we employ deliberate practice to mend the gaps in our memory. Deliberate practice acts like a sealant, ensuring that the knowledge we acquire remains intact and is not lost to forgetfulness, thereby enhancing our retention and mastery of new skills and information.

However, there's a caveat to using the same type of sealant—such as the same type of tape—to fix every leak in a bucket, which mirrors a challenge faced by novice learners. When someone first begins to learn a new topic, they might not be fully aware of the extent or nature of their knowledge gaps—akin to not knowing the size or number of leaks in a bucket. Applying the same type of practice uniformly, just as using the same type of tape for all leaks, might not be effective. Each leak might require a different type of tape, just as different aspects of learning might benefit from varied methods of practice. This tailored approach ensures that the specific needs and weaknesses of the learner are addressed, optimizing the learning process and enhancing overall retention.

The same philosophy can be applied to VR learning.

The use of varied practice should also be considered for VR learning. Relying on only one type of VR experience to enhance learning may not properly fill all the leaks. Using a variety of different types of VR experiences, like simulations, retrieval practice, and serious games, can help learners address different learning needs and cognitive gaps. For instance, simulations can provide realistic, immersive environments for practicing physical or technical skills, while retrieval practice in a VR setting can reinforce memory recall under varied contexts. Serious games, on the other hand, blend entertainment with learning to maintain engagement and motivation. Together, these diverse VR experiences create a more robust and adaptive learning environment, which can lead to more effective and lasting knowledge retention.

DO'S AND DON'TS FOR VIRTUAL FIELD TRIPS

DO'S	DON'TS
Trip purpose is clear	Trip is seen as an extra
Focus on Big Ideas	Focus on tiny facts
Travel with a Guide	Travel on their own
Have debrief sessions	Provide no reflection

BY CRAIG FREHLICH

Have you ever had a field trip go wrong? Imagine the chaos when a simple visit to a local museum turns into a comedy of errors. First, the bus breaks down, stranding eager tenth graders roadside. Then, as the trip resumes, rain turns their walk through historical artifacts into a soggy dash. Finally, a power outage closes the museum upon arrival, turning the day into an unexpected lesson in adaptability and patience for students and teachers alike.

Despite the fact that we have seen and heard horror stories from the education world like this, field trips as a tool to enhance learning have never been abandoned. The reason is clear: the value they offer in providing real-world experiences and practical knowledge far outweighs the occasional mishap. These outings expose students to new environments and hands-on activities that can ignite passions and inspire curiosity in ways that classroom settings often cannot.

Planning and preparation for field trips is key.

Then why are we so quick to abandon virtual world experiences, attributing failure solely to the medium rather than recognizing the importance of careful planning, just as with physical field trips? Virtual experiences, like their real-world counterparts, can offer immersive and enriching educational opportunities when properly designed. They can transport students to historical sites, simulate complex scientific processes, or explore global cultures without leaving the classroom. However, their effectiveness often hinges on thoughtful preparation and integration into the curriculum. Instead of dismissing these tools after initial setbacks, we should refine our strategies, enhance technological infrastructure, and train educators to leverage these digital landscapes effectively.

Here are a few Do's and Don'ts when using Virtual Worlds for learning:

1. Make sure the Purpose is Clear- Ensuring your virtual field trip has a clear purpose aligned with classroom learning outcomes is essential. It helps maintain focus and select relevant activities that reinforce key concepts, providing a cohesive and impactful learning experience.

2. Focus on Big Ideas/Concepts- It's crucial for students to focus on the big ideas from a virtual field trip instead of narrow facts. This approach promotes deeper engagement and critical thinking, helping them connect learning to real-world applications.

3. Have Students Travel with A Supervisor- Having students travel in small groups with a guide during field trips is vital for keeping them focused and on track. This structure ensures personalized attention and facilitates deeper exploration of the subject matter, enhancing the overall learning experience.

4. Have Debrief Sessions- Regular debriefing or reflection sessions are essential to unpack the virtual field trip experience. These discussions help students process what they've learned, relate it to their existing knowledge, and apply the insights to future learning scenarios.

VR Personas

The Perfectionist

The Daredevil

The Naysayer

The Tenderfoot

By Craig Frehlich

Do you remember your first time behind the wheel? How was it?

Getting someone behind the wheel for the first time is pretty much like getting them to try out VR—it's a whole mix of emotions and challenges! When you start driving, it's all about getting the hang of the car, feeling the road, and making quick decisions. It's real and hands-on.

Jumping into VR for the first time is a similar kind of thrill—you're thrown into these cool, unreal worlds where you have to learn how to move and interact in ways you never thought of before.

Both are about stepping into new spaces, figuring things out on the fly, and having some fun along the way. Whether you're cruising down the highway or exploring virtual worlds, you're in for a ride full of surprises and learning curves!

As a VR consultant, I have seen all types of VR people or drivers.

1. The Naysayer: the one who's super hesitant about getting behind the wheel or strapping on a VR headset. They might need a little extra push to give it a go because they're just not sure about it all.

2. The Perfectionist: this person is on point, both confident and skilled, whether they're navigating traffic or moving through virtual worlds. They've got it down to an art and make it look easy.

3. The Daredevil: someone who's maybe a bit too gung-ho. They love pushing limits, driving fast, or diving headfirst into the most intense VR games without a second thought, sometimes biting off more than they can chew. They often need a big boundary.

4. The Tenderfoot: the cautious type who takes it super slow and steady, both in learning to drive and in exploring VR, always careful to avoid any missteps or accidents.

Each type brings their own flavor to the experience, making the journey of learning and exploring as diverse as the individuals themselves.

VR IS THE "PINCH RUNNER" FOR EDUCATION

By Craig Frehlich
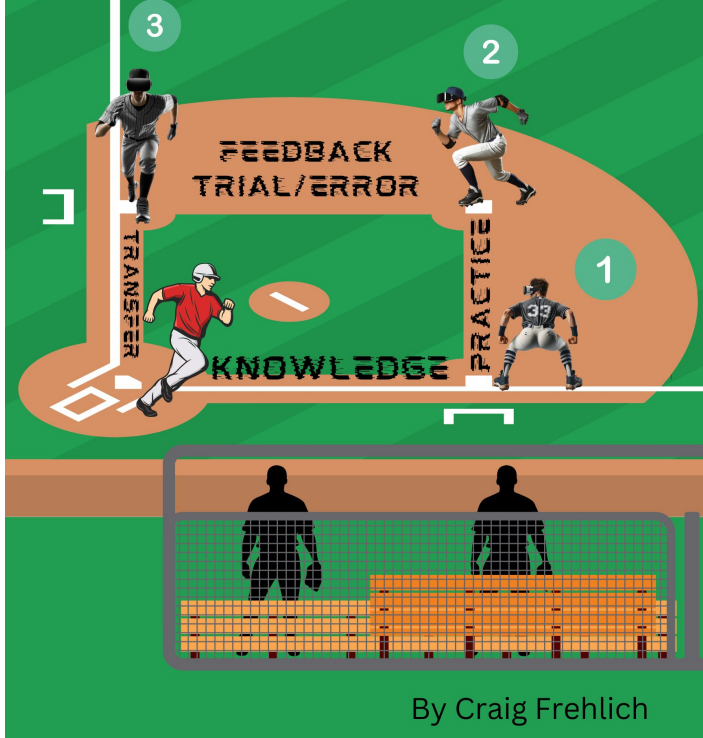
Have you played or watched baseball? It can be frustratingly slow at times.

The journey from novice to expert can be likened to a game of baseball. Often perceived as a slow-paced game, baseball requires strategic progression from one base to another, culminating in the ultimate goal of scoring a run. This methodical advance mirrors the learning process, where one begins by acquiring basic knowledge, akin to reaching first base. As in baseball, moving to second base in learning involves practice and integration of new information. Advancing to third base reflects the stage of receiving feedback and correcting mistakes, refining skills and understanding. Finally, just as a player heads home to score, a learner applies their knowledge in new contexts, achieving expertise. This analogy underscores the inherent patience and perseverance required in both baseball and the quest for mastery in any field.

Pinch runners in baseball add a thrilling element to the game, injecting speed and strategy into critical moments. These players, known for their swiftness, can be substituted for base runners at any stage—first, second, or third base—to enhance the team's scoring potential. By replacing slower runners with these agile athletes, teams increase the likelihood of advancing runners and scoring runs more quickly. The introduction of a pinch runner not only accelerates the pace of play but also intensifies the excitement for fans, as it often signifies a key turning point in the game's dynamics, adding a layer of tactical depth and unpredictability to the sport.

VR might be thought of as the "pinch runner" in the realm of education. Like a pinch runner in baseball, VR can be swiftly integrated at various stages of learning.

Utilizing VR for retrieval practice immerses learners in realistic environments, enhancing memory retention by providing context-rich, memorable experiences.

VR as a "pinch runner" for providing safe feedback through trial and error allows learners to experiment and make mistakes in a controlled, risk-free environment. This setup encourages experimentation, critical thinking, and problem-solving, fostering a learning atmosphere where students can confidently explore and refine their skills and knowledge.

VR can act as a "pinch runner" for the transfer of knowledge by providing immersive simulations that allow learners to apply their skills in a variety of contexts, mirroring real-life situations.

Over the years, baseball has evolved with changes like the introduction of pinch runners, designated hitters, and more recently, pitchers being on a clock, all aimed at making the game faster, more strategic, and exciting for fans. Similarly, the field of education stands at a crossroads, where integrating dynamic tools like VR can revolutionize learning processes, making them more interactive, efficient, and aligned with the digital age.

Let's Compare

Text to 3D Ai Platforms

Luma Genie	Meshy	Tripo 3d
Hi Res Sample	Hi Res Sample	Hi Res Sample
Cost	Cost	Cost
Free (for now)	Basic= Free 200 credits/month Monthly = $16.00 1000 credits/month	Basic= Free 600 credits/month Monthly = $19.90 3000 credits/month
GLB Download	GLB Download	GLB Download
❌	✅	✅

By Craig Frehlich

The text-to-3D assets war is heating up with many more players joining the game.

The capacity for educators to rapidly and effortlessly create immersive learning experiences is paramount. The most engaging and effective of these educational environments are those enriched with 3D assets, which foster deep thinking and interactive learning. Empowering teachers with the ability to generate their own 3D assets directly from text descriptions is a game-changer. This capability not only enhances the educational content but also significantly scales the use and impact of virtual reality (VR) in education.

The landscape of AI companies is expanding exponentially, making it challenging to stay abreast of all the new entrants. Among the myriad of companies focusing on converting text to 3D assets, who are the key players?

While numerous firms are making strides in this area, I want to highlight three companies that have caught my attention. Please see the attached image.

I focussed on 3 factors and used the prompt, "A Blood Pressure Monitor" for my sample.

I want to emphasize that these results were done as a single attempt and results might differ had I experimented with multiple attempts and collected a large data set.

1. The Quality of the Refined High-Resolution Model- Each of these platforms starts by generating a basic, low-quality model, offering users the chance to select one of the preliminary previews for enhancement into a high-resolution version. This refined, high-res model, which typically takes 5 to 8 minutes to produce, can then be downloaded. Be aware that achieving this higher quality may incur additional costs or consume extra credits.

2. The Cost Structure-Pricing for these platforms can be complex, particularly as some, like Luma Genie, are in the early beta phase, and therefore free. An important factor to consider in their cost structure is the number of credits required to obtain a high-resolution model. For instance, with Meshy, around 25 credits are needed to produce a single high-resolution model.

3. The ability to Download a GLB model-I emphasized this aspect because many virtual worlds support the upload of GLB models, which are particularly user-friendly. The advantage of GLB files lies in their "baked-in" textures, eliminating the need to manage them separately, thus simplifying the integration process into virtual environments.

Virtual worlds can be rich contextual learning experiences that can be significantly enhanced with the right 3D assets to tell an engaging and exciting learning journey. The use of Ai to support teachers in this process will be very important

Common Teacher Fears When Adopting XR

HOW MUCH TIME WILL THIS TAKE?

WILL I STILL COVER ALL THE MATERIAL?

HOW WILL I KEEP CONTROL OF THE CLASS?

WILL THIS HURT MY STUDENT EVALUATIONS?

By Craig Frehlich

Fear Of Change and Unknown

Have you ever found yourself at the edge of a dense, uncharted forest, where the myriad paths twist into the unknown and unseen creatures rustle in the underbrush? The sheer vastness and mystery of it all can ignite a primal fear of the unknown, sparking hesitations and resistance at the thought of stepping into the thick foliage.

This trepidation mirrors the feelings many educators experience when faced with integrating Extended Reality (XR) technology into their teaching. Just as the forest's hidden paths and lurking creatures can seem daunting, the unfamiliar landscape of XR technology can seem equally intimidating, full of potential pitfalls and unseen challenges. Here are some of the top fears many educators think about when they approach XR adoption:

1. How much time will this take me, personally, to implement?

2. How will I still cover all the material?

3. How will I keep control of the class?

4. Will this hurt my student evaluations?

By addressing these aspects early in the adoption phase, educational institutions can facilitate a smoother transition to integrating XR into teaching and learning, helping educators overcome their fear of the unknown and harness the potential benefits of XR technologies.

NOT ALL PRACTICE IS GOOD PRACTICE

3 Tips when designing practice experiences for VR

1 Make sure practice is related to context

2 Don't put pressure on novice practice

3 Practice should not promote guessing

By Craig Frehlich

Do you remember learning your math times tables? Picture yourself sitting at your desk, working through worksheet after worksheet filled with rows of multiplication problems, each one a slight variation of the number before. This repetitive practice, a cornerstone of elementary math education, was probably our first foray into what many critics call "Drill and Kill".

But, it is not the drill or practice that is the problem, it is the repeated delivery of the same type of practice that is causing many learners to feel the "kill". Critics argue that while practice is essential for learning, it should be balanced with other methods that promote engagement and comprehension from a variety of perspectives.

Besides deploying repetitive worksheets, and practice quizzes, why not consider using immersive virtual worlds to help students practice?

However, be careful, not all practice is good practice even in virtual reality.

Picture a virtual world with Beat Saber Math, a student stands poised with a wand in hand, immersed in a vibrant digital arena. As rhythmic music pulses in the background, mathematical equations appear in the form of floating numbers, gliding toward the player on a rhythmic conveyor of challenges. With keen focus and swift movements, the student slashes through the air, aiming the wand to strike the correct numbers that complete the equations. Each successful hit racks up points and propels them further into this engaging practice session. Sounds great, right? Not really!

What is wrong with Beat Saber Math?

1. It Lacks Contextual Relevance- Beat Saber Math, while interactive and engaging, falls short as an educational practice tool in VR due to its lack of contextual relevance; the game's focus on rapid numerical selection doesn't naturally connect to the practical applications or deeper understanding of mathematical concepts.

2. It Puts Too Much Pressure on the Beginning Learner-Beat Saber Math's steep learning curve, and timed experience may overwhelm novices, lacking gradual difficulty progression and detailed feedback for skill improvement.

3. It Encourages Guessing- Beat Saber Math, which combines fast-paced gameplay with mathematical problem-solving, could lead to counterproductive learning outcomes. The quick decision-making required in such a game might encourage players to guess answers rather than methodically work through mathematical problems, undermining the development of critical thinking and problem-solving skills. This approach can result in superficial understanding and retention of mathematical concepts, as it prioritizes speed over accuracy and depth of learning.

Dumping hardware in schools, like VR headsets, hoping for magic and fireworks to happen, is just a bad idea.

Have a plan.

Merely providing VR headsets without carefully integrating their use into the teaching curriculum often results in underutilization.

Where should you start?

A significant challenge is securing teachers' confidence in the effectiveness of the tool. For successful implementation, educators must adapt their lesson planning and instructional strategies to meaningfully include immersive learning technologies, such as virtual reality.

It is essential to begin with established, effective practices in education and learning. Asking teachers to make huge pedagogical leaps of faith may not work for most.

Here are three small ideas you might use to convince teachers to give VR a try:

1. Spaced-out and varied practice is more effective than single-focused mass practice.

So why not consider using VR headsets as a tool for spaced-out varied practice?

2. Feedback is key during the learning cycle to help students make sense of their learning journey.

When curating and deploying VR experiences, can you ensure students are receiving feedback as they learn?

3. Ongoing teacher training and agency will increase the adoption of new technology innovations.

Once you have adopted an immersive learning program, have you considered compensating your teachers for embracing change with regular professional development workshops?

Consider creating a detailed policy document for immersive learning, which defines the mission, vision, and strategic plan of the program, and can facilitate the long-term scalability and feasibility of your virtual reality headset initiative.
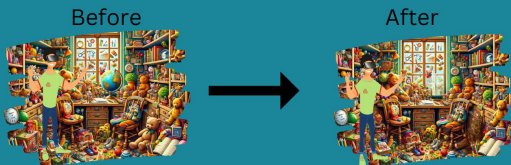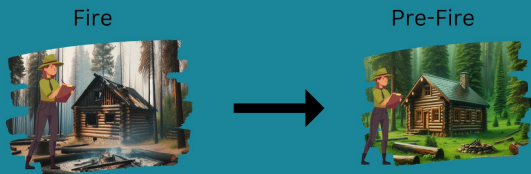
Isn't time travel fascinating? Did you know we can use two connected VR scenes to time travel? Check out my example below.

Do you remember the iconic scenes from "Back to the Future" where Michael J. Fox, as Marty McFly, had to travel back in time to rectify a critical problem? This thrilling journey was not just about zipping through time in a DeLorean; it required Marty to use keen observation and deep thinking skills to navigate the complexities of the past and its impact on the future. Just like Marty's adventures, virtual reality in education can transport students between different worlds, enabling them to explore, understand, and solve problems in a way that fosters critical thinking and deepens their learning experience.

Let's delve into how this dynamic approach can transform educational landscapes and equip students with the skills to think critically much like our time-travelling hero.

One of the most compelling applications of VR in education is the creation of interconnected virtual worlds where students can navigate between different scenes to gain a comprehensive understanding of a subject. This learning method is particularly effective in developing critical thinking skills, as it places students in the driver's seat of their educational journey, allowing them to explore, analyze, and draw conclusions based on their experiences in these virtual environments.

There are several examples of how a teacher might design two virtual world scenes and enable the learner at the click of a button, to jump from one scene to the next.

1. Can You Spot the Difference Rooms- In a "can you spot the difference" scenario using two virtual worlds, learners could be presented with nearly identical scenes, such as a cluttered bedroom, a bustling medieval marketplace or a serene coral reef, with subtle differences between them. This setup would challenge students to meticulously observe and compare elements in each world, honing their attention to detail and observational skills.

2. Can you Prevent a Disaster Rooms- Imagine a learning scenario focused on environmental science and fire prevention. Students begin in a virtual world that resembles a forest with a cabin that has been ravaged by fire. This initial setting offers a stark, visual representation of the aftermath of a wildfire, prompting students to ponder the cause and effects of such a disaster.

3. Can you Solve the Crime Rooms-In this type of learning scenario, two interconnected worlds could be created where one presents a detailed crime scene complete with clues, and the second depicts the environment moments before the crime occurred. Students could first investigate the aftermath in the crime scene world, identifying key pieces of evidence and forming hypotheses about what transpired. Then, by switching to the pre-crime world, they can observe the sequence of events leading up to the incident.

Check Out this video to see an example, https://lnkd.in/g85GtV22

THE IMPORTANCE OF VARIED PRACTICE

Fast Ball
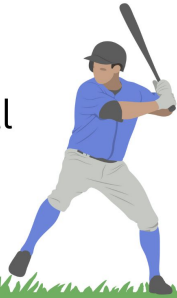
Curve Ball

Slider

Worksheets

Flash Cards

Virtual Reality

By Craig Frehlich

If practice makes perfect, then "varied practice makes perfection".

Educators face a significant challenge in persuading important stakeholders that VR is a valuable investment for enhancing the learning journey from novice to expert. Although many compelling arguments support the adoption of VR, one noteworthy point is its ability to facilitate varied practice.

While the consistent mass practice of the same idea, concept or skill can lead to improvement and eventual mastery, incorporating variety into one's practice can lead to even greater levels of achievement and perfection.

Take baseball as an example. To develop better hitters in baseball, what is the most effective approach?

1. Mass Practice: Should we concentrate on repeatedly hitting the same type of pitch to master it before progressing to the next type?

2. Varied Practice: Or should we structure each practice session around facing and practicing against a variety of pitches?

While mass practice allows a player to concentrate on hitting a single type of pitch, such as the fastball, offering numerous opportunities to refine this specific skill, it falls short in preparing the hitter for the diverse challenges of a real game. In contrast, varied practice, which involves facing an assortment of pitches like curveballs, sliders, and fastballs within the same practice session, presents a more complex and realistic challenge. This approach not only enhances the hitter's adaptability and pitch recognition skills but also promotes deeper cognitive and motor skill development. Although varied practice may result in slower initial progress due to its increased difficulty, it fosters more robust and comprehensive learning.

How about education?

Just as in baseball, where hitting a fastball at 90 mph demands not just repetition but varied practice to truly excel, learning a key skill in education also benefits from a similar approach.

Mass practice, focusing solely on repetitive exercises, can lead to mastery of a narrow set of problems but may fall short in preparing students for the broader challenges of real-world application.

In education varied practice is more desirable. Teachers should integrate a range of practice regimes, exposing students to different learning journeys and problem-solving contexts, to cultivate true expertise in the material. Delivering content and then testing students immediately afterward, while straightforward and efficient, does not facilitate deep and rich learning.

In this context, Virtual Reality can play a pivotal role. VR offers an immersive and dynamic environment, allowing students to experience and interact with the subject matter in diverse and complex ways, thereby enhancing their learning and retention. By incorporating VR into their teaching strategies, educators can provide students with the rich, varied practice necessary to become well-rounded experts in their field.
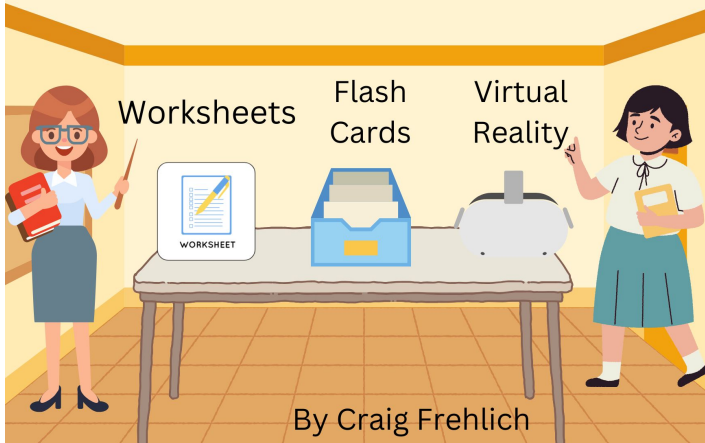
Harmonizing Music and VR for Learning

A Guitar Singer	A VR Teacher
Types of Guitars	Types of VR Headsets and Worlds
Learning Cords and Notes	VR Navigation and Interaction
Understanding Different Types of Music	Using Different Types of Learning Experiences
Learning to Sing and Play Songs	Building Immersive VR Worlds

By Craig Frehlich

Have you ever learnt to play the guitar? Did you progress harmoniously as you learnt?

The guitar, often revered for its melodic potential and iconic status in music history, is fundamentally a tool, a means to an end in the creation of music. Its strings, body, and frets are the components that, when manipulated by a skilled artist, transcend their physical limitations to produce sounds that resonate with emotion and meaning. Ultimately, it is not the instrument itself that holds value, but the music it produces. The true essence of musical artistry lies in the ability to use this tool to craft melodies and harmonies that capture the human experience, making the guitar a vessel through which the soul of music is channeled and expressed.

Someone new to using a guitar to produce music needs to be careful to follow a progression in learning to become a masterful musician. Just as one cannot expect to play complex symphonies without first understanding basic notes and chords, a budding guitarist must build their skills methodically. Starting with types of guitars, to simple strumming patterns and gradually advancing to more intricate compositions allows for a solid foundation upon which musical expertise can grow. Mastery of the guitar, much like any complex tool, requires patience, practice, and a well-structured approach to learning, ensuring that each step taken is a harmonious note in the symphony of their musical journey.

Similarly, a VR headset, serving as a gateway to virtual worlds, is akin to a guitar in the realm of music, but in the context of learning. This device, with its immersive capabilities, is merely an instrument through which educational experiences are amplified and transformed. The virtual environments accessed through the headset are the stages for interactive learning, where the content and experiences provided are what truly matter. Just as a guitar's value is realized through the music it helps create, the worth of a VR headset is manifested in the depth and quality of learning it facilitates, proving that in both cases, it is the output—be it musical or educational—that truly counts.

When using VR for learning, newcomers must follow a structured progression to harness its full potential effectively. This approach ensures a solid understanding of the medium's capabilities and how to interact with virtual content meaningfully. Mastery in using VR for education, therefore, demands a thoughtful progression, allowing the learner to build confidence and skills in a step-by-step manner, turning each virtual experience into a building block for advanced knowledge and proficiency.

"If content is King, then context must be the Kingdom." (Dr. Karl Kapp)

When it comes to learning, are you telling the whole story?

Amidst the surge of recent content showcasing floating objects and the capabilities of mixed reality and AR in personal spaces like homes and offices, I felt the need to write this post from a learning perspective.

A cook doesn't learn to be a chef by browsing ingredients on the shelves of a grocery store.

And a novice learner doesn't grow to be an expert by seeing things in isolation.

Augmented Reality has the potential to revolutionize learning by bringing 3D holograms of dinosaurs, engine parts, and space stations right before our eyes, offering an interactive experience. However, the use of AR for learning can sometimes be superficial, especially when it focuses solely on the visual spectacle without integrating these objects into a broader educational context. Merely observing these fantastic holograms out of context can limit the depth of learning and thus only tell part of the story. Without the challenge of understanding their relevance or the opportunity to discover how they fit into the larger picture of knowledge, these AR experiences risk being reduced to mere "eye-candy." This superficial engagement fails to promote the critical thinking and deeper conceptual understanding necessary for meaningful learning. Without incorporating narratives, explanations, and connections that link these objects to wider concepts and real-world applications, the educational value of AR can be significantly diminished.

While I support the idea of introducing beginners to these simplified mental models to ease cognitive strain, there must be a moment in their educational path where they are guided to see and understand the broader context.

To maximize the educational potential of AR, integrating these technologies into relevant environments where learning is contextually grounded can offer a solution. For instance, placing a nurse or doctor beside a real hospital bed with an AR hologram of a patient allows medical professionals to visualize and interact with virtual scenarios while in the actual environment where their skills are applied. This blending of physical and digital realms enhances learning by providing a tangible context, making the experience more meaningful and memorable. Similarly, a mechanic in a garage, surrounded by the authentic smells and sounds of their workspace, can engage with a hologram of a broken engine, offering a hands-on learning experience that combines virtual simulations with real-world sensory inputs. This approach leverages the immersive capability of AR to enrich professional training, enabling learners to apply theoretical knowledge in practical, real-world situations. By situating AR experiences within their natural context, learners are not just spectators but active participants, encouraging deeper understanding and retention of knowledge through experiential learning.
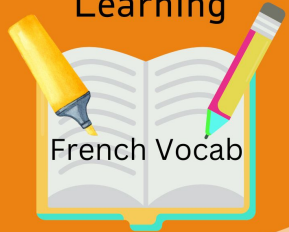
FIXING MISTAKES IN LEARNING

RECALL

Learning

French Vocab

Re-Reading

Highlighting

RECONCILE

Learning

French Vocab

Real world Practice

Immediate Feedback

Personalized

By Craig Frehlich

We all make mistakes. How we fix them can make a huge difference in our lives.

How do you approach mistakes, do you recall or reconcile?

Growing up in the Catholic tradition, I have vivid memories of attending confession sessions with our local priest. During these sessions, I would confess my sins from the recent months, receiving counsel and subsequently, tasks designed as penance to atone for my wrongdoings. Often, these tasks amounted to reciting a set number of prayers right after the confession, which, in hindsight, seemed to have minimal effect on amending the negative behaviours tied to my confessed sins. Reflecting on this practice, it became clear that a truly transformative penance would need a more comprehensive approach, one that extends beyond the confines of simple prayer recitations to address the root causes of one's actions and foster genuine personal growth. One that involved deeper reconciliation.

The same goes for learning.

The act of confession and the assigned penance in the Catholic Church, particularly when it involves the recitation of prayers as a form of atonement, can be likened to the process of learning through repetitive reading and highlighting of a textbook. Just as reciting a few prayers may have a minimal impact on truly rectifying behaviors or understanding the depth of one's actions, repeatedly reading a textbook without engaging in deeper reflection or practical application tends to result in a superficial grasp of the material, rather than a profound understanding. The reason for this is that the learner lacks engagement with the underlying principles or the application of knowledge in varied, real-world contexts. True learning, much like meaningful penance, requires a more engaged, thoughtful approach: reconciliation.

The reconciliation of our mistakes must be grounded in real-world contexts, tailored to individual needs, and incorporate continuous feedback. Well-designed virtual environments offer a unique space where all these elements can coalesce, providing immersive experiences that cater to personal growth and understanding. Well-designed immersive experiences provide a space whereby learners are catapulted into a contextually relevant environment that allows them to understand more deeply how concepts and content connect. Moreover, we can ensure that the experience gives the learner just-in-time feedback through sounds and signals within the virtual world.

For example, if I am learning French vocabulary, I could start by reading and re-reading a textbook, but to truly help me reconcile any mistakes I am making in my journey to be an expert I should also find a strategy that affords me great context, personalization, and feedback.

Check out this example that was built in Zoe Immersive in less than 30 minutes. https://lnkd.in/gBNsmFGR

Have you ever felt devalued? I have.

When a colleague devalued me, it was evident in their actions. They often scheduled meetings at the last moment or at inconvenient times, signaling that my input was low on their list of priorities. They treated my role in the project as peripheral, making me feel like an optional add-on rather than a key contributor. This behavior was demoralizing, particularly when they overlooked the details of my work, showing disinterest or distraction. Such disregard made it clear that they didn't value the effort I put into our shared goals, diminishing my sense of contribution and worth within the team.

If we personified your VR program, what might that look like? Would it feel valued?

Here are a few thoughts and statements that would indicate your VR program is being devalued and heading for a slow death:

1. Waiting until the very end of units to insert VR experiences into the curriculum

Delaying the integration of a VR experience until the very end of a learning unit can significantly undermine its educational value. This approach might suggest to students that the VR component is merely an afterthought rather than a core part of their learning journey. It could lead to a diminished engagement with the VR content, as students might not see its relevance if it's not clearly connected to their prior learning.

2. Suggesting students experience VR once they have finished their other work

Framing VR as an option for students who finish their work early risks undermining its educational value. This approach treats VR as a reward, not a critical part of learning, suggesting it's less important than traditional tasks. It may lead students to not take VR seriously, overlooking its potential to make learning more immersive and engaging. Essentially, this diminishes the unique benefits VR offers for deepening understanding and motivation, failing to integrate it as a vital component of the educational experience.

3. Not allowing students time to reflect and debrief on the VR experience

Debriefing is crucial for consolidating learning, allowing students to reflect on their experience, articulate what they learned, and integrate this new knowledge with existing understanding. Without this reflective process, students might miss the opportunity to fully process and make sense of the immersive content they encountered. This oversight can result in a shallow engagement with the material, where the potential for deep learning and critical thinking is overlooked.

4. Insisting students take notes inside the VR experience

Requiring note-taking within a VR experience can undermine its immersive and interactive benefits. VR's strength lies in its ability to provide a hands-on, engaging learning environment. Introducing traditional note-taking can disrupt this immersion, diverting focus from experiencing to documenting, which may hinder the full absorption of the content.

Two Ways to Provide Greater Context to Learning
(Using Virtual Worlds)

CHANGE THE TIME OR PLACE

CHANGE THE SIZE OR SCALE

By Craig Frehlich

he Importance of Context in Learning

Does this story resonate with you?

In a bustling elementary school, Mrs. Ellie faced an unexpected challenge during her phonics lesson. Eager to teach the mechanics of reading, she meticulously explained the sounds of letters without anchoring them in meaningful context. Her students, confused and disengaged, struggled to grasp the significance of the sounds. A turning point came when a student questioned the relevance of the word 'cat' beyond its phonetic components. Realizing her oversight, Mrs. Ellie shifted her approach, integrating phonics into vibrant stories that resonated with her students' experiences. This transformative strategy ignited her class's enthusiasm for reading, revealing that the true magic of literacy unfolds when words are woven into the rich tapestry of stories, connecting sounds to the vivid world around them.

Learning something out of context is like trying to understand a story by reading only a single page in the middle of the book. Without the beginning, you lack the background information and introduction to the characters or concepts. Without the end, you miss the conclusion and the resolution of the plot or the application of the concept. Just like a puzzle piece without the rest of the puzzle, learning out of context provides an incomplete picture. It can lead to misunderstandings, misinterpretations, or an inability to fully apply the knowledge because you don't see how it fits within the larger framework or narrative.

Virtual reality and virtual worlds present an innovative frontier in education, offering an immersive platform that can transform abstract classroom concepts into vivid, experiential knowledge. Two ways they can enhance the contextual landscape of a lesson are:

1. Adjusting the Time and Place- VR can transcend the conventional limitations of time and place, enabling learners to experience historical events first-hand or explore distant locations without leaving the classroom. This ability to virtually transport students to any era or place significantly enriches the context of learning engagement, making complex concepts more accessible and fostering a profound connection with the material.

2. Adjusting the Size and Scale of Objects-VR can dramatically enhance learning by offering new perspectives that are impossible to replicate in a traditional classroom. For example, examining the human heart at a massive scale allows students to explore its intricacies in detail, while looking down as a giant into a city can reveal the complexities of urban systems and infrastructure. These unique vantage points unlock a deeper understanding and appreciation of subjects by visually demonstrating concepts that are often abstract or difficult to grasp.

BALANCING THE STORY FOR VR IN EDUCATION

Concepts VS Content

Form Logic
Power Change
Systems Instinct

Dates
vocabulary
Definitions Facts

The Devil isn't Always in the Details in VR for Education!

I recently saw a video where a healthcare professional used a creative experiment to teach young kids the importance of handwashing. In the demonstration, a bowl filled with water and pepper simulated germs. The healthcare worker invited some children to dip their fingers into the pepper-water mixture, illustrating how germs cling to our skin. Next, he showed them a second bowl containing water and soap. This time, after the children dipped their fingers in the soap before placing them in the pepper-water, they observed that the pepper (representing germs) didn't adhere to their fingers, visually reinforcing the protective effect of soap against germs.

Although the demonstration involving water, soap, and pepper might not adhere strictly to scientific accuracy in depicting how germs and viruses interact with soap at a microscopic level, its educational value, particularly for young children, cannot be overstated. The visual and interactive nature of the experiment effectively conveys the critical message of handwashing's importance in a manner that is both accessible and memorable to its young audience. The primary objective of such demonstrations is not to delve into the complexities of microbiology but rather to instill fundamental hygiene practices from an early age. By simplifying the concept through a tangible and visually striking experiment, the demonstration successfully highlights the protective benefits of soap, making the underlying health message the most crucial takeaway.

When creating VR learning experiences, it's a common misconception that every single fact and detail must be intricately simulated to construct an effective educational journey. However, this approach isn't always necessary or beneficial. In fact, many of the most impactful VR experiences prioritize conveying "big ideas" and broad, meaningful takeaways over an exhaustive exploration of minute details. By focusing on these larger concepts, VR experiences can provide learners with a holistic understanding of a subject, fostering a deeper appreciation and comprehension that sticks. This method avoids overwhelming the learner with too much information, making the learning process more engaging, memorable, and accessible. Through immersive storytelling and interactive environments, VR can simplify complex ideas, making them easier to grasp and more exciting to explore, thus enhancing the overall learning experience. Here are two examples:

Out of Scale- The player explores the effects of distorted scale on biology, physics, and chemistry across five different-sized worlds.

https://lnkd.in/ga4JHnA7

Nano-The learner needs to master the cell's living systems: you generate energy from food molecules, and use the cell's DNA to manufacture a variety of proteins to keep the cell alive, and to combat invaders.

https://lnkd.in/gupExa7x

Tips for Virtual World Travel in Education

Give the learner a guide

Don't let them get lost

Push them out of their comfort zone

By Craig Frehlich

Travel is the best education you can get. Why is this?

Travel thrusts you into diverse environments, cultures, and situations that challenge your perspectives and broaden your understanding of the world. By experiencing the world firsthand, travellers develop a profound appreciation for the intricate tapestry of cultures and the stunning diversity of landscapes and global events. This type of immersive education surpasses what can be learned theoretically.

While the idea of traversing the globe and soaking in its myriad cultures and landscapes is incredibly appealing, the reality is that not everyone has the financial resources or the time to travel extensively in their lifetime. This constraint prompts an innovative solution: supplementing our real-world adventures with the exploration of virtual worlds. Virtual reality and online platforms offer a unique opportunity to experience distant lands, historical events, and cultural practices from the comfort of our own homes, providing a complementary way to satisfy our curiosity and thirst for knowledge when actual travel isn't feasible.

Especially for learning.

Virtual world travel in education opens up global experiences to all students, making distant cultures and historical events accessible and engaging. This approach not only enriches learning but also cultivates empathy and global awareness, preparing students as informed and compassionate global citizens.

But when considering virtual world experiences to the moon, the pyramids, or back in time to the dirty thirties, it is key to set your learners up for success. Just like real-world travel, there are a few key ingredients that ensure the traveller is optimizing their journey.

When using virtual worlds for education, like virtual trips to the moon or exploring ancient pyramids, preparation is key to success. Educators must equip students with the necessary tools, context, and guidance, akin to planning a real trip, to ensure enriching and effective learning experiences. Here are three things to consider when planning a virtual world trip for education:

1. Make sure they have a guide- A knowledgeable guide guarantees that students not only observe but also understand the significance of what they're experiencing, enriching their learning journey with insights, feedback and context.

2. Make sure they don't get lost- This ensures that their exploration is focused and meaningful, aligning with educational outcomes and facilitating a deeper understanding of the content. This structured approach to virtual exploration maximizes the educational benefits and keeps students on track toward achieving their learning goals.

3. Push them out of their comfort zone- If the experience is too easy, it lacks the challenge necessary to stimulate critical thinking and problem-solving skills. Encountering unfamiliar situations and overcoming obstacles in these virtual environments can lead to significant personal growth and deeper learning.

RETHINKING VR IN EDUCATION

MYTH VS REALITY

MYTH
1. VR should be used to teach an *entire course*.
2. VR works best when we *push* information to learners.
3. Learning in VR should emphasize *watching*.
4. VR should invite learners to *recall* information.

REALITY
1. VR should be used to target *specific needs*.
2. VR works best when we *pull* information out of learners.
3. Learning in VR should emphasize *doing*.
4. VR should invite learners to *use and transfer* information.

By Craig Frehlich

Do you remember the magic of drive-in theatres? Those starry nights spent in the comfort of your own car, watching the big screen light up with stories and adventures, are cherished memories for many. Yet, as times have changed, so too has the way we experience movies. Drive-in theatres, once a symbol of communal joy and a testament to the golden age of cinema, have seen a significant decline. This fading popularity mirrors a broader trend in our attempts to replicate traditional movie-watching experiences in mediums or contexts that simply aren't the same.

The same goes for teaching and learning in VR.

The educational sector faces a similar challenge with the advent of Virtual Reality technology. Traditional teaching practices, characterized by passive lectures, 2D videos and an emphasis on rote memorization, are ill-suited to the immersive and interactive potential of VR. Attempting to directly transplant these outdated methods into VR environments misses the medium's unique opportunity to revolutionize learning. Instead of passive absorption, VR offers a canvas for experiential learning, where students can engage actively with content, explore complex concepts in a hands-on manner, and cultivate critical thinking skills in dynamic scenarios.

Here are 4 things we need to re-think about as we deploy learning in VR.

Myth: VR should be used to teach an entire course.

Reality: VR should be used to target specific needs.

A strong educational program requires a balanced approach, integrating both real-world teaching and VR-enhanced experiences. While VR can simulate complex environments and scenarios, offering students immersive, hands-on experiences that traditional classrooms cannot, it should not fully replace the learning opportunities presented by the real world.

Myth: VR works best when we push information to learners.

Reality: VR works best when we pull information out of learners.

Virtual Reality transforms education from passive information absorption to active knowledge discovery. Rather than merely pushing information at learners, VR excels in pulling insights and understanding from them through interactive, immersive experiences.

Myth: Learning in VR should emphasize watching.

Reality: Learning in VR should emphasize doing.

Virtual Reality experiences should prioritize doing over watching to maximize their educational impact. By "doing" rather than merely "watching," learners are encouraged to apply theoretical knowledge to practical scenarios, enhancing critical thinking and problem-solving skills.

Myth: VR should invite learners to recall information.

Reality: VR should invite learners to use and transfer information.

Virtual Reality should focus on learning experiences that encourage learners to use and transfer information, rather than merely recall it. VR's immersive nature offers a unique platform for experiential learning, where learners can experiment, and explore different outcomes.

Playing with

Perspective in virtual worlds

Scaling Down

Make the user tiny by having all the assets and the environment appear huge.

Scaling Up

Make the user huge by having all the assets and the environment appear small.

By Craig Frehlich

Do you remember the story "James and the Giant Peach"? This fantastic narrative, much like the movie "Honey, I Shrunk the Kids," allowed participants to stretch their perspectives and points of view by playing with scale. In these tales, the protagonists find themselves in worlds where the ordinary becomes extraordinary due to a dramatic shift in size. Whether it's James navigating the complexities of life aboard a giant peach or the Szalinski children's adventure through their now-gigantic backyard, these stories challenge our perceptions of the world around us. They invite us to imagine the impossible and explore the familiar from an entirely new vantage point, where even the smallest creature or object takes on a significance and scale that is both daunting and wondrous.

By harnessing the superpowers of virtual worlds, educators can recreate the wondrous experiences of James and the Szalinski children, offering students a unique and immersive learning environment. Virtual reality (VR) has the potential to bring big ideas like "point of view," "power," and "scale" to life, allowing students to explore these concepts in ways that are both engaging and profound. Through the exploration of virtual realities, learners can literally step into different scales, witness the effects of power from various perspectives, and understand abstract concepts by interacting with them in a simulated, yet tangible, environment. This approach not only deepens conceptual understanding but also builds stronger connections to these ideas by making them experiential and truly transformative.

"Out of Scale" is a VR game that exemplifies the power of immersive tech to teach concepts like perspective and scale engagingly. Set in the distinctive Kurzgesagt style, it guides players through four missions across realms of varying sizes—from molecular to mountainous. This VR journey not only enlightens us on the concept of scale but also informs us of the unique dynamics at different levels. By making abstract concepts accessible, "Out of Scale" enables players to grasp the intricate idea of scale and its implications across various sizes, serving as a valuable educational tool that deepens our comprehension of the universe's vastness and diversity.

Educators can create virtual worlds to explore perspective and scale without a large budget like the makers of "Out of Scale", thanks to low-code and no-code platforms like Zoe, EngageVR, and FrameVR. These platforms simplify virtual reality creation, allowing teachers to easily design immersive experiences by dragging and dropping assets. This makes teaching abstract concepts like scale and perspective both engaging and accessible, opening up new possibilities for interactive learning without needing deep technical skills or significant resources. Such tools empower educators to enrich learning and make complex ideas understandable and exciting for students.
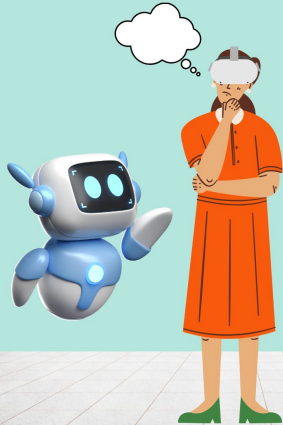
ACTIVE LEARNING IN VIRTUAL WORLDS

INTERROGATE AN AI AVATAR

Have a learner ask probing questions to an Ai character to determine if they are an imposter.

SORT, ORDER, AND ARRANGE

Provide a series of scrambled colored blocks with descriptions to key steps in a process and invite the learner to sort, arrange and order them.

SPOT THE MISTAKE

Take the learner through a virtual world and ask them to find all the mistakes.

You have a virtual world, now what? Do you resonate with this story?

Mr. Jensen, a high school science teacher, embarked on a journey to redefine his teaching approach. Enthusiastically, he enrolled in a course designed to teach educators how to construct basic virtual worlds, a skill he envisioned would catapult his classroom into the future of learning. With visions of interactive ecosystems, virtual chemical experiments, and galaxies to explore, Mr. Jensen saw this as his gateway to bringing complex scientific concepts to life. However, once he had mastered the basics of crafting these digital realms, his application of this groundbreaking technology took a surprisingly conventional turn. Instead of utilizing the full interactive potential of these virtual worlds to engage students in hands-on, immersive learning experiences, Mr. Jensen opted for a more familiar and passive approach. He transported his students into these meticulously created 3D spaces only to have them watch videos on a large virtual screen and listen to his lectures, much like they would in their physical classroom.

In the immersive expanse of virtual worlds, the traditional educational paradigm of simply transferring information to students—anchoring on a teach-and-test model—falls short of harnessing the full potential these digital realms offer.

Rather than funnelling information into learners' heads in a one-way street fashion, the unique capabilities of virtual environments beckon for a more engaging, exploratory approach. This shift focuses on extracting knowledge and critical thinking from students, encouraging them to interact deeply with content and contexts. Here are three strategies that could easily be deployed to virtual world settings:

1. Interrogate an Ai Avatar- Have a learner ask probing questions to an Ai character to determine if they are an imposter. By engaging learners in activities such as interviewing AI avatars to unveil imposters, they're pushed to apply reasoning, inquiry, and analytical skills in dynamic settings.

2. Sort, Order and Arrange Blocks- Provide a series of scrambled colored blocks with descriptions of key steps in a process and invite the learner to sort, arrange and order them. Providing them with scrambled, colored blocks representing steps in a process not only demands understanding but also the ability to organize and strategize effectively.

3. Spot the Mistake- Take the learner through a virtual world and ask them to find all the mistakes. Tasking students with identifying errors within a virtual world cultivates attention to detail and critical observation.

These strategies foster an active learning experience that leverages the spatial and interactive superpowers of virtual worlds, moving beyond passive reception to active discovery and problem-solving.

What Can We Learn From Apple's New Vision Pro?

The new Apple Vision Pro headset exemplifies a key principle in product design: usability. By focusing on productivity and streamlining the user experience, Apple has deliberately taken small, measured steps toward enhancing ease of use, rather than pushing users toward more complex use cases such as gaming. This approach underscores the importance of accessibility and intuitive design in modern technology, ensuring that users can seamlessly integrate the device into their daily tasks without a steep learning curve.

So what can education learn from this strategic move?

Despite the availability of extraordinary virtual reality experiences that transform learning into an immersive adventure—be it navigating the microscopic world within a cell to fend off pathogens or applying mathematical modeling to address hospital overcrowding during a pandemic—education has been reticent to widely adopt VR as a teaching tool. The reluctance is not for lack of innovative applications but stems from a broader unfamiliarity with the medium itself. Many educators, still new to VR, find it challenging to visualize how these advanced, immersive experiences can be seamlessly integrated into their existing teaching methodologies. The gap between the potential of VR as a dynamic educational tool and its practical application in classrooms highlights a significant hurdle: the need for educators to not only become acquainted with VR technology but also to understand how it can enhance pedagogical outcomes.

So, maybe we need to adopt the "APPLE WAY".

Here are four principles that could enhance the appeal of VR adoption in schools, making it more resonant with educators as they contemplate integrating VR:

1. Start with Simple Use Cases- Integrating VR into the curriculum provides various starting points, from complex games to simple instructional tools. A practical strategy, similar to the "Apple way," involves starting with VR applications that support explicit instruction, making it easier for teachers to adopt this technology.

2. Make it Easier for Educators to Create Content- To foster the use of VR in education, empowering teachers to design VR experiences aligns with their expertise and teaching preferences. Giving educators the tools to customize VR content ensures immersive experiences complement their curriculum and instructional style.

3. Minimize the Amount of Travel in VR- In VR experiences, navigating complex controls and movement can distract from learning goals if not quickly mastered. Simplifying movement in VR can minimize distractions and keep the focus on educational objectives.

4. Consider Offering Multiplayer- Some of the most effective learning experiences are those that are social in nature. Engaging in learning activities with others can enhance our comprehension and deepen our connection to the material. This collaborative approach may foster a better understanding of the content.

MANGING CHANGE
To Immersive Learning

Asynchronous field trip to a virtual world on the computer
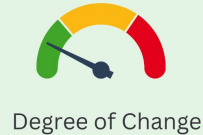
Degree of Change

Synchronous field trip to a virtual world on the computer

Degree of Change

Synchronous field trip to a virtual world in a VR Headset

Degree of Change

By Craig Frehlich

How do we intentionally manage change toward a more immersive learning culture?

Have you ever experienced the pressure of rapid change, perhaps feeling it was too abrupt or fast? Such swift transformations can be risky and even harmful to an organization. To mitigate these risks, it's vital to deliberately manage the pace of change, much like how resistors are used in electrical systems. Resistors effectively regulate electricity, managing the electron flow within a circuit to prevent fires or burnouts. In a similar vein, learning organizations implement specific measures akin to these resistors. These measures are designed to control and stabilize the rate of change, ensuring it happens at an absorbable pace.

The integration of virtual worlds and virtual reality is no different.

The adoption of virtual worlds and virtual reality in organizations requires a mindful and measured approach. Similar to how resistors in circuits prevent overloads, integrating VR technology needs careful pacing. Rapid, unplanned introduction can lead to resistance and confusion. It's vital to introduce VR gradually, with adequate training and adaptation time, ensuring it enhances rather than overwhelms. A gradual and consistent approach is preferable to a rapid one that risks alienating numerous stakeholders.

When integrating virtual worlds and virtual reality (VR) to improve curriculum outcomes, it's essential to adopt a structured, step-by-step approach. The challenge lies in determining the most effective way to implement this versatile tool, given its numerous possible applications. Virtual worlds and VR can enhance instructional methods at different stages of a lesson.

Expert support and guidance can significantly ease and accelerate the deployment of immersive learning tools. However, many schools lack in-house experts for this. Therefore, it's crucial to start with simpler applications and gradually advance to more complex uses. This might be a safe and effective progression for educators with minimal support:

1. Start with Asynchronous Virtual World Experiences on the computer- We know that context matters, so taking students into a contextually relevant location like ancient Rome in 3D can help make learning more relevant. Check out https://lnkd.in/gg9YH7ga, to learn more.

2. Progress to Synchronous Virtual World Experience on the computer- After familiarizing students with virtual worlds individually, the next step is to guide the entire class into a virtual world via computer. While managing a class in this setting takes practice, it can offer additional benefits once students are comfortable with the medium.

3. Take students to a virtual world experience in VR headsets- VR headsets provide immersive and engaging experiences but come with challenges such as navigation, comfort, and interaction. If these issues aren't addressed, they can hinder learning. Therefore, effective guidance and support are crucial when implementing VR.

VR PERSISTENCE

Moving Past the "One and Done"

Immersive Learning Experiences Characteristics to Consider

Shorter Length — Longer Length

Guided Practice — Open Practice

Simple — Complex

By Craig Frehlich

Introducing virtual reality and virtual world experiences for educational purposes can be challenging, particularly for those who are unfamiliar with this technology and its impact.

Typically, there is a single opportunity to demonstrate its value. However, this isn't quite just. Like many tools, VR needs sustained engagement to fully grasp its impact and potential. It requires intentional deployment.

Introducing virtual reality in education is akin to learning to ride a bike without any support like training wheels or someone to guide you. Imagine attempting to balance, steer, and pedal for the first time, all on your own. Without these supports, your first ride is likely to be challenging, perhaps even discouraging. Similarly, first experiences with VR can be overwhelming for novices, particularly without proper guidance or gradual introduction. Just as a beginner cyclist benefits from training wheels and a guiding hand, new VR users need structured, step-by-step support. This approach ensures that their initial encounter is not only manageable but enjoyable, setting the stage for more complex and rewarding experiences as their skills develop.

Effective learning balances challenge with skill level. Tasks should stretch learners without causing overwhelm. This balance is crucial in all educational settings, including VR. Introducing a novice to complex VR simulations too soon can be counterproductive.

When deploying a VR or immersive learning experience to learners, here are three characteristics to consider:

1. Length of Experience- When introducing learners to VR or immersive learning experiences, it's important to consider the duration of the session. For first-time users, shorter experiences are ideal as they help to reduce discomfort and ease users into the medium.

2. Level of Support Feedback and Guidance- The amount of support, feedback, and guidance provided within the VR experience, such as coaching through virtual assistants and avatars, should be tailored to the user's level of experience. More experienced users may require less assistance, while beginners might benefit from additional help.

3. Complexity of Learning- In immersive learning experiences, it's essential to tailor the complexity of content to the learner's level. Start with basic concepts and gradually introduce more challenging material as the learner's understanding grows. This approach ensures a smooth progression from foundational knowledge to advanced, conceptual learning, enhancing the educational impact of the experience. Novice learners often struggle with knowledge transfer until they gain experience.

The effectiveness of virtual reality in learning isn't guaranteed by the technology alone. It demands thoughtful deployment and a balance between challenge and support. Too much frustration or too little struggle can hinder learning. Finding this equilibrium is key to unlocking VR's potential as a powerful educational tool.

Virtual World Design Tips

To reduce cognitive load and improve learning

Keep it Realistic

Ensure 3D assets look and behave like the real world. Refrain from floating posters and 3D models.

Have Focal Points and Signposts

Use podiums, arrows and platforms to help provide wayfinding for users as they navigate the space.

Minimize Text Based information

Use audio narration where possible to provide instructions and explanations to accompany 3D assets.

By Craig Frehlich

Tips For Educators When Designing Virtual Worlds

Does this story sound familiar?

A student named Alex was excited to learn about Ancient Greece in a new virtual reality environment. Initially thrilled by the immersive and realistic digital Athens, Alex quickly became overwhelmed. The vast and detailed world lacked clear guidance making it hard for him to find specific landmarks or understand what he was supposed to learn. His excitement turned into frustration as he struggled with disjointed information and unclear learning tasks.

The design of virtual world experiences in education requires meticulous crafting to ensure their effectiveness. It's not enough to simply create a visually stunning and immersive environment; these virtual worlds must also be structured to foster learning and engagement. As evidenced by the transformation of Alex's experience in virtual Ancient Greece, the success of these digital platforms hinges on their ability to merge the marvels of technology with the essentials of effective teaching. The transition from a vast, directionless world to a purposeful and enlightening virtual exploration underscores the critical need for clear learning objectives, realism, guided pathways, and interactive elements that align with educational goals. By carefully balancing the awe-inspiring possibilities of virtual reality with the foundational principles of pedagogy, we can craft virtual experiences that are not only captivating but also profoundly educational.

Here are 3 tips to help make your virtual world experiences successful:

1. Keep it Real- In virtual learning environments, realism is key. Ensure that elements such as posters and 3D assets adhere to real-world physics, avoiding unnatural features like floating objects.

2. Have Focal Points and Signposts- In virtual environments, use podiums, arrows, and platforms for clear navigation. These elements act as visual guides, helping users find their way and focus on key areas. Efficient wayfinding enhances learning by reducing confusion and ensuring a smooth, intuitive journey through the virtual space.

3. Minimize Text- When designing virtual learning environments, prioritize minimizing text-based information. Instead, lean towards audio narration to provide instructions and explanations. This approach aligns with the dual coding theory, which suggests that information is better retained when presented through both verbal and visual channels. Moreover, text information can be hard to read in a virtual world.

WHERE TO INSERT VR?

(15%-20%) (30%-40%) (25%-30%)

| Intro and Review | Explaining and Modelling | Practice |

TIME SPENT ON A LESSON ELEMENT

WHY INSERT VR IN THE EXPLAINING STAGE?

1 Greater Context — Taking students to contextually relevant environments can provide clarity to complex topics.

2 Engagement and Interest — VR for explaining can help in making the content more engaging and interesting. This is crucial because student attention and interest tend to wane during traditional lectures.

3 Time Well Spent — The explaining stage usually occupies a significant portion of the lesson.

By Craig Frehlich

How do we convince teachers to incorporate VR into lesson design?

Changing habits and routines can be challenging, and this is true for teachers as well. They tend to become accustomed to a specific routine and method of teaching. A widely respected and effective teaching approach is direct and explicit instruction. This method typically includes stages like introducing and reviewing material, followed by explaining and demonstrating, and concluding with practice. Virtual Reality stands out as a flexible tool that could potentially enhance various aspects of a lesson plan, especially in direct or explicit instruction. Here are the stages with approximate time spent on each stage:

Introduction and review (~15-20%): This stage sets the stage for the lesson, engages students, and presents the learning objectives. Reviewing previous lessons or relevant concepts helps to build connections with new material.

Explaining and modelling (~30-40%): This is often the core of the lesson where new concepts, skills, or information are presented. It can take a significant portion of the lesson, especially if the topic is complex or requires a detailed explanation.

Practice: Guided and Independent (~25-30%) -Students begin applying the new knowledge with the teacher's guidance during this phase. It's a critical step for ensuring understanding and for providing support as students try out new skills.

NOTE-The allocation of time in each lesson plan stage can vary significantly based on the subject, level of education, and specific lesson objectives. However, there are general principles and strategies that educators can apply to optimize the learning experience.

As VR content, especially simulations and gamification, grows in education, many teachers yearn for a more active role than just overseeing students in virtual worlds. The solution may lie in developing VR experiences that engage teachers in a vital part of the teaching process: the explaining phase. This approach integrates their expertise with VR's immersive potential, maintaining their central role in guiding the learning experience.

Why might VR be a valuable tool for the Explaining Phase of a Lesson?

1. Greater Context: One superpower of VR is providing context to the learning. The explaining stage often involves delivering the core content of the lesson, which can be complex. Teachers need tools, like VR, that can simplify and clarify these concepts for students.

2. Engagement: Tools for explaining help in making the content more engaging and interesting. This is crucial because student attention and interest tend to wane during traditional lectures. Interactive tools, multimedia content, and other teaching aids can make lessons more dynamic and captivating.

3. Time Well Spent: On average, teachers spend the majority of their lesson time in the explaining phase, so teachers are often looking for tools to enhance this part of the lesson delivery.

Enhancing Direct Instruction Using Virtual Worlds

Physical Classroom	Virtual Classroom
Finite Resources	Infinite Resources
Limited Possibilities	Unlimited Possibilities
Critical Space	Safe Space

EXPLAINING

MODELLING

PRACTICE

Does this story sound familiar?

Mr. T faced the daily challenge of effectively delivering instruction to a large group of students. His classroom, limited by its physical constraints and lack of technological resources, struggled to provide contextual relevance and interactivity. The static walls and outdated tools hindered his ability to make lessons tangible and engaging, while the crowded space complicated personalized scaffolding and interactive practicing. Amidst these challenges, Mr. T often dreamt of transcending the classroom's confines, envisioning a future where learning was immersive and boundless.

Direct and explicit instruction is a structured and effective methodology for teaching that is particularly beneficial in teaching new skills or concepts. Whilst there are many variations, most have four key stages:

Explaining- The teacher provides critical knowledge and skills. You can't think about what you don't know, so if we want our pupils to do anything interesting or creative we must give them the vocabulary and background knowledge required to explore a topic.

Modelling- showcasing the skill or concept being taught through practical demonstration. Mastery of any skill requires learners to analyze and understand exemplary models, followed by an insight into expert thinking.

Guided Practice- involves providing students an opportunity to understand the material with the teacher's support. This could involve breaking the task into smaller, more manageable steps, providing hints or cues, using graphic organizers, or offering examples and non-examples.

Independent Practice- giving opportunities to practice a new skill or concept. As they work through this process, feedback is key. We must be vigilant about the mistakes pupils are likely to make and prevent them from becoming embedded.

While the initial phase of learning a new concept typically doesn't commence in a virtual world, the potential of virtual worlds to augment our capabilities as educators in delivering effective direct instruction deserves attention and consideration.

Ways Virtual Worlds might enhance our ability to deliver direct instruction:

Explaining- In a virtual world, explanations can be situated within a more immersive context, making abstract concepts more tangible. For example, explaining a historical event can be done within a virtual reconstruction of the historical setting. Teachers can use interactive elements within the virtual world to illustrate points dynamically, such as manipulating 3D models

Modelling and Guided Practice- Teachers can use virtual simulations to model complex processes that would be difficult or impossible to demonstrate in a physical classroom.

Independent Practice- Virtual worlds provide a safe environment for students to practice new skills without real-world consequences, whether it's conducting virtual lab experiments or practicing language skills in a simulated foreign environment, therefore building confidence.

As part of my work as a VR consultant, I often get asked, "What research is there to support the adoption of VR in education"? Alas this is not an easy answer.

Does this story connect with your educational experience?

Mrs. Thompson, an innovative teacher, read a research article about a new educational practice tested in a controlled setting. Skeptical of its relevance, she noted the contrast between the predictable lab environment and her unpredictable, diverse classroom. Recognizing that her students' unique needs couldn't be addressed by a rigid method, she adapted the research findings, blending them with her own experience to create a flexible, effective teaching approach that resonated with the dynamic nature of her classroom. This resulted in a successful balance of empirical insight and real-world applicability.

In education research, "research-based practice" strictly follows methods validated by scientific studies, while "research-informed practice" is more flexible, integrating a range of research insights and theories, allowing for adaptation to individual contexts.

Research-based practices, often too rigid for real-world scenarios, struggle to adapt to the complexities of environments like education. Research-informed practices, however, offer greater flexibility by blending empirical evidence with professional judgment, making them more adaptable and effective in diverse, dynamic settings.

Here are 3 research-informed practices to consider for VR adoption.

1. Varied practice improves learning

a. Implications For VR- Besides lectures, textbook readings and debates, incorporating VR into educational practices offers a dynamic, engaging, and effective way to enhance learning outcomes by providing immersive, customizable, and interactive learning experiences.

b. Where to Learn More-Make it Stick-Peter Brown et al

2. Learning can be enhanced in 3D and provide context

a. Implications for VR- 3D virtual environments offer a unique opportunity for students to interact with and understand spatial relationships and complex structures. And, provide real-world contextually relevant environments to dive deeper into understanding.

b. Where to Learn More: Learning in 3D-Dr. Karl Kapp

3. Active Retrieval Of Information Enhances Learning

a. Implications for VR-Active retrieval practice strengthens memory by embedding information more deeply, making it easier to recall in the future. Allowing students in virtual worlds to interact with objects to think, sort, and make sense of their experience is a key part of this process.

b. Where to Learn More- Powerful Teaching-Pooja K. Agarwal, & Patrice M. Bain

When to Deploy A VR Experience

FROM THE BEGINNING

"Lessons from the Pre-test"

START

1 Provides context to draw from

2 Hypothesizing strengthens learning

3 Making mistakes alerts us to our weaknesses

Does this narrative sound familiar?

In high school, Emily dreaded the start of each history unit because her teacher, Mr. Thompson, always began with a pre-test covering the key concepts of the upcoming lessons. Initially, she found these tests frustrating, feeling overwhelmed by questions on topics she hadn't yet learned. However, as the semester progressed, Emily's perspective shifted. She started to see these pre-tests not as assessments of her existing knowledge, but as tools to spark curiosity and prepare her for new information. Gradually, the frustration gave way to anticipation and engagement. By the end of the year, Emily had come to appreciate the pre-tests as valuable parts of her learning journey, teaching her that not knowing an answer was often the first step to understanding and knowledge.

The Pre-testing Effect is a pedagogical approach where students are initially tested on material they have yet to study, challenging traditional teaching methods that prioritize instruction before assessment. When students attempt unsure answers, it enhances their engagement and attention, leading to more effective retention when they are subsequently exposed to the correct information further in their learning journey. The Pre-testing Effect underscores the value of active student participation and retrieval of information they were exposed to at the beginning of a learning journey.

I often get a question from educators who have curated a curriculum-aligned VR experience that focuses on exploration and schema for a topic: "What is the best time to deploy this piece of immersive learning?"

If we look at this from the lens of the Pre-testing Effect then the answer might be: From the beginning. And here are three reasons:

1. Provides Context to Anchor Learning- A VR experience that provides new experiences exposes students to key concepts early, creating a mental framework that aids in assimilating detailed information learned later.

2. Guessing and hypothesizing strengthen learning- Thinking about new information actively engages students with the material, priming their brains to be more receptive to new information when it is taught.

3. Making mistakes Early is Beneficial- Deploying new information at the start of a unit helps identify mistakes and errors early by revealing gaps in students' understanding, allowing for targeted teaching that addresses these specific areas of confusion right from the beginning.

When considering the application of the Pre-testing Effect in VR learning experiences, it's crucial to recognize that not all scenarios are equally suitable. Some VR experiences have a limited focus, targeting only a specific subset of learning outcomes. Therefore, the effectiveness of the Pre-testing Effect may vary depending on the scope of the VR experience. Generally, the more comprehensive the VR learning experience is, the more likely it is to benefit from the positive impacts of the Pre-testing Effect.

VR FOR LEARNING VS PERFORMANCE

VR For Learning	VR For Performance
A Marathon	A Sprint
Involves desirable difficulties	Few challenges
Deep connections	Superficial
Memorable	Forgotten

By Craig Frehlich

Not So Fast: The Difference Between Learning and Performance

Does this story resonate with you?

Alex, a teenager eager for independence, rushed through a condensed driving course, aiming to get his license quickly. He managed to pass his driving test but with minimal understanding of road safety and defensive driving. Soon, while navigating a busy street, Alex found himself in a complex traffic situation. Overwhelmed and underprepared, he was involved in a minor collision. Thankfully, no one was hurt, but the incident was a wake-up call for Alex. He realized the perils of hastily learning a skill as serious as driving. Alex then committed to further, more thorough driving lessons, understanding the importance of proper training and safety on the road.

Understanding the distinction between learning and performance is crucial in education. Here is a quick breakdown of how they are different.

Learning is a long journey, a marathon. It involves a deeper understanding and retention of information or skills over a long period. When we learn something we often benefit from forgetting and retrieving the information over spaced-out and varied practice. This process is often slower because it builds and connects neural pathways in the brain, leading to long-lasting knowledge or abilities.

Performance is a sprint. It centers on short-term achievements, often focusing on immediate results. Performance-driven tasks usually involve memorizing or mastering skills quickly for immediate use, but this information or skill is often quickly forgotten once the task or assessment is over.

A statistic by PwC highlights that employees undergoing training in Virtual Reality environments can learn up to four times faster compared to traditional classroom settings. While VR may expedite our performance, there's a debate over whether faster performance equates to deeper, long-lasting understanding, also known as LEARNING. Education often values depth and retention over speed.

I propose advocating for the use of immersive learning tools such as Virtual Reality to create a diverse and engaging educational journey for students. This journey should encompass a range of experiences, including those in virtual environments. However, it is crucial to recognize that VR is not a replacement for the myriad of methods we employ to involve students in the learning process. VR should be viewed as a complementary tool that enhances, rather than replaces, traditional educational practices.

When it comes to the race between learning and performance, it's time to shift our mindset. So, put away your track spikes and spandex, and instead, grab your walking poles and jacket. Embrace a pace that allows for exploration, reflection, and deep understanding. In this journey of education, it's not just about reaching the finish line as quickly as possible. It's about allowing learners to savor each step, absorb the scenery, and gather a wealth of knowledge and experience along the way.

PURPOSEFUL DESIGN FOR VIRTUAL REALITY

BUILDING A TRADITIONAL DIORAMA | **LEARNING IN VIRTUAL REALITY**

MIS-ALIGNED TO OUTCOMES | ALIGNED TO OUTCOMES

3D SPATIAL LEARNING | 3D SPATIAL LEARNING

FOCUS ON FACTS | FOCUS ON CONCEPTS

By Craig Frehlich

What is Immersion?RIP to the Diorama -Unless It is Purposeful

Do you remember your first Diorama?

Emma, a student I taught, who previously found history uninteresting, discovered her passion for learning by creating a diorama depicting the first moon landing for a school project. Immersing herself in research, she meticulously crafted a lunar landscape and a model Apollo Lunar Module. This hands-on, creative process not only deepened her understanding but also ignited a newfound enthusiasm for space exploration and history. Her project, was a labour of love, revealing the joy and engagement found in interactive learning. Emma's diorama became a testament to the power of 3d immersive creativity in making learning an exciting and personal journey.

This assignment deviated from the traditional drill and practice that is part of the machine of education lore and how we often prepare students for standardized tests. Bravo?

Well, not really!

Are Dioramas a deep learning activity or a way for the teacher to find some breathing room and not be the center of attention who drives the learning?

Dioramas offer a unique educational experience that combines hands-on learning, 3d spatial learning and creativity. By physically engaging in the construction of a diorama, students experience a form of learning that can be more impactful than traditional auditory or visual methods because they challenge the students to think in 3D. This hands-on approach encourages students to express their understanding of a subject creatively. Alas, it is not that simple. If these tasks require students to spend more time on the mechanics of building and less time on the conceptual underpinnings of the lunar surface and its relationship with the sun and Earth, then time is wasted. Reimagining a 3D spatial environment should push students to solve problems instead of recreating an existing model or situation. Effective diorama projects should prompt students to ask questions, hypothesize, and test their understanding, turning the construction process into a journey of discovery that enhances their comprehension of complex concepts.

When integrating VR into the curriculum, it's crucial to ensure that the focus remains on deep, contextual understanding rather than just the technical aspects of building in a virtual space, or diorama. The immersive nature of VR can be leveraged to provide students with a more profound spatial perspective, encouraging them to think critically about the environments they are creating. For instance, when constructing a virtual model of a historical event or a scientific phenomenon, the emphasis should be on understanding the underlying context and relationships within that environment, rather than just on the technical skills required to build the model. This approach can help students develop a more holistic understanding of the subject matter, fostering critical thinking and problem-solving skills that are applicable beyond the virtual world.

OPEN VS GUIDED LEARNING IN VIRTUAL WORLDS

Open Virtual World   Guided Virtual World

By Craig Frehlich

Open vs Guided Learning in Virtual Worlds

Navigating learning without the right skills and knowledge is like sailing a boat without a map or compass. Just as a sailor needs tools to steer and reach their destination, a learner requires prior knowledge and critical thinking skills to guide their educational journey. Without these, the learner, like the sailor, may drift aimlessly, overwhelmed by confusion and frustration, struggling to achieve understanding and mastery. This analogy emphasizes the importance of being prepared for the voyage of learning, especially in virtual worlds.

Incorporating virtual worlds into traditional classroom settings offers a dynamic and immersive way to complement and enhance traditional teaching methods. While lectures and textbook materials might lay the foundational groundwork for a student's educational journey, integrating virtual reality experiences can profoundly deepen their understanding and retention of the material. But, these worlds don't work without careful consideration of where the learner is at in their journey.

Envision a beginner in marine biology putting on a VR headset after a lecture, and diving into a virtual oceanic adventure. This isn't merely watching the underwater world; it's an engaging journey that complements the day's lesson with interactive, context-rich elements. However, the question arises: Is it advisable for such a novice, still in the early stages of developing their vocabulary, schema, and understanding, to navigate this immersive world independently?

At this juncture in the learning journey, they should be guided and not provided an open exploration popularized by platforms like Roblox.

Guided instruction for a novice learner in a VR platform is essential because it provides structured cognitive scaffolding, helping students build foundational knowledge in a complex subject. It ensures focused learning by keeping students engaged with specific objectives, avoiding the distractions of an open virtual world. This approach facilitates progressive skill development, allowing students to master basic concepts before advancing to more complex ideas.

In this guided virtual environment, the student can still interact with marine life, and witness ecological processes all guided by a recording of a 3D teacher avatar.

This 3D teacher avatar plays a crucial role in the virtual learning experience. It's not just a passive guide but an interactive element that challenges students, prompts critical thinking, and offers personalized feedback. The avatar can adapt its instructional approach based on the student's interactions, ensuring a highly individualized learning experience.

Here are three tips that could be incorporated into a guided virtual world experience:

1. Ask them to construct the order and hierarchy of the information being presented using blocks.

2. Force them to interact with content through questions.

3. Build their learning journey from simple to more complex.

The Importance of Pragmatism for the Future of VR

This is an article about teaching with VR, it is not a research-based article, above all I am a pragmatist. This article is about ideas, not theoretical underpinnings. By training and predisposition, I am a teacher. Therefore, the ideas in this post are viewed through the lens of my experience of working in schools and classrooms that are looking to adopt VR into their learning systems.

I hope these ideas will provide a better appreciation both of what VR and learning might mean and how we might get better at it.

One of the reasons we struggle with implementing VR into education is we are looking for the "landmark empirical study" or "holy grail" that will allow administrators and money brokers to say, "Aha I now see the return on investment".

Alas, there are a few fundamental principles I have noticed while working in the trenches with VR and students that should make everyone pause and trust that the medium has a bright future in 2024:

1. Learning is often invisible and requires careful consideration and observation beyond pre and post-test performance.

The effectiveness of VR as a learning tool often hinges on careful observation and nuanced understanding of individual learning experiences, which are not easily quantifiable through conventional pre and post-test methods. This creates a challenge in objectively demonstrating the benefits of VR in educational settings. What a student is doing and thinking behind the veil of an HMD might not be truly articulated in a test.

2. Experts and novices learn differently yet we put both of them into similar situations.

In virtual reality experiences, the differing learning journeys of experts and novices often lead to a mismatch in satisfaction and ratings. Novices may find VR environments overwhelming or confusing without proper guidance, while experts might consider the same experiences too simplistic. This disparity suggests a need for VR designs to adapt to varying skill levels

3. How a student feels and their emotional well-being towards a learning experience should be given more respect.

Educators are starting to place student emotional well-being as a critical component of effective learning, recognizing that a student's emotional state significantly influences their academic performance. Emphasizing emotional health in education enhances engagement, mental health, retention, and the development of essential soft skills. Virtual reality emerges as a powerful tool in this realm, offering immersive and personalized learning experiences that cater to diverse needs. VR can create safe, engaging environments for skill practice, reduce stress, and facilitate social and emotional learning, making it a valuable asset in modern educational strategies that prioritize the holistic development of students

UNCONVENTIONAL LEARNING TO BUILD SCHEMA

BUILDING DEEP LASTING UNDERSTANDING

Knowledge
ex. facts, vocabulary → Simple Schema
ex. power, systems → Complex Schema
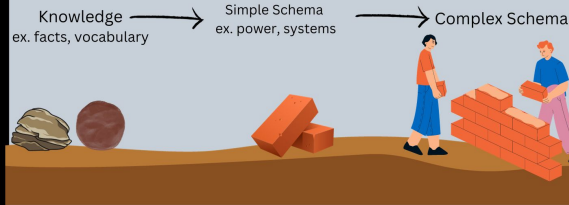
EXAMPLES OF UNCONVENTIONAL LEARNING IN VR

Perspective

Team work

Systems

By Craig Frehlich

Have you ever had to teach a Big Idea, often called "Schema" in learning science?

In learning science, a schema refers to a cognitive framework or concept that helps organize and interpret information. Schemas are essential for understanding the world around us and play a crucial role in learning and memory. Some simple examples might include peace, power or equilibrium.

Teaching schemas is often hard. Schemas are abstract cognitive structures that are not directly observable, making them inherently difficult to explain and demonstrate.

So what is the best way to teach them?

Whilst learning schema should not be a "one-and-done" journey, the use of unconventional learning experiences can be a powerful way to introduce schema into your units. And with regular and explicit engagements students will start to build robust connections.

A great example of unconventional learning experiences to teach schema can be vividly illustrated in the film "Beautiful Mind."

In the film, Professor John Nash demonstrates the concept or "schema" of equilibrium in game theory through a unique pen-dropping activity. Diverging from the typical lecture style, Nash places several pens on a desk and invites his students to each take one. The ensuing rush results in chaos, effectively setting the stage for Nash to explain equilibrium. He uses this practical, interactive example to show how orderly and organized actions can result in more beneficial outcomes for everyone, thus bringing the principles of game theory to life tangibly and memorably.

This approach not only captivates his students but also makes an abstract concept tangible and relatable. Such innovative teaching strategies highlight the effectiveness of unconventional methods in introducing and reinforcing learning schemas. By stepping outside the conventional classroom lecture format, educators can foster a deeper, more intuitive understanding of complex subjects. Nash's method in "A Beautiful Mind" serves as a compelling example of how starting with an unconventional learning experience can be a powerful way to engage students and develop robust cognitive frameworks, or schemas, that enhance understanding and retention of material.

When we think of compelling learning experiences in virtual reality we often gravitate to conventional applications like virtual dissections, historical field trips, and space missions. However, when introducing schema into our units we might want to consider some unconventional learning journeys to help students begin to unpack complex concepts. Here are three examples:

1. Introducing "Perspective"- I will often use "Baby Hands VR", https://lnkd.in/gqtv8qjj.

2. Teaching "Team-Work"- I regularly use "Keep Talking and Nobody Explodes", https://lnkd.in/gTPhuQc3.

3. Introducing "Systems"- I will use "Little Cities VR", https://lnkd.in/gc3nPu5C.

VR Training Is More Than A Checklist

1 Individual Learning with a Checklist

2 Team Learning with a Checklist

3 Individual Learning to adapt

4 Team Learning to adapt
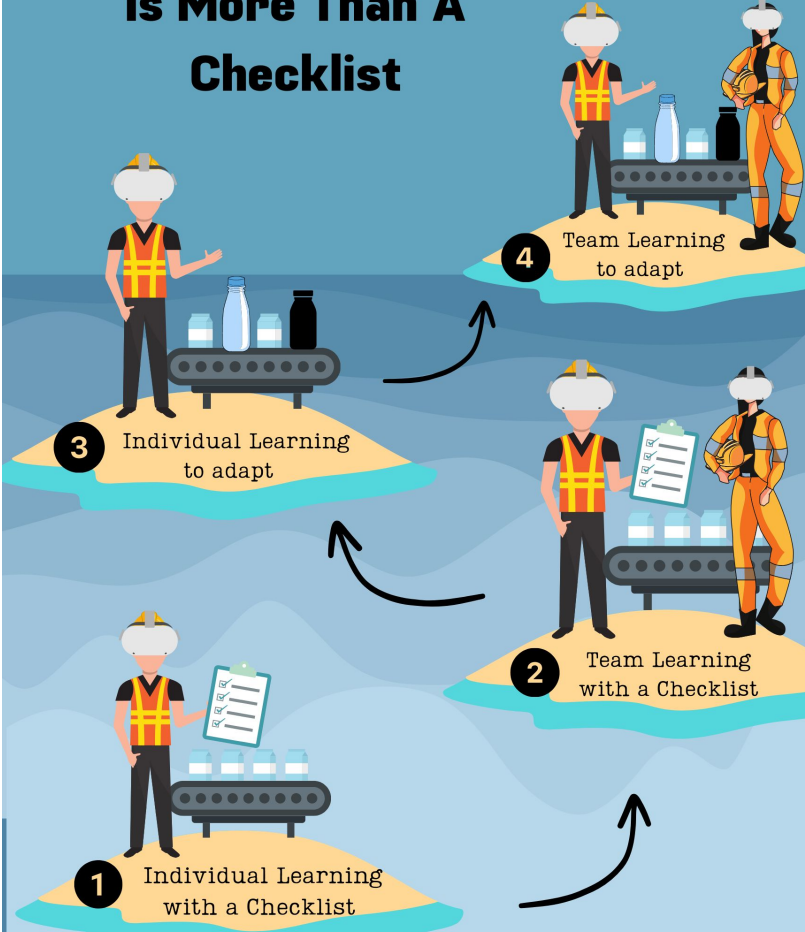
The Might and Peril of Checklists for Learning

In the heyday of rock and roll, David Lee Roth of Van Halen had an unusual request in his concert rider: a bowl of M&M's with all the brown ones removed. Far from a mere whimsy of a rock star, this stipulation served a practical purpose. Roth's concerts required complex technical setups, involving elaborate staging, lighting, and sound systems. The no-brown M&M's clause was a clever test to ensure that the venue staff paid close attention to his detailed technical specifications. If he found brown M&M's in his dressing room, it was a sign that the technical aspects of the rider might not have been thoroughly checked, prompting a full review to ensure safety and success. This unique strategy, initially seen as eccentric, demonstrated the need for workers to ensure they followed and instigated all the key tasks within a checklist.

Checklists are a staple in learning and development training due to their unparalleled effectiveness in promoting organization, consistency, and thoroughness. They serve as a tangible guide, breaking down complex tasks into manageable steps, which is especially crucial in environments where precision and accuracy are paramount. For learners, checklists simplify the assimilation of new information and processes, reducing cognitive overload by presenting clear, sequential actions. This step-by-step approach fosters confidence, as individuals can track their progress and ensure that no critical steps are missed.

Virtual Reality is an excellent tool for training people in checklist procedures due to its immersive and interactive capabilities. It offers a safe, controlled environment for learners to practice complex tasks, enhancing engagement and memory retention. VR's immediate feedback mechanism also aids in the effective correction and comprehension of procedures, making it a superior alternative to traditional training methods for mastering checklists.

While allowing employees to practice using checklists is beneficial, it is not the end of the story in ensuring effective task execution, especially in team-based environments. Team dynamics and collaboration play a crucial role in the successful implementation of checklist procedures. Additional training is needed to help employees not only understand their roles but also how to communicate, coordinate, and collaborate with others effectively.

Ensuring employees are proficient in following checklists is just the foundation; real skill development occurs when they are exposed to unpredictable and dynamic situations. This exposure is critical in teaching learners how to adapt and think on their feet. Beyond the routine checklist tasks, employees should be trained in scenarios that challenge them to apply their knowledge in novel and complex situations. Such training encourages problem-solving, critical thinking, and decision-making skills, essential in environments where conditions can change rapidly and unexpectedly.
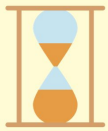
Preservation Strategies for......

Food

Learning in Virtual Worlds

Fridge
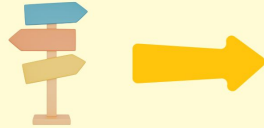
Structured Environment

Containers

Space out the Learning

Preservatives

SELECT

Interactives

The Preservation of Food and Learning in Virtual Worlds

Food preservation, a practice as ancient as civilization itself, serves a critical role in prolonging the quality and shelf-life of perishable goods, ensuring that nutrients and flavors are retained over time. This concept not only stands as a testament to human ingenuity in safeguarding vital resources but also mirrors a parallel need in the realm of human cognition: the preservation of knowledge and skills within our brains. Much like the diverse tools and techniques developed to keep food fresh and consumable, the field of learning science offers an array of strategies designed to 'preserve' information within our minds. These methodologies enable us to maintain, retrieve, and apply knowledge effectively, ensuring that our mental resources, like our food supplies, remain rich and accessible over time.

And, translating these methodologies to virtual worlds can be overwhelming.

Here are three strategies that we can learn from food preservation and transfer them to learning retention and preservation in virtual worlds:

1. Fridge-Structured Learning Environment: Just as a fridge maintains a consistent temperature to preserve food, a virtual learning environment with clear signposts and structured navigation ensures a stable and consistent learning framework. This stability is crucial for learners to understand where they are in the learning process, just as consistent cooling is vital for food preservation. It prevents cognitive overload and disorientation, similar to how a constant temperature prevents spoilage in food.

2. Food Containers-Space Out Learning: Food containers help in preserving the quality of food over an extended period. Similarly, spaced-out learning aids in the long-term retention of information. By revisiting topics at intervals, just as you might consume stored food over several days, learners reinforce their understanding and memory. This method prevents the 'decay' of knowledge, akin to how containers keep food fresh for longer durations. So instead of developing a "one-and-done" virtual world experience, try to plan virtual world experience in concert with other learning strategies to space out the learning over time.

3. Preservatives-Interactivity: Preservatives often enhance the appeal of food by maintaining its taste and appearance. Similarly, interactive elements in virtual worlds enhance the appeal of the learning process. Animations, interactive buttons, and decision-making scenarios make learning more enjoyable and visually appealing. This increased enjoyment can lead to a more profound engagement with the material.

Just as the tools and techniques of food preservation have significantly improved the quality of life structured learning environments, spaced-out learning, and interactive elements in virtual worlds—hold a similar potential to enrich the lives of learners.
Activate to view larger image,

Learning Unleashed

Variety in Your Instructional Delivery

Differentiated

VS

Uniform

Lecture
Video
VR Simulation
Ai Chatbot

Lecture
Worksheet
Worksheet
Worksheet
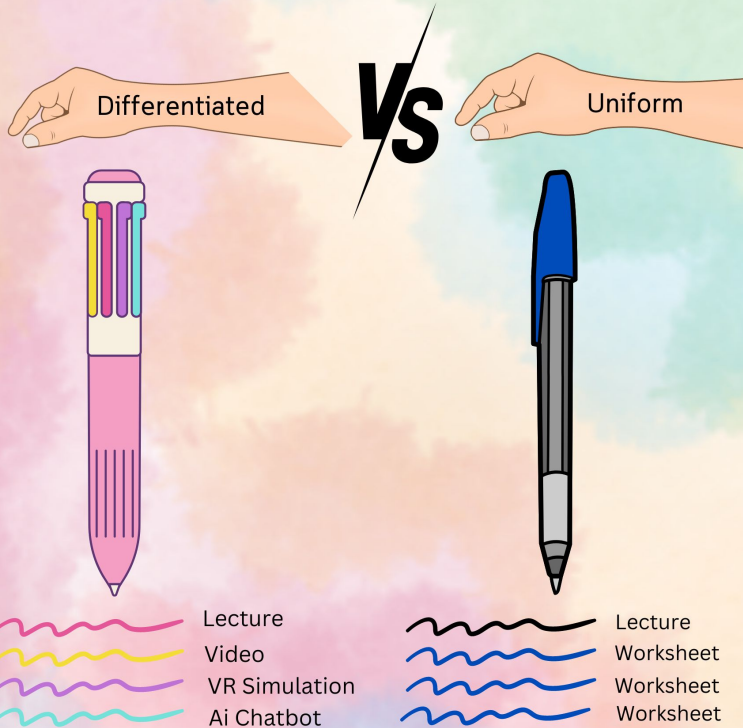
By Craig Frehlich

Do you remember when the first multicolor pens came out? I do!

The excitement of writing with a multi-colored pen as a student was truly unparalleled, especially compared to the mundane experience of using a standard single-color pen. The ability to click a button and magically switch colors brought a level of engagement and creativity to my writing tasks that was simply unattainable with a basic blue pen. Whether it was crafting a vivid story or taking colorful notes, each click of the pen was like opening a door to a new realm of possibilities. The assortment of colors not only made my writing visually appealing but also helped in organizing thoughts and emphasizing important points. This simple yet innovative tool transformed the act of writing from a routine task into an adventure, where each word could be a different hue, adding depth and personality to my work.

Using a multi-colored pen instead of a single-color one is an apt analogy for the benefits of utilizing diverse teaching strategies compared to a singular method in education. Much like how different colors in a pen can make notes more engaging and organized, varied teaching approaches address different learning needs and interests, keeping students more engaged and aiding in a deeper understanding of the subject. While a uniform single-color pen is limited in expression, a one-dimensional teaching style can fail to capture the full spectrum of a student's learning potential, underscoring the importance of adaptability and variety in teaching methods.

In a more progressive model of teaching, the incorporation of a multitude of experiences, such as Virtual Reality (VR) and AI chatbots, can significantly enhance student engagement and unlock deeper understanding, much like adding various colors to a palette in art.

Virtual Reality allows students to step into environments or situations that would be impossible or impractical in a traditional classroom setting. For example, VR can transport students to historical sites, distant planets, or inside the human body, providing a rich, multi-sensory learning experience. This deep immersion can lead to a more profound understanding of the subject matter, as students are not just passive recipients of information, but active participants in a virtual learning environment.

AI chatbots, on the other hand, offer personalized, interactive learning experiences. These chatbots can adapt to individual student's learning paces, styles, and needs, much like a tutor. They can provide instant feedback, clarify doubts, and even guide students through complex concepts at any time of the day, making learning more accessible and tailored. This is similar to having a tool that adjusts its function based on the user's needs, enhancing the learning experience.

Incorporating these technologies in education represents a shift from a one-size-fits-all approach to a more dynamic student-centered learning model.

IMPOSTER SYNDROME

A Strategy for.....

Using Ai Avatars in Virtual Worlds

By Craig Frehlich

Have you ever delved into the classic board game Clue, immersing yourself in the suspense of uncovering a mystery? Now, imagine elevating that experience to an extraordinary level with the power of virtual reality (VR) and AI avatars. Picture yourself not just playing a detective but truly embodying one in a world where your decisions shape the story. In this realm, every glance, question, and deduction brings you closer to unravelling a compelling historical conundrum.

With the use of Ai avatars in virtual worlds this is possible. Enter "Imposter Syndrome". A learning journey about communication, inquiry, engagement and immersion.

If you were studying history, the war and Winston Churchill, you could create an "Imposter Syndrome" experience around this topic.

Picture this example, "Imposter Syndrome for Winston Churchill" is a captivating VR learning experience set in the 1940s, where players take on the role of a private investigator tasked with identifying the real Winston Churchill among two identical claimants. Through immersive VR technology and AI avatars, players interact in a historically accurate setting, using yes-or-no questions to discern truth from deception. The game challenges players to use their observational skills and knowledge of history to uncover subtle inconsistencies and reveal the imposter. This interactive experience combines elements of mystery, history, and technology, offering a unique and engaging way to explore a significant historical figure and era.

Engaging in a VR learning experience like "Imposter Syndrome for Winston Churchill" offers a vastly different and more immersive experience compared to reading about Winston Churchill in a history textbook. While textbooks provide valuable factual information, they often lack the interactive and emotional depth that a VR experience can offer. As they interact with characters representing Churchill and his imposter, players are thrust into the heart of a pivotal era, experiencing the atmosphere, challenges, and nuances of the time. This direct engagement deepens understanding and appreciation of historical context, bringing to life the complexities of Churchill's personality and the period he lived in. The VR environment, coupled with AI avatars, allows players to explore details and scenarios that a textbook could never convey, fostering a personal connection with the past that is both educational and profoundly memorable.

A learning experience like "Imposter Syndrome" could easily be deployed into a virtual world at a fraction of the cost of an expensive game development studio with the advent of "chatGPT" plug-ins. No code platforms like EngageVR, VictoryXR and FrameVR are already making this type of integration easy to do for teachers and educators.

Not interested in Winston Churchill?

The narrative and characters could be adapted to a plethora of curriculum topics:Characters within a novel, Famous Scientists, Patients in a healthcare setting

VR LAB
SUSTAINABLITY

VR Lab Bookings

(chart: VR Lab Bookings vs Month, y-axis 0–40, showing rise from ~15 in September to ~20 in October to ~35 in November)
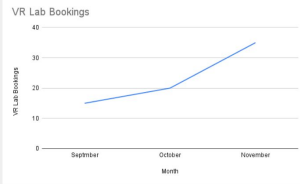
3- Key Principles

1 Align experiences explicitly to the curriculum

2 Ensure the learning outcomes are enhanced by VR

3 Curate a variety of different types of experiences: simulation, immersive stories, serious games

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In the past three months, our school's virtual reality lab has experienced a big surge in interest and growth among teachers, and it's clear that this remarkable evolution can be attributed to several factors. Although these are not the only principles, here are three key ones that have been instrumental in our growth:

Firstly, we've emphasized the importance of aligning virtual reality experiences with our curriculum, ensuring that every VR activity directly contributes to the educational goals set by our teachers.

Secondly, we've strived to make sure that the learning outcomes are significantly enhanced through the use of VR, creating an immersive and engaging environment that fosters deeper understanding and retention of subject matter.

Lastly, our commitment to curating a diverse range of VR experiences, including serious games, simulations, immersive worksheets, narrative stories etc., has enriched the learning journey, catering to a variety of student and teacher preferences.

This holistic approach to integrating VR into our educational framework has not only captured the imagination of our educators but also transformed the way our students engage with their studies, making the virtual reality lab an indispensable tool for immersive learning.

"If you build it, they will come" – a timeless adage from the movie "Field of Dreams" – aptly encapsulates the remarkable journey our school's virtual reality lab has undertaken in the past three months. Just like the protagonist in the film who transformed a cornfield into a baseball diamond, our commitment to fostering immersive learning experiences has yielded tremendous results. The surge in interest and growth among our teachers and students alike is a testament to the transformative power of this innovative tool, proving that when you create a sustainable environment for immersive learning, they will indeed come – eager, engaged, and ready to embark on a new era of educational exploration.

Anatomy of An Immersive Learning Lesson

Topic- refugees and migration.

	360 Degree Video	Immersive Worksheet in EngageVR	Speak with a Refugee Chatbot
	1 10 min	**2** 15 min	**3** 15 min
Contextually Relevant	✅	✅	✅
Active Learning	❌	✅	✅
Transactional	❌	✅	✅

By Craig Frehlich

Have you ever tended a garden, nurturing each plant to ensure it thrives? This is much like the role of a teacher in the classroom. Just as a gardener understands the unique needs of each plant, teachers recognize the diverse needs and requirements of their students. They meticulously plan lessons with a variety of experiences, akin to providing the right amount of sunlight, water, and nutrients, to ensure every student grows and flourishes in their educational journey.

I was recently consulted to help the English department at a school. They really wanted to use VR. My initial pushback was, "Why do you want VR?".

After a great discussion, we unravelled the real problem. Students from this affluent school could not connect deeply with the plight of the refugee characters within the novel they were reading. So what next?

The core objective was to enlighten students about the complex realities faced by refugees and migrants. However, as the unit progressed, the teachers were facing a signific ant challenge: the students were grappling with the factual and historical aspects but needed help to engage with the emotional and human dimensions of the topic.

It became clear that to truly resonate with the students, the unit of study needed to adopt a greater perspective, one that emphasized empathy. This would enhance their understanding and foster a deeper, more meaningful connection. We came up with 3 key learning principles that we felt needed to be enhanced in the unit:

i) Provide greater Context- we wanted students to be given more examples of real-world situations involving refugees and migrants.

ii) Include Active Learning- we realized that giving students more agency in their learning might get them to connect with the narratives.

iii) Provide Transactional Learning- involving the students in the learning process through interaction and exchange might lead to a deeper understanding.

Armed with these three principles we curated a 40-minute experience that utilized VR and an Ai chatbot. Here were the parts of the student's learning journey:

-Clouds Over Sidra- a VR documentary that offers an immersive insight into the life of Sidra, a 12-year-old girl living in the Za'atari refugee camp in Jordan.

-Custom VR Experience in EngageVR- we built an experience whereby students had to navigate an island and witness the coming of refugees to the island from boats. However, some of the villagers on the island were not very welcoming.

-Ai Chatbot - we programmed a chatbot to take on the persona of a teenage refugee and students used iPads to talk with the chatbot and ask them questions.

Each element - the VR documentary, the EngageVR experience, and the AI chatbot - nurtured their growth, akin to providing sunlight, water, and nutrients to plants. Through this nurturing educational experience, the students blossomed, emerging not only more knowledgeable but also empathetic, mirroring the vibrant growth of a well-tended garden.

Underdogs in Education?
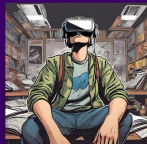
"The Unrecognized Potential of Comic Books and Virtual Reality"

Criticisms

Comic Books

-Only for youth

- Only for entertainment

- Lack Breadth and depth

Virtual Reality

Benefits

Comic Books

- Emphasis on action

- A synthesized and conceptual version

- Highly visual

Virtual Reality

By Craig Frehlich

Do you remember your first comic book? I do!

Since discovering Spider-Man comics, my life has been intertwined with Peter Parker's adventures. The excitement of diving into each comic was transformative, making Spider-Man a central figure in my life. This influence extended to Spider-Man themed birthdays and Halloween costumes, where I embraced the thrill of being a superhero for a day. Through these experiences, I absorbed lessons of bravery, resilience, and integrity from Spidey's world.

Despite my deep-rooted passion for reading and learning sparked by comic books like Spider-Man, it's disappointing to see their lack of recognition as valuable literacy and educational tools. This contrast highlights a societal hesitation to appreciate the educational worth of comics. Often seen merely as entertainment, their ability to offer rich narratives and engage a diverse range of learners is underestimated.

Similar to the undervalued role of comic books in literacy and education, the use of VR in learning environments is facing a parallel fate. VR is often sidelined in educational contexts despite its immersive and interactive capabilities. This cutting-edge technology has the potential to revolutionize the way students engage with and comprehend complex subjects, yet it struggles to gain widespread acceptance as a legitimate teaching tool.

Here are some criticisms of both:

1. Youth-Centric Stereotype: Comic books and Virtual Reality are often misperceived as primarily for young audiences, despite the depth and sophistication present in many graphic novels and the educational potential of VR. This view neglects their ability to engage and educate people across all age groups, overlooking their broader applicability in learning and literacy.

2. Perceived as a Gimmick: Just as comic books are often seen as mere entertainment, VR is sometimes dismissed as a gimmick or a novelty, rather than a serious educational tool. Its association with video games and leisure activities contributes to this perception, overshadowing its educational potential.

3. Lack of Proven Pedagogical Models: The relative novelty of both Virtual Reality (VR) and comic books in educational settings contributes to a scarcity of established pedagogical models and comprehensive studies demonstrating their effectiveness, especially when compared to traditional teaching methods.

The time is ripe to embrace the immense potential of Virtual Reality (VR) and comic books in education, recognizing their unique strengths. These mediums can vividly transform complex ideas into engaging experiences, offering new perspectives for learners. Integrating comic books' narrative-driven approach with VR's experiential learning can deeply enhance understanding of intricate subjects. As we continue to explore their effectiveness, VR and comic books have the potential to revolutionize education, catering to diverse learning styles and making learning a more engaging journey for all ages.

How Virtual Worlds can help the...

"UN-THINKERS"

"Mimic"   "Staller"   "Slacker"

Personal Learning   Self-paced Content   Interactive content

More Agency   Less Presssure   Greater Context

By Craig Frehlich

In the dynamic landscape of a classroom, a silent narrative unfolds daily.

Picture this: the "thinkers," that (according to a recent EdSurge interview with Dr. Peter Liljedahl) fill roughly 20% of our classes, whose hands eagerly soar to the sky, ready to grasp the knowledge that's presented before them. They lean in, eyes alight with curiosity, embodying the very essence of engaged learning.

In stark contrast, lurking in the periphery are their counterparts, the "un-thinkers"—the "Slacker," whose spirit of inquiry seems to have taken an indefinite hiatus; the "Mimic," whose own academic voice is an echo of their peers; and the "staller," who masters the art of the strategic retreat to any haven but their desk. These students present a challenge as compelling as any academic subject, a puzzle that, when solved, could transform the very fabric of educational engagement.

The Slacker: a) Engagement Level-Demonstrates low engagement and appears disinterested in class material.; b) Approach to Learning-Tends to do the bare minimum, avoiding effortful engagement with the content.; c) Coping Strategies-Often pretends to work, may daydream, or distract others; d) Impact on Learning-Results in superficial learning with poor understanding and retention of information.

The Mimic: a) Engagement Level-Conditionally engaged; participation is often a mirror of peer behavior.; b) Approach to Learning-Relies on imitation, copying the work of others; c) Coping Strategies-Frequently seeks help from peers, taking cues from more engaged students without true comprehension.; d) Impact on Learning-Lacks personal understanding, heavily reliant on others' insights; critical thinking skills remain undeveloped.

The Staller: a) Engagement Level-Engages in avoidance behaviors to escape active participation in learning activities.; b) Approach to Learning-Uses evasive tactics to avoid direct engagement with learning materials.; c) Coping Strategies-Regularly requests to leave for bathroom breaks or engages in other tasks like sharpening pencils to stay off-task.; d) Impact on Learning-Experiences frequent knowledge gaps due to consistent inattention and missed learning opportunities.

Traditional teacher rituals and routines can unintentionally neglect the needs of "un-thinkers" by enforcing a one-size-fits-all approach that often prioritizes order and compliance over engagement and critical thinking. Such methods may stifle students who are deemed "un-thinkers".

Can Virtual Reality play a role in helping the "un-thinkers"? My pragmatic side would say, "Yes".

Have a look at my poster that outlines how VR might save the "slacker", "staller", and the "mimic".

Check out Dr. Peter Liljedahl book, "Building Thinking Classrooms in Mathematics, Grades K-12: 14 Teaching Practices for Enhancing Learning"

RESEARCH VS PRAGMATISM

For Virtual Reality

Research

1. VR causes more learning and faster (debatable)

2. VR causes greater learning retention (debatable)

3. VR evokes greater empathy (debatable)

Pragmatism

1. People learning in VR are usually amazed.

2. People learning in VR usually want to come back for more.

3. People learning in VR seem more curious about the experience.

By Craig Frehlich

Have you ever been in a situation where you just know based on intuition or gut response, something that no amount of data could have revealed to you? This intrinsic sense of understanding, often honed through years of experience, can be the guiding light through complex situations.

In the movie "Sully," during a courtroom scene, Captain Sully, portrayed by Tom Hanks, challenges flight simulator data presented by the National Transportation Safety Board. The data suggests he could have returned to the airport safely, instead of landing on the Hudson River. Sully argues that the simulations didn't account for human response time and real-world stress, which were critical factors in his decision. Upon his request, the simulations are re-run with adjustments for human reaction time, validating Sully's decision to land on the Hudson as the safer choice.

The courtroom scene from "Sully" illuminates a broader discussion concerning the balance between research (or data) and pragmatism (or practical experience) in decision-making. Finding a balanced approach as to when to rely on research vs pragmatism is always complex.

Take the use of VR as a tool to enhance learning. There are many debatable claims regarding the power of using VR as a tool for learning. Here are three: 1. VR causes more learning and faster.; 2. VR causes greater retention.; 3. VR evokes greater empathy.

A great rebuttal by Heather Dodds, Ph.D. on the myths vs realities of XR for learning can be found here, https://lnkd.in/gEZun2tf.

Alas, not every "way of knowing" should be the domain of research.

I have spent over 10 years working with people in various VR labs around the world and have seen and heard some amazing things. Whilst the stories and vignettes (mostly good but some bad) will be saved for another day, I can tell you that I have collected enough qualitative evidence to firmly believe that VR is a tool that can make a positive impact on learning. I have heard countless comments from people who finish a learning session in a VR environment and say things like:

1. "Wow, I was just blow away at how impactful that was for me."

2. "When can I come back for more."

3. "Seeing things from this perspective has made me more curious about…"

Should we discount these experiences and stories? I hope not!

While researching the effectiveness of technology tools like VR in education presents its set of challenges, the endeavour is crucial. Given the growing integration of technology in learning environments, it's imperative to have these insights. Alas, this journey must also be balanced with stories from practitioners who are working in the field and sharing stories and insights into what they are observing.

Explicit Instruction
in Virtual Worlds

Do's & Don'ts

Do's	Don'ts
Provide clear learning goals and directions ✓	✗ Provide limited sign-posts and directions
Activate Prior knowledge ✓	✗ Use lecture theatres or virtual classrooms to teach
Model good and bad examples with 3-D Assets ✓	✗ Use videos or powerpoint slides
Provide immersive feedback ✓	✗ Provide pop-up multiple choice questions for feedback

by Craig Frehlich

Imagine you're tasked with building a house and you have very little experience.

In the world of Discovery-Based Learning, you're handed a pile of bricks and tools and left to your own devices, navigating through potential pitfalls and inefficiencies.

Discovery-based learning when you are just beginning to learn something new can have several pitfalls. Without structured guidance, students might arrive at incorrect conclusions or develop misconceptions that can be challenging to rectify later. Additionally, students may take a long time to grasp concepts that could be quickly understood with more direct instruction.

Contrast this with Explicit/direct Instruction, where an expert builder stands beside you, guiding you step-by-step, ensuring each brick is laid correctly and every nail is hammered with precision. Explicit instruction provides clear and structured guidance. This clarity minimizes confusion, ensures that foundational concepts are thoroughly understood, and reduces the likelihood of misconceptions developing.

In education, just as in construction, explicit instruction lays a robust foundation, setting the stage for learners to confidently innovate and expand upon their knowledge in the future.

Virtual worlds can be a great place to orchestrate Explicit instruction. They can present unique opportunities that can enhance learning that may not be feasible in a traditional physical classroom. However, be careful when designing virtual worlds to be used for explicit instruction.

What should you Do?

1. Provide clear learning goals and directions- clear learning goals and directions are crucial to anchor students' focus and optimize their learning journey. Such clarity ensures efficient navigation, bolstering purpose and motivation while preventing aimless wandering. It also facilitates effective time management, self-regulation, and teamwork by setting clear benchmarks.

2. Activate Prior Knowledge (with Posters)-activating prior knowledge through posters on the walls is advantageous due to their ability to swiftly engage learners with visual and succinct content. These posters act as immediate visual anchors, reducing cognitive load in an environment already demanding navigation skills. Unlike prolonged lectures or videos, posters allow students to process information in bite-sized chunks and at their own pace.

3. Using 3D assets to model examples of good and bad practices- In virtual worlds, 3D assets offer a superior learning experience over traditional methods like videos or PowerPoint slides. These assets allow for dynamic interaction, granting students a hands-on exploration that may foster deep understanding.

4. Give Immersive Feedback- Avoid providing feedback with pop-up screens that break immersion. Providing ongoing feedback on behaviour using virtual avatars in a virtual world holds distinct advantages over 2D pop-up screens, primarily due to the immersive nature of these environments.

From an educator's perspective, the integration of open virtual gaming platforms like Roblox and Fortnite into educational initiatives has brought a dynamic shift in how we engage with students in the classroom. Whilst having these options is opportunistic from an economic perspective, it is a careful dance from an educator's point of view. It's fascinating to witness how these popular gaming environments can be harnessed as tools for learning and pastoral care.

A recent announcement regarding the alignment of Lego (a very innocent and wholesome brand) and Fortnite (known for a more aggressive brand) has stirred some emotion within the educational community. Some key questions that should be asked when aligning these platforms to educational communities are:

1. What measures can they implement to ensure the safety of young users, including online etiquette and cybersecurity?

2. How can you foster a positive learning community within the platform?

3. How can teachers be integrated into the platform to provide guidance and support?

4. What is the revenue model for the platform, and how do we protect students from this system?

3-WAYS TO ENSURE POSITIVE EMOTIONAL LEARNING IN VIRTUAL REALITY

1 Have Clear Goals

2 Provide Engaging Content

3 Reduce Cognitive Load

BY CRAIG FREHLICH

"Human beings are emotional first. You have to find their emotions."

Joe Rohde, Disney Imagineer.

Do you remember your first trip to a Disney theme park?

For me, stepping into a Disney theme park for the first time was like diving into a storybook where every page sprung to vivid life. The familiar melodies, the iconic characters, and the meticulously crafted landscapes enveloped me in a world of wonder and awe. Every corner held a promise of a new adventure, evoking emotions so intense they etched themselves onto my soul. That first visit was more than a day out; it was an unforgettable emotional odyssey.

Should learning be any different?

According to Nick Shackleton-Jones, what we learn is closely tied to how we feel about the information and the context in which it is presented. Shackleton-Jones posits that traditional learning models, which often focus solely on cognitive processes, miss the mark by ignoring the emotional aspects of learning. He suggests that we are more likely to remember and internalize information that has emotional resonance or significance for us.

How do we supercharge our learners to ensure they develop emotional resonance and significance in our lessons? How do we enable them to feel learning?

Virtual Reality offers a unique platform for creating emotionally resonant learning experiences, aligning well with Nick Shackleton-Jones' concept of "affective context." These technologies allow for the creation of immersive environments that can evoke real emotions, thereby enhancing the learning process.

Getting them to a place of positive emotional engagement requires careful consideration, and is often referred to as a state of "Flow".

Flow, as conceptualized by Mihaly Csikszentmihalyi, is a state of deep absorption and enjoyment in an activity where individuals lose track of time and are fully immersed in the task at hand. Achieving flow in a VR learning experience involves the consideration of several factors. Here are three:

1. Have Clear Goals - The learner should know what they are trying to achieve. Goals should be broken down into smaller, achievable tasks to maintain engagement and provide a sense of accomplishment. The task or activity should be matched to the learner's skill level. If it's too easy, they'll get bored; if it's too hard, they'll become frustrated.

2. Provide Engaging Content- Use the power of VR to create immersive and interactive scenarios that can't be experienced in traditional learning environments. Allow the learner to be active and

incorporate storytelling elements to make the experience more relatable and memorable.

3. Reduce Extraneous Cognitive Loads- This can be accomplished through intuitive design, clear navigation and instruction. The VR interface should be user-friendly, with easy-to-understand controls. Moreover, ensuring physical comfort is crucial. Make sure the VR headset is comfortable to wear for extended periods and participants have an opportunity to sit down

Why Do I Need a Digital Twin For Learning?

To Reduce Anxiety,Fear and Discomfort

To Improve Accessiblity

To Allow Unlimited Practice

By Craig Frehlich

Has this ever happened to you?

As an avid traveller, I was thrilled to explore the vibrant streets of Barcelona. Before every adventure, I always took a digital photo of my passport, a tip I'd learned from my father. One evening, while savoring tapas at a local bar, my bag with my passport and valuables was stolen. Distraught, I reported the theft and headed to the Canadian embassy. Thankfully, I had the digital copy of my passport stored in my email. The embassy quickly verified my identity and issued a temporary travel document. The loss was a setback, but the digital backup was my saving grace, allowing me to continue my journey with peace of mind. This experience reinforced the importance of digital preparedness.

In education, creating a virtual twin of a building, school, or workplace for the virtual world offers numerous advantages. It provides an immersive learning environment, allowing students to interact with the infrastructure in ways that might not be possible in the physical world, thus providing several benefits. Here are three:

1) Reduce Anxiety, Stress and Discomfort- A virtual twin, a digital replica of a physical space, can significantly ease the transition for students entering a new environment. Allowing students to explore the institution's layout and facilities before arrival, reduces first-day uncertainties.

2) Accessibility- ensuring that students from different geographical locations can access the same resources and experiences without the need for physical presence. This can be a game-changer for remote learning, making education more inclusive.

3) Unlimited Opportunity to Practice- an exact digital replica of a physical environment, which offers unparalleled opportunities for skill development from home. It ensures 24/7 accessibility, allowing learners to practice at their convenience. The virtual setting ensures risk-free experimentation, especially in fields where errors can have serious consequences. With realistic simulations, instant feedback mechanisms, and cost-efficiency, learners can immerse themselves in diverse scenarios without the constraints of the real world.

While virtual worlds offer unparalleled opportunities to transport learners to contextually relevant environments, enhancing immersion and engagement, there's undeniable value in replicating real-world elements within these digital realms. Replicating real-world environments provides learners with a familiar foundation, making the transition to virtual learning smoother and less intimidating.

What is Active Learning?

Pseudo-Active Learning		True Active Learning
Fun with Limited Purpose		**Engaging with High Purpose**

Greek paper mâché

VS

Visit Virtual Greece To Explore Artifacts

Math Number Hunt

VS

Solving Building Heights Using Trigonometry

By Craig Frehlich

In the nostalgic hallways of our school memories, many of us fondly recall the joy of tackling word searches. Those intricate grids of letters, where words played hide and seek, provided a delightful diversion from the routine of classroom lectures. We'd eagerly scan each row, feeling a rush of triumph every time we spotted a hidden word. Yet, as time-consuming and entertaining as they were, one can't help but wonder: did these puzzles truly offer any substantial educational value? Or were they just a clever way to keep us occupied?

While word searches might masquerade as an active learning technique, their contribution to genuine learning outcomes is arguably minimal. At first glance, they seem to engage students in a task that requires focus, pattern recognition, and vocabulary recall. However, the depth of cognitive engagement they offer is superficial. They don't necessarily challenge students to think critically, apply knowledge, or connect concepts in meaningful ways.

Additionally, I recall an experience with a student teacher named Eric, who had planned a unit on ancient Greek culture. The main activity had students creating Grecian urns using papier-mâché. While it was fun, it didn't align with the intended learning outcomes. See also, this blog, https://lnkd.in/gGAZ9QYZ

I have also seen this in virtual world experiences.

For example, recently I used a blaster to shoot numbers to learn my multiplication facts and teleported through an intricate maze as part of an elaborate scavenger hunt for meaningless facts.

The visual and kinesthetic elements of such activities could be seen as a departure from traditional rote memorization. However, from an instructional design standpoint, this method still falls short of true active learning.

Here's why:

-Surface-level Engagement: Shooting at numbers might engage the learner's motor skills and provide immediate feedback, but it doesn't necessarily engage higher-order cognitive skills.

-Lack of Contextual Relevance: Active learning emphasizes the importance of context. Learning times tables by shooting numbers lacks a real-world context or relevance. Without understanding the practical application or significance of multiplication, the learner might not grasp the underlying concept or its importance.

True active learning goes beyond mere participation in a task. It emphasizes deep engagement, where students are not just passive recipients of information but are actively involved in constructing knowledge. This can be achieved through strategies like problem-based learning, where students tackle real-world problems; and reflective practices, where they introspect on their learning journey. These methods require students to analyze, synthesize, and evaluate information, fostering a deeper understanding of the subject matter. In contrast to the fleeting satisfaction of finding a word on a grid or shooting a number in the air.

VR For Conceptual Understanding

Schema

Surgery Simulation

Conceptual Learning
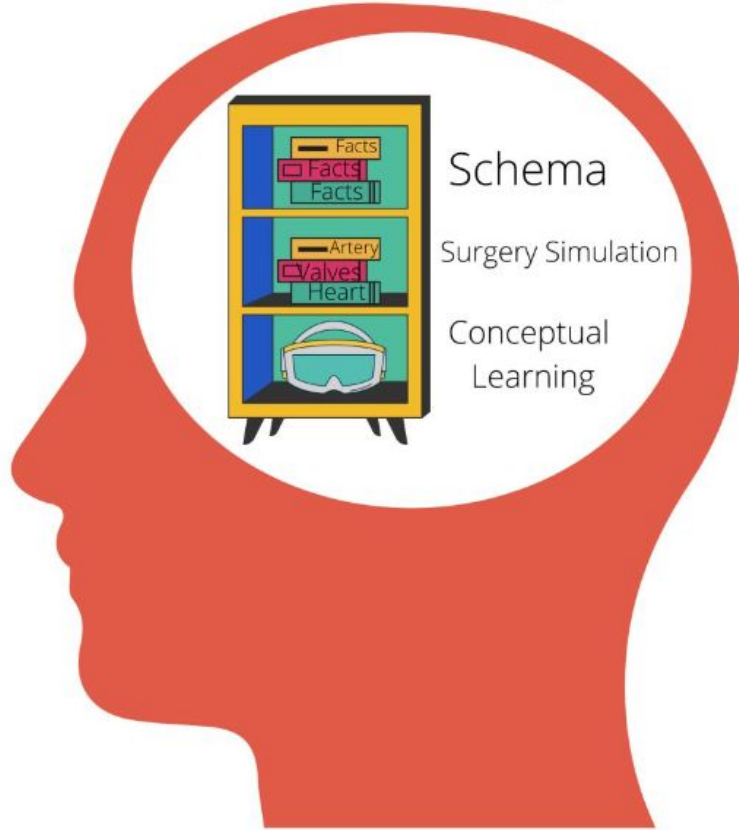
Teaching and Learning in Virtual Worlds

VR and It's Superpowers

We have learnt a lot about how the brain works in the last decade. And,more importantly, why some learning activities result in more robust understanding that promotes long-term memory whilst others do not. Learning that is "sticky" requires time and careful consideration.

Our brain stores information and organizes facts better when it is connected as a bundle or schema. This is best done through providing learners with conceptual understanding related to "big ideas" like power, systems, and identity. Teaching facts in isolation through rote memorization and note taking will minimize the possibility of it becoming part of our long term memory. However, taking the time to solidify facts through concepts will provide a greater probability that the learning is stored for future use.

Virtual reality can play a big role in building conceptual understanding. We may begin our instructional journey by providing mico-learning of low level facts, but VR can help cement these isolated bits into a more memorable bundle. For example, we might teach students in biology about valves, artia, ventricles and arteries, but then use VR to allow them to practice through a game like "surgeon simulator". Or, we might teach students about the parts to a hero's journey and send them into a VR narrative experience like "Manifest 99" whereby they have control and agency over the plot of the story to fully understand character identity.
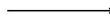
Imagine walking into a gourmet kitchen. The chef doesn't use a cleaver to peel an apple, nor does he choose a paring knife to chop a thick slab of meat. In the world of education, the scenario is strikingly similar. Just as that chef understands the nuances of each knife and its purpose, educators must discern which tools best fit the learning outcome at hand.

Review and retrieval practices are not one-size-fits-all. Some learning outcomes may benefit from the precision of a short quiz, akin to the delicate work of a paring knife, while others might require immersive depth, much like the broad strokes of a chef's knife.

In both the kitchen and the classroom, mastery comes not just from skill, but from matching the right tool to the task, ensuring every endeavour is a recipe for success. So how do we align our curriculum to the right tool?

Worksheets have been a staple in classrooms for decades, and for good reason. They are particularly effective for certain types of learning outcomes:

1. List-Worksheets provide a structured format for students to list down points, whether it's the causes of World War I, the symptoms of a disease, or the phases of the moon. This structured format helps in organizing thoughts and information in a linear manner.

2. Define- When students need to understand and remember specific definitions, worksheets are an excellent tool. They allow students to write down definitions in their own words, aiding retention.

While worksheets excel in knowledge acquisition, immersive VR offers an entirely different set of advantages:

1. Hands-on Learning- VR provides an interactive 3D environment where students can practice skills in a safe and controlled setting. Whether it's a medical student practicing a surgical procedure or a trainee pilot navigating a flight, VR offers a hands-on learning experience.

2. Empathy and Caring: One of the most profound advantages of VR is its ability to foster empathy. By immersively placing students in scenarios, they can see the world through another's eyes. For instance, experiencing the life of a refugee or the daily challenges faced by someone with a disability can cultivate deeper understanding and compassion.

Digital Twin AI Avatars

Emotional support

self-improvement

Ethical Coach
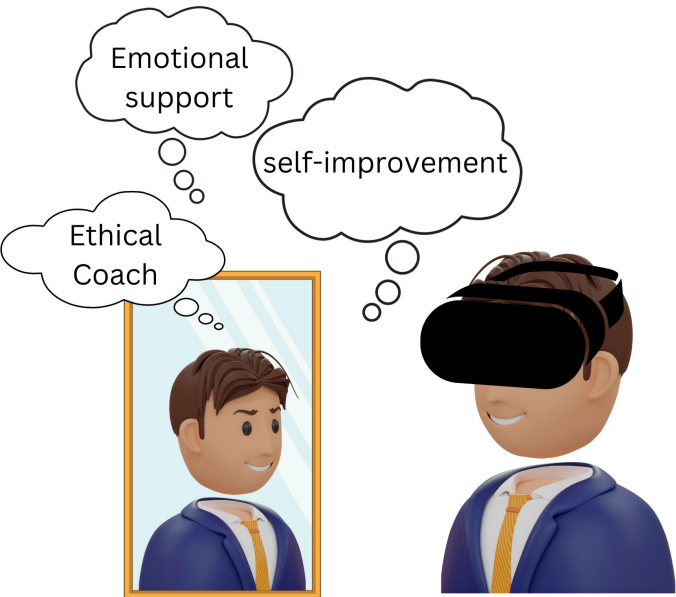
Do you remember Michael Jackson's song, "Man in the Mirror"...

"I'm starting with the man in the mirror I'm asking him to change his ways, And no message could have been any clearer, If you want to make the world a better place, Take a look at yourself, and then make a change"

The song emphasizes the importance of looking inward and evaluating one's own actions and beliefs. It suggests that change starts with the individual, advocating for personal responsibility in making the world a better place.

Alas, exploring one's own identity is not easy. Especially if you are trying to do it in a mirror!

One tool that might be neat to explore and help learners interrogate their changing identity could be using a digital twin AI avatar.Interacting with an AI avatar of yourself in a virtual world could offer several learning benefits. However, the extent of these benefits would depend on the capabilities of the AI and the design of the virtual environment. Here are some potential advantages:

Interacting with an AI avatar of yourself in a virtual world may offer a multifaceted approach to personal growth and learning. The avatar could serve as a mirror for self-reflection, providing feedback on your thoughts and actions while analyzing your past behaviour to offer actionable insights. It may act as a training ground for enhancing communication skills and emotional intelligence, allowing you to practice active listening and emotional response management. The AI's computational abilities might be harnessed for problem-solving and data analysis. Beyond cognitive benefits, the avatar might offer unique emotional support, understanding your preferences and thought patterns to provide stress relief and personalized motivation. It can also be a platform for ethical and moral development, facilitating debates on ethical dilemmas and offering moral support based on your own value system.

Giving an AI avatar in a virtual world information related to your own persona might be a unique and motivating way to embark on self-reflection and identity exploration. However, it has it's potential risks some of which are:

-The potential for AI to reinforce existing biases and Over-reliance on the AI for emotional support could be problematic. Or, The AI's understanding of you would be limited to the data it has, which may not fully capture the complexity of human experience.

SHOULD I USE VR?

Do they already care about the learning?

Yes — No

Are they confident? — No

Yes

Is performance time important? — Yes

No

VR

BY CRAIG FREHLICH

As a teacher with a daughter who has severe allergies, I've always felt a heightened sense of responsibility regarding EpiPen training. This isn't just a professional development box to tick; it's a matter of life and death that hits close to home. I've already spent countless hours researching anaphylaxis, understanding its triggers, and practicing how to administer an EpiPen. I've even had the unfortunate experience of using it in a real-life emergency. So, when I walk into a training session, I'm looking for something simple in the form of a checklist to guide my training.

This is a stark contrast to some of my colleagues who are just being introduced to the concept. They will need to be taught why it is important to care about the training and build empathy. Additionally, they need to start with the fundamentals, like how to recognize the signs of an allergic reaction and the step-by-step process of administering an EpiPen. They need to embark on learning how to confidently and safely deploy an EpiPen for the first time.

Given my extensive experience with severe allergies—both as a parent and as someone who has had to administer an EpiPen in a real-life emergency—I already possess a high level of care and confidence in using the device. For me, the tactile, emotional, and cognitive aspects of handling an anaphylactic situation are not theoretical; they are part of my lived experience. I've navigated the stress, the urgency, and the relief that comes with successfully using an EpiPen, so the immersive experience that Virtual Reality (VR) training offers wouldn't necessarily add a new layer of understanding or skill for me.

On the other hand, my colleagues who are less familiar with the severity of anaphylactic reactions could greatly benefit from a VR training experience. Virtual Reality can simulate the urgency and gravity of a real-life situation in a way that a lecture or a pamphlet cannot. It can help to bridge the gap between theoretical knowledge and practical, hands-on experience, providing an emotionally charged, realistic scenario that demands quick thinking and precise action. This kind of immersive training could be invaluable for instilling a sense of urgency and care, helping them move from a state of low confidence to one of assured competence. It's one thing to know the steps in theory, but it's another to have "experienced" it, even if that experience is virtual. Therefore, while I might not gain much from a VR training module, it could be a game-changer for those who are new to the concept and responsibilities of handling an EpiPen.

Meeting Famous Ai Avatars in Virtual Worlds

Possible Benefits
1 Real-World Connection
2 Emotional Connection
3 Personal Connection

By Craig Frehlich

Imagine walking down the streets of New York, lost in thought about your upcoming exams and wondering if all the hard work will ever pay off. Just as you're about to cross the street, you bump into someone. You look up, and there he is—Bill Gates, the tech visionary you've always admired. You apologize, expecting him to rush off, but instead, he smiles and asks what's on your mind. You share your worries about your education, and he offers a piece of advice that resonates deeply with you: "Remember, failure is an option here. If things are not failing, you're not innovating enough."

That brief encounter becomes a pivotal moment in your life. You go back to your studies with renewed vigour, embracing challenges as opportunities for innovation. Years later, you find yourself leading a team of engineers, and that chance meeting still serves as your guiding star.

Now, imagine if educational experiences could capture even a fraction of that inspiration and personal connection. What if learners had the chance to interact with the people who have shaped history, technology, or culture? The impact would be immeasurable, turning mere interest into lifelong passion and transforming educational journeys into unforgettable adventures.

Wouldn't you want to be part of such a transformative learning experience?

In today's rapidly advancing technological landscape, the dream of recreating transformative encounters like meeting Bill Gates on a New York street is becoming a reality. Thanks to the development of conversational AI avatars in virtual worlds, we can simulate such life-changing interactions, bringing a new dimension to educational experiences.

Incorporating socially important people such as key historical figures and individuals with high social status into learning design can have a profound impact on learner motivation and emotional engagement. Here are 3 benefits:

1. Real-World Connection-Learning often becomes more meaningful when it is tied to real-world applications. The lives and achievements of socially important people provide concrete examples of how theoretical knowledge can be applied in practice, making the learning experience more relevant and relatable.

2. Emotional Connection-Stories of struggle, success, and innovation from key figures can evoke emotional responses that make the learning experience more memorable. Emotional engagement is a key factor in long-term retention and application of knowledge.

3. Personal Connection-Interacting directly with these individuals allows learners to form a personal connection, which can make the learning experience more emotionally impactful. Emotional connections often lead to better retention and a deeper understanding of the subject matter.

HOW TO STRENGTHEN LEARNING

Pottery For Sale

Learning Experience

Practice Experiences

limited practice

no variation

no context

Retrieval Strength

Practice Experiences

spaced practice

variable practice

contextual practice

Retrieval Strength

By Craig Frehlich

Imagine this: You've just visited a bustling pottery market for the first time, mesmerized by the intricate designs and the expert craftsmanship of the potters. Inspired, you decide you too want to become an expert potter.

You go home, eager to create your own masterpiece. You set up your pottery wheel, gather your clay, and start spinning. But despite your enthusiasm, your first attempts are far from the elegant pieces you saw at the market. Frustrated, you realize you've practiced very little, focused only on making bowls, and did so in a makeshift corner of your garage, far removed from the inspiring atmosphere of a real pottery studio. What went wrong?

In the quest for effective learning and long-lasting retention, three science-backed strategies stand out: Spaced-Out Practice, Varying the Type of Practice, and Practicing in Context.

Spaced-Out Practice-Instead of cramming all at once, this approach advocates for distributing learning sessions over a period of time—days or even weeks. The psychological spacing effect comes into play here, reinforcing neural pathways each time you revisit the material, making it easier to recall later.

Varying the Type of Practice- This strategy involves mixing different topics or skills in a single study session, rather than focusing on just one. Interleaving enhances your brain's ability to differentiate between similar but distinct concepts, thereby improving retrieval and application of knowledge.

Practicing in Context-This involves practicing in an environment closely mimicking the real-world context where the skill or knowledge will be applied. Learning in context creates strong associations between the information and the environment, making it easier to remember and apply when you're in that setting again.

So, if you're tired of spinning your wheels and ready to shape your destiny, why not consider adopting tools that might support these 3 powerful strategies?

Virtual Reality (VR) and Virtual Worlds offer innovative ways to enhance key retrieval strategies for effective learning. VR's adaptive and varied scenarios allow for a mix of challenges that require different skills or knowledge areas, thereby enhancing the brain's ability to differentiate between concepts. Furthermore, VR's immersive environments provide the perfect setting for contextual learning, mimicking real-world conditions to improve both retention and application of knowledge. Coupled with the engaging nature of VR and the instant feedback it provides, these platforms offer a comprehensive and effective approach to mastering the art of retrieval.

From Rituals to Relevance

The Old Model: A Relic of the Past-As someone who has spent years in the educational system, both as a student and as an educator, I can't help but feel frustrated at times by the outdated model that continues to dominate some of our schools and universities. This model, which emphasizes rote memorization, standardized testing, and a one-size-fits-all approach, lacks variety and engagement. It perpetuates a cycle of boredom, fear, and anxiety, leaving little room for creativity, critical thinking, and an opportunity to appreciate and enjoy more personalized learning.

The Problem with Rituals-The rituals of traditional education—tests, lectures, excessive homework—are not inherently bad. They were designed with the intention of standardizing knowledge and skills. However, they have become so deeply ingrained in our educational culture that we have lost sight of their original purpose: to facilitate learning. Instead, these rituals have become the end goal. Students cram facts into their heads for the sake of passing a test, not for the sake of understanding.
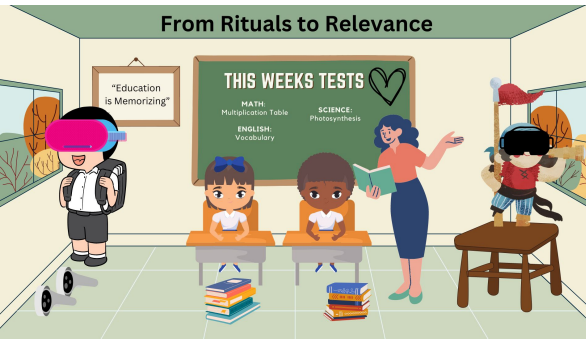
The New Model: Learner-Centric, Implicit, Playful, Context-Driven- It's time for a bit of a paradigm shift. We need to move away from an education system that is heavily teacher-centric, explicit, and decontextualized, and towards a greater balance that is learner-centric, implicit, playful, and context-driven.

Learner-Centric-In a learner-centric model, the focus is on the individual needs, interests, and abilities of each student. This means more personalized learning paths, more choice, and more agency for students.

Implicit Learning-Implicit learning occurs naturally, without conscious effort. Think about how you learned your first language or how to ride a bike. No one gave you a multiple-choice test on grammar rules or bike parts. You learned by doing, by making mistakes, and by gradually improving. Our educational system should make room for this kind of learning.

Playful Learning-Play is not just for preschoolers. Playful learning can and should be a part of education at all levels. When students are allowed to explore, experiment, and be creative, they are more engaged and more likely to retain what they learn.

Context-Driven-Learning doesn't happen in a vacuum. It is always influenced by context—cultural, social, historical, etc. By making learning context-driven, we make it more relevant and meaningful for students.

The Way Forward-The shift to a new educational model won't happen overnight, and it won't be easy. It will require a collective effort from educators, administrators, policymakers, parents, and students. It will require us to question long-held beliefs and to be willing to try new approaches like AI, Virtual worlds and Virtual reality.

But the rewards—a more engaged, more creative, more well-rounded generation of learners—are well worth the effort.

Traditional Learning VS Virtual World Learning

Traditional Learning	Virtual World Learning
2D Assets	3D Assets
One Direction	Transactional
Sit and Listen	Try and Do

BY CRAIG FREHLICH

It's time to reduce the days of chalk and talk, and say hello to a universe of immersive learning. With VR, you're not just a teacher; you're a tour guide to new dimensions of understanding.

2D Assets vs. 3D Assets

a) Traditional Classroom: 2D Assets -In a traditional classroom, you're often limited to 2D assets like textbooks and PowerPoint slides. While these can be efficient, they often lack the depth and engagement that come with more interactive forms of learning. Students see flat images and texts that they must interpret and visualize in their minds, which can be a barrier to understanding complex concepts.

b) Virtual Reality Classroom: 3D Assets- Here, students can walk around a historical monument, explore the inner workings of a machine, or even traverse the human circulatory system. The 3D environment allows for a more comprehensive understanding, making abstract or complex ideas easier to grasp.

One Direction of Learning vs. Transdirectional Learning

a) Traditional Classroom: One Direction of Learning- In a conventional setting, learning is often unidirectional—from the teacher to the student. The teacher imparts knowledge, and the students passively receive it. While there may be some opportunities for questions and discussions, the flow of information is primarily one-way, which can limit student engagement and understanding.
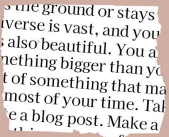
b) Virtual Reality Classroom: Transdirectional Learning -Not only do students learn from the teacher, but they also learn from interacting with the virtual environment and each other. They can explore, experiment, and even make mistakes in a safe, virtual space, gaining different perspectives that enrich their understanding. The teacher becomes more of a facilitator in this learning ecosystem, guiding students through multi-directional information flows.

Sit and Listen vs. Try and Do

a) Traditional Classroom: Sit and Listen- The age-old "sit and listen" model has students in rows, attentively (or not so attentively) listening to a lecture. This passive form of learning relies heavily on the student's ability to focus, take notes, and hopefully retain the spoken information for later use. It's a model that has worked for centuries but is increasingly criticized for not engaging or effective enough for modern learners.

b) Virtual Reality Classroom: Try and Do- Students are not just passive recipients of information; they are active participants in their learning journey. They can practice surgical techniques, conduct virtual chemistry experiments, or recreate historical events, all while receiving real-time feedback. This hands-on approach enhances engagement and significantly improves retention and application of knowledge.

While traditional classrooms have their merits, the advent of virtual reality in education offers an immersive, interactive, and multi-directional learning experience that is hard to match. So, are you ready to take your teaching into the next dimension?

3 WAYS AI AVATARS IN VR WILL DISRUPT LEARNING

- Students may feel more comfortable asking for help
- Reduce heavy workload for teachers
- Ability to personify or role-play any character
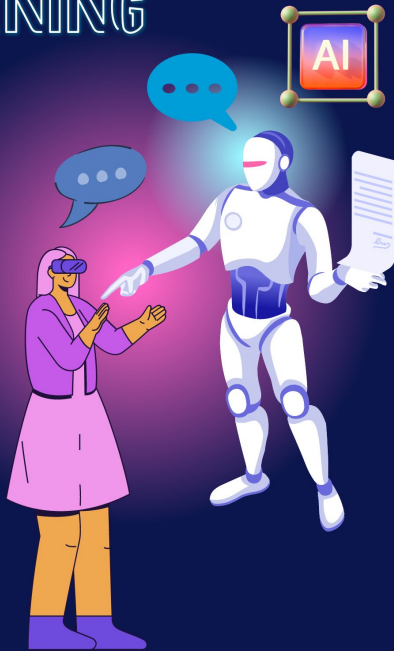
BY CRAIG FREHLICH

Imagine a classroom where every student receives personalized instruction from a teacher who never tires, adapts to individual learning styles, and is available 24/7. This isn't science fiction; it's the future of education, powered by AI avatars in virtual worlds. Welcome to a revolution in learning where the boundaries of time, space, and pedagogy are redefined.

In traditional classrooms, one teacher is responsible for the education of a diverse group of students, each with their own unique learning needs, styles, and paces. The teacher must divide their attention, often leaving some students feeling left behind while others are not sufficiently challenged. But what if we could level the playing field? What if every student could have a 'personal tutor' designed to meet their specific educational needs? That's where AI avatars in virtual worlds come into play.

Ai virtual avatars are no longer found in the realm of science fiction movies, they are now part of the landscape of many virtual world platforms

Here are 3 Ways AI Avatars are starting to disrupt learning:

1. Greater levels of student comfort in asking for help: Students may feel more at ease asking an AI tutor in a virtual world for help over a real teacher due to a range of factors. The anonymity and non-judgmental nature of AI can alleviate fears of ridicule or judgment, allowing students to ask questions freely. The absence of social pressure, immediate feedback, and 24/7 availability make AI tutors highly accessible and responsive. Additionally, the consistency and customization capabilities of AI can offer a tailored learning experience that adapts to individual needs. While not a replacement for human teachers, AI tutors can offer low-stakes and personalized educational support.

2. Reduce Teacher Workload: An AI tutor avatar in a virtual world could significantly alleviate teacher workload by automating various educational tasks. These include automated grading and immediate feedback, providing personalized learning paths for students, and being available 24/7 for student queries, thereby reducing the teacher's administrative burden and time spent on answering questions outside of class. The AI can also offer data-driven insights to inform teaching strategies, generate additional learning materials, and engage students in a way that minimizes classroom management issues. By handling these routine tasks, the AI allows teachers to focus on more complex and personalized aspects of education, such as fostering critical thinking and emotional support.

3. Role-Play agents for a variety of Situations- An AI tutor avatar with a persona in a virtual world can offer a unique and immersive way to role-play real-world situations, thereby enhancing the educational experience in several ways. For example, they might play historical figures like Abraham Lincoln or Marie Curie. Or, they could play a victim in a medical disaster scenario.

VIRTUAL WORLD WARS

CLOSED VIRTUAL WORLD **VS** **OPEN VIRTUAL WORLD**

	CLOSED VIRTUAL WORLD	OPEN VIRTUAL WORLD	
STRUCTURE	Direct supervision of learning outcomes and behaviour	Limited supervision of learning outcomes and behaviour.	**STRUCTURE**
SOCIAL AND EMOTIONAL DEVELOPMENT	High levels of guidance and support regarding social and emotional interactions and issues.	No social emotional help regarding the learning journey.	**SOCIAL AND EMOTIONAL DEVELOPMENT**
MONETIZATION	Students are not asked or encourage to buy things in the virtual world.	Students are encouraged and incentivize to buy products to improve their experience and look.	**MONETIZATION**
CONFLICT	Limted conflict because students are supervised and held accountable.	Users can potentially interact with untrusted users, including strangers and/or adults.	**CONFLICT**

By Craig Frehlich

As education increasingly embraces VR, the battle for student attention in the learning space is intensifying, and not just among traditional educational platforms. Gaming companies like Roblox, RecRoom and VRchat are emerging as unexpected competitors in this arena.

As an expert educator observing the trends in virtual learning spaces, it's fascinating to see how students are taking advantage of these platforms for educational purposes. However, there are several reasons why unsupervised experiences in these virtual worlds may be less effective compared to guided, traditional educational experiences. Here are some reasons:

1. Lack of Structured Learning-In traditional educational settings, the curriculum is designed to be sequential and structured to ensure that students gain a comprehensive understanding of the subject matter. In open-ended virtual worlds whereby the learning goal is not supervised by the teacher, students may adopt incorrect or incomplete understandings of topics.

2. Social and Emotional Development-Teachers play a significant role in the social and emotional development of students, including fostering a classroom culture and resolving conflicts. Unsupervised virtual environments may not provide the same level of emotional and social guidance.

3. Consumerism and Materialism-Constant exposure to in-game advertising and purchasing options may encourage a materialistic outlook, where the acquisition of virtual goods becomes a priority or status symbol among peers.

4. Conflict-Without adult supervision, children may be exposed to inappropriate content or interactions in virtual worlds. Teachers act as a safeguard against this, ensuring that the educational content and social interactions are appropriate and safe.

Both physical classrooms and educational virtual worlds should be supervised to ensure a safe, structured, and equitable learning environment. In the classroom, teachers provide real-time feedback, enforce safety measures, and offer a balanced curriculum while helping students develop social, emotional, and ethical competencies. These roles are equally crucial in virtual worlds to guard against risks like cyberbullying, exposure to inappropriate content, and educational inequities. Just as legal guidelines mandate supervision in physical educational settings, similar oversight should be considered essential for maintaining the quality and integrity of educational experiences in virtual worlds.

My recommendation is to focus on virtual world learning experiences that are carefully curated by educators who have been intimately involved in the classroom and learning process. Having educators in the same space as learners is key. Closed virtual world products like 🎉VirtoryXR, Imedu, Zoe, Edumetaverse, EngageVR, Kabuni and others that do not allow students to enter a space without educators being present or aware of who is going into the space are the gold standard.

Have you ever had to teach or explain something really difficult? Take driving for example. You can not teach the complex nuances of how to drive using just a textbook or lecture. We call this type of knowledge, Tacit Knowledge.

Tacit knowledge is a form of knowledge that is difficult to articulate, formalize, or share in a concrete way. It's often contrasted with "explicit knowledge," which can be easily documented, communicated, and taught. Tacit knowledge is deeply personal and rooted in individual experience, context, and intuition. It often involves skills, ideas, and experiences that one may not be consciously aware of. For example, the ability to read social cues in a negotiation, the craftsmanship skills like those possessed by a master carpenter, or the intuitive understanding of a complex system, all fall under the umbrella of tacit knowledge.

Teaching tacit knowledge is like trying to bottle intuition—it's an elusive wisdom that often defies explicit instruction.

It requires the skills of a magician or alchemist who prides themselves on the learning journey. The alchemical process is not just about the end result; the journey or the transformation is seen as equally important.

One essential tool the teacher alchemist has at their disposal to teach elusive and difficult tacit knowledge is Virtual Reality. Here are some examples of how VR can help teach various types of tacit knowledge:

1. Driving-Virtual reality allows learners to practice driving in a safe, controlled environment, free from the dangers and pressures of real-world driving. This can be particularly useful for beginners who are not yet ready to navigate actual streets. Furthermore, VR can simulate various driving conditions such as rain, snow, or heavy traffic, enabling learners to practice and adapt to different scenarios they may encounter on the road.

2. Medical Diagnosis-VR can create highly realistic patient scenarios where medical students can practice diagnosing a variety of conditions without any risk to actual patients. Virtual environments can provide immediate, detailed feedback on diagnostic choices, helping students understand the consequences of their decisions and improve their diagnostic skills iteratively.

3. Negotiation Tactics-In a VR setting, you can role-play with virtual characters programmed to emulate different negotiation styles and tactics. These characters can range from cooperative to confrontational, allowing the learner to practice different strategies.

4. Traditional Practices- (Ie. Farming) VR can emulate various weather conditions, soil types, and seasons, allowing farmers to practice making judgments under different scenarios, such as when to plant or harvest.

By simulating real-world scenarios and conditions, VR bridges the gap between theory and practice, helping learners internalize the intuitive skills that are difficult to teach through traditional methods.
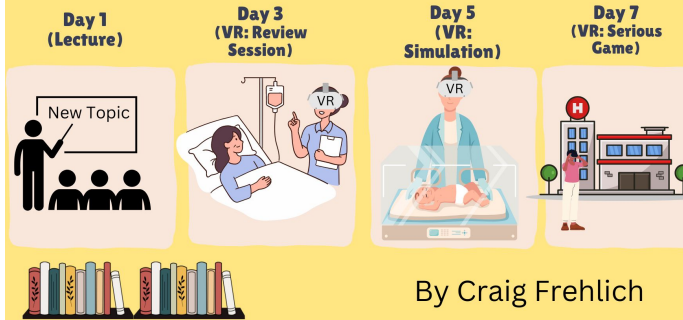
Do you go to church? I sometimes do. And I usually sit in the same spot every time.

Many humans love routine and continuity. Why is this?

The inclination towards continuity over variety arises from a confluence of multiple factors. Individuals naturally lean towards the comfort of the known and familiar. Additionally, opting for continuity demands less cognitive exertion compared to the perpetual pursuit of novelty. Venturing into uncharted territory introduces an element of uncertainty and potential risk. Furthermore, embracing continuity can foster heightened emotional bonds with specific experiences.

Choosing continuity over variety often holds true for teaching.

Take lesson design as an example.

We know from research that after teaching new content we should review that information over a period of time: spaced practice. Yet, it is not typical to see teachers deploy a variety of different strategies or tools to engage students in spaced practice. The common method in the schools I have seen is the dreaded worksheet.

Yet, differing the type of practice may lead to greater levels of interest and engagement.

For example, after delivering new content why not take students into a Virtual World to view information from a new perspective via an immersive review session, simulation and/or serious game?

Incorporating a range of active immersive learning retrieval practice methods in place of worksheets can create a more dynamic and effective learning environment, where students are actively involved, motivated, and better equipped to retain and apply their knowledge.
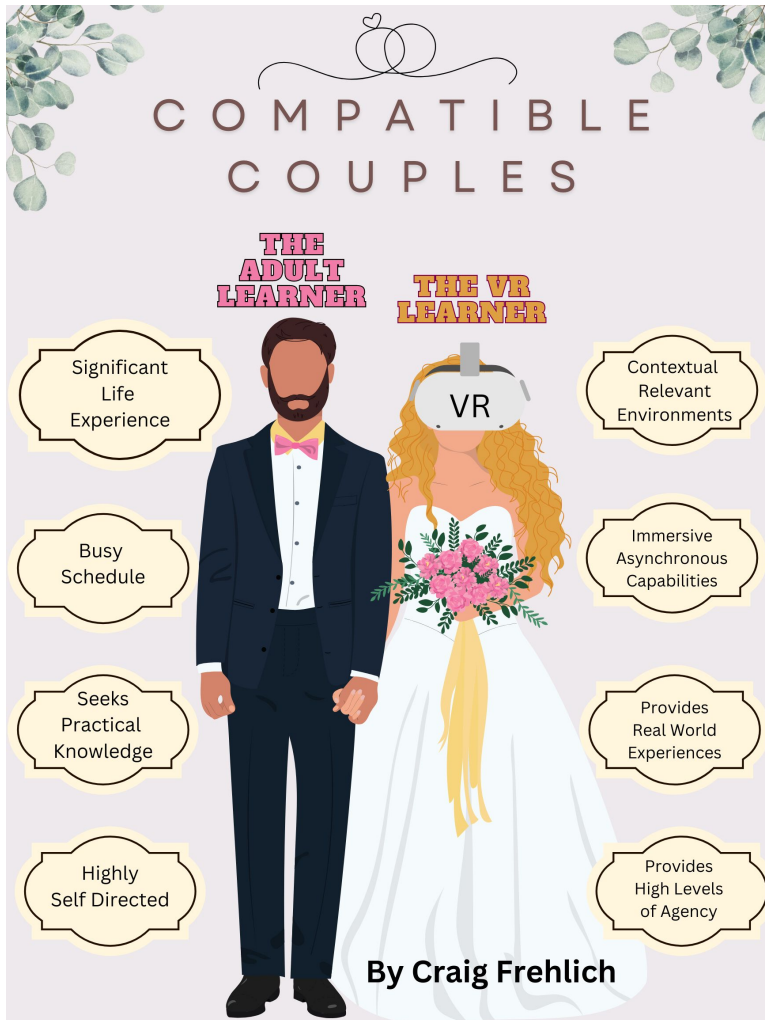
As an adult have you ever sat through a training session that was boring and highly ineffective?

Enduring unengaging training sessions composed of irrelevant lectures that offer minimal practicality to our everyday lives can be extremely painful and a significant misuse of our time.

Learning experiences should be catered to their audience. Although we may not have the opportunity to do a deep dive into the detailed characteristics that make up our target group of learners there are some general personalities that define many. Take adult learners as an example.

Andragogy is a theory of adult learning that was developed by educator Malcolm Knowles in the 1970s. It focuses on the unique characteristics and needs of adult learners and proposes principles for effective adult education. Andragogy is often contrasted with pedagogy, which refers to the teaching methods and approaches used with children.

Here are some common characteristics of Andragogy:

1. Adults bring a wealth of life experiences to the learning process.
2. Adult learners often have busy schedules due to work, family, and other commitments.
3. They thrive when they can apply what they are learning to real-world practical situations.
4. Adult learners are more self-directed and autonomous in their learning compared to children.

When we look at this list and think of what makes VR and Virtual World experiences so powerful, we can see huge connections and compatibility.
Andragogical principles seem to align well with virtual learning superpowers. To ensure that the design and delivery of education align with the unique needs, motivations, and preferences of adult learners, why not consider adding VR and Virtual Worlds to the learning journey?

This compatibility has the potential to create a strong learner-centred approach that promotes effective learning outcomes and a positive educational experience for adult learners.

TWO WAYS VR CAN BE USED TO IMPROVE LEARNING AND PERFORMANCE

VS

FLOODING   **SPACED OUT**

VS

SINGLE CONTEXT   **VARIED CONTEXT**

BY CRAIG FREHLICH

Still trying to convince others that VR or Virtual Worlds have a place in education? Is there research that provides valid and reliable data beyond a small localized sample size and is not survey-based?

These pivotal inquiries challenge many individuals when contemplating the utilization of immersive learning technologies like VR and virtual worlds.

Yet, rather than adopting a narrow perspective, why not broaden our outlook?

Let's contemplate this... There exist numerous established educational practices that have proven effective, and VR and Virtual Worlds could potentially contribute to reinforcing and elevating learning and performance related to these research-backed practices.

Here are two…..

1. Spaced Practice- If tasked with watering the lawn, which option would you choose? a) Water it extensively on the first day, running the sprinkler for several hours to saturate the area, and completing the task for the entire week. b) Water it every other day, spending shorter intervals of around 30 minutes each time, gradually using the hose to add small amounts.

While the second approach demands greater exertion, it is likely to result in a lusher, more vibrant, and healthier lawn.

The same is true for learning. Spacing out learning over time is a more effective learning strategy compared to trying to learn something all at once. Each time you retrieve information, you reinforce the neural connections associated with that information, making it easier to remember in the future. However, finding ways to space out the learning experiences so it is interesting and engaging can be difficult. Many educators begging and end with a lecture. Why not start with a lecture and expose students to a virtual world simulation or case study?

2. Varied Context- Varying the context of learning has been shown to be more effective than teaching and learning in a single context due to several cognitive and psychological factors. When context varies, learners must actively engage with the material to discern the appropriate approach for each context. Varying the context encourages learners to identify the underlying principles or patterns that link different concepts or skills which leads to deeper understanding. Many educators deliver learning experiences in the classroom setting. Why not start there and then take them on a virtual field trip to ….somewhere amazing!!

Virtual reality (VR) and virtual worlds offer educators an additional valuable asset to enhance their expanding collection of pedagogical tools. This resource aids teachers in crafting an engaging learning experience that incorporates captivating practice sessions that are spaced out over time and exposes learners to diverse contexts throughout their educational journey.

THE DELICATE BALANCE OF DESIGNING LEARNING EXPERIENCES

Content Depth		Time Contraints
Knowledge		Inquiry
Standardization		Personalization
Cognitive Load		Engagement
Ease of Use		Challenge
Beginner		Expert

By Craig Frehlich

Have you ever had to teach something? Easy right?

Find the information you need to deliver, review it, and deliver it!

Teaching and learning are far from being this BLACK AND WHITE.

There is a tug of war in regard to the many competing factors that determine an excellent learning journey. And, having a deep understanding of how to balance these factors is key!

In the world of education, contradictions can arise due to the complexity of the learning process and the various factors that need to be considered. Here are a few:

-Content Depth vs. Time Constraints: There is often a tension between covering in-depth content and the limited time available for instruction. Instructional designers must decide how much content to include without overwhelming learners or sacrificing depth and understanding.

-Knowledge vs Inquiry: Knowledge acts as a foundation for inquiry. Without a basic understanding of key concepts and principles, students may struggle to formulate meaningful questions or make informed judgments during the inquiry process. Moreover, inquiry-based learning encourages students to actively participate in the learning process by asking questions, exploring ideas, and seeking answers.

-Standardization vs. Personalization: Designing standardized learning experiences ensures consistency and ease of implementation, but it may not address individual learners' unique needs and preferences. Striking a balance between standardization and personalization is essential to accommodate diverse learners.

-Cognitive Load vs Engagement: Designers aim to create engaging learning experiences, but they must also be mindful of the cognitive load placed on learners. Too much complexity or multimedia elements can overwhelm learners and hinder comprehension.

-Ease of Use vs Challenge: When a learning experience is too easy, learners may become disengaged and lose interest. On the other hand, if it is excessively challenging, learners may feel overwhelmed and discouraged. Striking the right balance keeps learners engaged and motivated to continue learning.

-Beginner Learner vs Expert Learner: If the learning experience is too advanced for beginners, they may feel frustrated and discouraged. On the other hand, experts might become frustrated if the content is too rudimentary for their level of expertise.

Effective teachers seek to create cohesive and meaningful learning experiences by finding the right balance between these conflicting elements.

BOOSTER YOUR LEARNING

VR
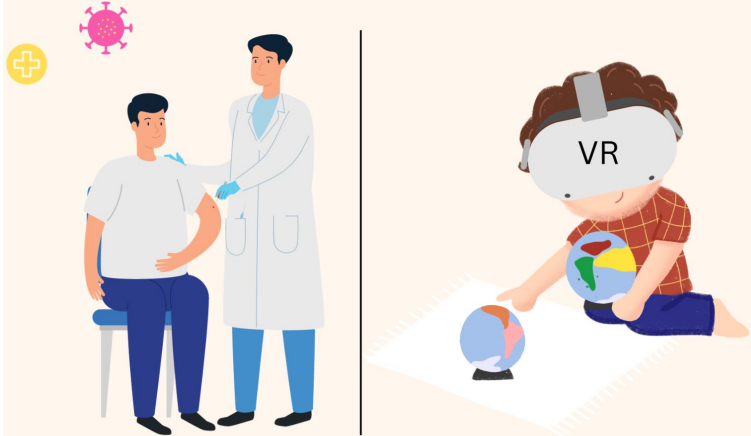
Increase relevance

Increase hands on experience

By Craig Frehlich

Do you remember the Covid Pandemic?

We were asked on several occasions to inject our bodies with vaccines that would help our immune system to protect us against the disease. But, why so many booster shots? Why does our immune system forget?

Unfortunately, our immune system contains cells that decline in numbers and forget over time what certain invaders look like so we need boosters to help improve our immune response.

This is true for learning.

Forgetting a huge chunk of what we learned, especially if it is new is not:

-Laziness
-ADHD
-Or some other learning disorder

It is a sign that the brain is working as it should. In short, our brain is wired to forget.

The brain only holds on to what is relevant, useful and interesting!!!!!

Thus, Virtual worlds and VR can play a huge role in this situation.

VR can provide relevant content by affording environments that are contextually appropriate

VR can provide hands-on experiences that are meaningful and engaging.

Providing learners with a "booster shot" that engages them in previous content from a new perspective will help them with the confidence, feedback and motivation needed to continue on the path toward life-long learning.

Building *Confidance* in Learning with VR

Allow repeated practice

Focus on more difficult learning without others watching

Provide real-world relevance

Make the experience active

VR

I am a Confident Learner
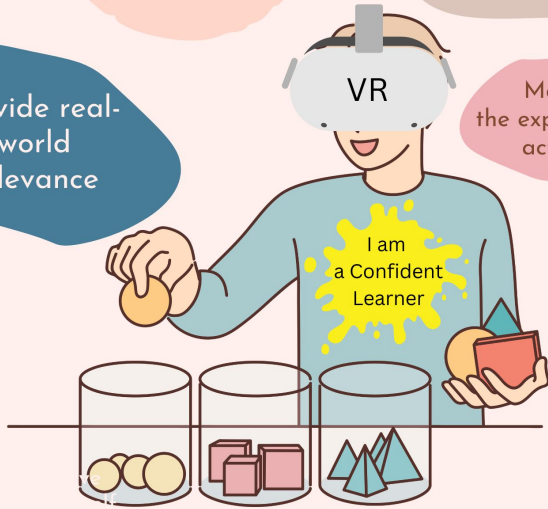
By Craig Frehlich

Have you ever watched a learner who lacked the self-esteem and self-confidence to continue the learning journey? Low self-confidence can have a significant impact on learning.

When someone lacks self-confidence, they may doubt their abilities and potential. This can lead to a decrease in motivation to learn and pursue new challenges. The fear of failure or not measuring up to expectations can make learning seem daunting and unattainable.

Low self-confidence can lead to negative thoughts and self-doubt, which can be distracting during learning activities. Instead of focusing on the subject matter at hand, individuals may focus on their perceived inadequacies or worry about what others might think of their performance.

As an educator passionate about empowering students, there is remarkable potential for Virtual Reality (VR) in building learner confidence. VR can revolutionize the learning experience. Here are four crucial elements that VR can provide to build learner confidence:

1) Repeated Practice: VR allows learners to engage in repetitive exercises, honing their skills and knowledge through practice, practice, and more practice! Repetition is key to mastering any subject, and with VR, learners can confidently immerse themselves in various scenarios until they feel fully competent.

2) Private Learning Spaces: The power of VR lies in its ability to create a safe and private environment for learners. By practicing concepts away from the judgmental eyes of others, learners can freely explore and experiment without fear of embarrassment. This promotes a positive and self-paced learning experience.

3) Real-life Context: Gone are the days of learning in abstract spaces! VR brings the real world into the classroom, providing learners with practical, real-life contexts to apply their knowledge. Whether it's simulating a scientific experiment or practicing public speaking in a virtual auditorium, learners build confidence by seeing the direct application of their skills in the world around them.

4) Active Learning: Learning should be a dynamic, engaging process! VR facilitates hands-on experiences that capture learners' attention and encourage active participation. Through interactive simulations and role-playing, learners can deepen their understanding while enjoying the thrill of learning by doing.

By incorporating Virtual Reality into educational practices, we empower learners to confidently step out of their comfort zones and embrace new challenges. The impact of building this self-assurance extends beyond the classroom, enabling learners to approach real-world situations with resilience and adaptability.

THE ASSEMBLY LINE OF LEARNING

Virtual Reality Learner

Learning Efficiency

Low — Medium — High

Distractions **1**

Ability to Signpost **2**

Rewards for Learning **3**
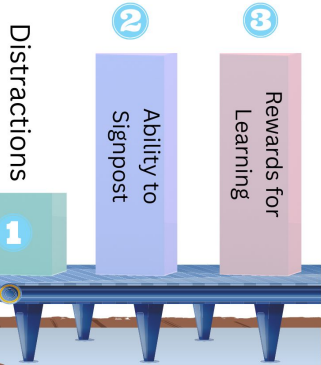
Traditional Learner

Learning Efficiency

Low — Medium — High

Distractions **1**

Ability to Signpost **2**

Ability to Provide Rewards for Learning **3**
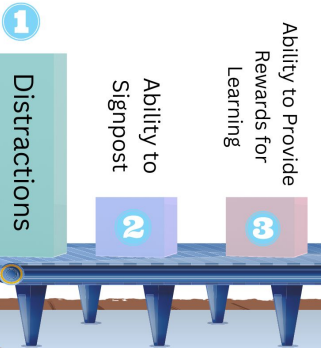
By Craig Frehlich

"I never teach my pupils, I only provide the conditions through which they might learn." (Albert Einstein)

Have you ever worked on an assembly line? This fast-paced and high-stress environment can sometimes be very challenging and demanding.

What about an assembly line of learning?

As teachers we want our students to enjoy the challenges of a learning journey and feel confident and engaged as they progress through an experience.

So how can we provide the conditions necessary for them to be efficient learners on the assembly line of learning?

Learning efficiency refers to how effectively and quickly an individual can acquire new knowledge or skills. It measures the rate at which learning occurs relative to the resources invested in the learning process. A higher learning efficiency means that a person can grasp and retain information more easily and can apply that knowledge effectively.

There have been statistics thrown around regarding the quantitative differences between learners in VR compared to traditional learning modalities like videos. For example, according to a study by PwC learners can be trained up to four times faster. Whilst I have my reservations regarding the validity and reliability of their data and study, I do have some thoughts and predictions about why VR might have the potential to be a valuable tool to improve learning efficiency. Here are three reasons why VR has to potential to increase learner efficiency:

1. Distractions-VR can reduce the number of distractions because the HMD blocks out most of the unwanted visual "noise" around us. When learners put on a VR headset, they are transported to a virtual world that is specifically designed to align with the learning objectives. This immersive experience can help students stay focused and reduce the likelihood of external distractions.

2. The Use of Visual Cues or Signposts- Visual cues or signposts are visual elements that provide guidance, direction, or information to aid in understanding and processing information. Common examples of these in education are arrows and numbers. They help learners associate new information with existing knowledge and can make learning more engaging and interactive. Learners are more likely to pay attention and stay focused when the content. In VR, the strategic use of these elements is much more prevalent than in traditional learning.

3. The rewards associated with learning- Rewards associated with learning can be both intrinsic and extrinsic. Intrinsic rewards come from the enjoyment of learning itself, while extrinsic rewards are external incentives that encourage and reinforce the learning process. In VR we can heighten the intrinsic motivation by providing emotional experiences that spark awe, wonder, curiosity and exploration. Moreover, we can design learning experiences that provide instant extrinsic feedback in the form of audio and visual cues when a learner has successfully performed a learning engagement.

WORKED EXAMPLES

In Virtual Worlds

Sarah is a 30-year-old pregnant woman who is in active labor. She is currently in the second stage of labor and experiencing strong contractions. Sarah wants to explore different birthing positions to alleviate the intensity of her contractions and facilitate the birthing process. As her nurse, you need to assess the situation and recommend appropriate birthing positions for Sarah.

1 Use a Case study

Helen

2 Invite Learns to Make A Decision

BENEFITS

Reduces Cognitive Load

Scaffolds the Learning

Supports Error Identification

Helps Transfer Learning

Promotes Expertise Development

How are you using virtual worlds to enhance your teaching and learning? One common example is scavenger hunts and virtual museums. Whilst these are great ways to start your journey into adopting virtual worlds into your curriculum, I want to present another creative way to use virtual worlds in this article.

Research supports many effective teaching strategies, which can assist learners in transcending the monotonous and unstimulating pattern of merely attending lectures and undergoing testing routines. According to (Neelen and Kirschner), worked examples are one such strategy.

Worked examples are teaching tools that provide step-by-step demonstrations or solutions to problems or tasks. They are carefully designed to guide learners through the process and help them understand the underlying concepts and strategies employed by experts in a particular domain.

Worked examples are an effective teaching strategy for several reasons:

1. Cognitive Load Reduction: By presenting the solution in a structured and organized manner, learners can focus their attention on understanding the problem-solving process rather than struggling with the mechanics or details.

2. Scaffolding Learning: They offer a clear and structured model that learners can follow, breaking down complex tasks into manageable steps. This scaffolding helps learners gradually develop their skills and understanding, building a foundation for independent problem-solving.

3. Error Identification and Correction: By analyzing worked examples, learners can compare their own problem-solving attempts with the correct solution. This allows them to identify and understand their mistakes, misconceptions, or gaps in knowledge.

4. Transfer of Learning: By exposing learners to various examples that illustrate different problem-solving scenarios, they develop the ability to apply their knowledge and skills to new and unfamiliar situations.

5. Expertise Development: Studying worked examples allows learners to observe and internalize the thinking patterns and strategies employed by experts in the field. By repeatedly engaging with well-designed examples, learners can develop their expertise, acquire problem-solving heuristics, and develop a more nuanced understanding of the subject matter.

Virtual worlds can be an excellent medium to expose learners to worked examples.

Case studies, which are a type of worked example, can be presented to a learner inside a virtual world exposing the participant to a real-life situation in 3D. The learner must then analyze the situation and come up with a decision.

Having a coach or instructor follow up on the outcome and process is a key element in the learning experience. This might be facilitated through video or face-to-face discussion.

Neelen, Mirjam, and Paul A. Kirschner. Evidence-Informed Learning Design: Creating Training to Improve Performance. P 210-213. 2020.

3 Ways to Move VR Beyond DELIVERY

1. Coach/Content Mentor
2. Goals or Learning Outcomes
3. Feedback on the Journey

LEARNING

Knowledge/Content

VR Trucking
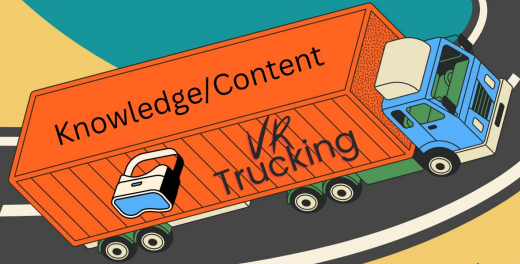
By Craig Frehlich

Have you ever sat through a training video wishing there was a button to fast-forward or skip the information or content?

Many multimedia presentations like videos still seem to miss the mark when it comes to capturing student interest and engagement. Why is this the case?

These mediums are merely delivery trucks or tools that are charged to carry/deliver the content/information to the learner. They need to be dependent on many other factors. These trucks need to know where they are going, have a competent driver and give feedback to others on the journey.

Virtual reality and virtual worlds are no exception, they serve as tools or mediums for delivering/transporting knowledge and content. To ensure an effective learning experience with any technological device, it is essential to possess a profound understanding of learning design and instructional practices.

We need to curate our content to guarantee the student is provided with learning experiences grounded in research based on learning science.

To that end, make certain learning experiences are highly effective by:

1. A Stellar Driver- Supporting the learning with an avatar guide or "content coach"
2. Key Sign Posts- Providing a clear direction through learning outcomes
3. Important Signals/Lights- Provide timely feedback on their thinking and choices.

It's time to revolutionize the way we learn and make it an exciting journey of discovery and growth. Well-designed virtual experiences are key to this journey.

If you are looking at adopting VR and virtual worlds in your classroom make sure you take the time to keep the truck on the road and headed in the right direction. Let me know if you need driving lessons.

DEALING WITH DIVERSE LEARNERS IN IMMERSIVE WORLDS

Type of Learner	Strategy
SCHOLAR →	ENRICH WITH EASTER EGGS
STROLLER →	HEIGHTEN CURIOUSITY WITH ANIMATION
STREAKER →	SLOW THEM DOWN WITH BUTTONS
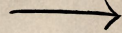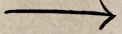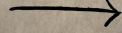
Have you ever been to a Museum? How did you move about and explore the content and space?

In a world where haste and impatience often dominate, museum curators invite you to slow down, take a breath, and embrace the beauty of immersing yourself in the extraordinary tales that lie within. We want museums to be an extraordinary journey that transcends the realms of time and space.

I have been to some museums whereby I could have stayed until they kicked me out. Alas, there were some museum memories that made me feel like I wasted my money because I was in and out in record time.

Margaret Kerrison's book "Immersive Story Telling For Real and Imagined worlds" talks about three types of people who visit museums and other immersive spaces.

1. The Scholar- is totally engrossed in the experience and usually stays the longest. They are not only familiar with the content of the experience they are passionate about it.

2. The Stoller- is mildly interested in the content and will spend a few minutes at various spots or stations within the exhibit. They usually move from one thing to another based on what interests them. They will often "pick" or graze on information out of a sense of duty. They pay enough attention as long as it holds their interest.

3. The Streaker- move quickly through stations and exhibits and gather short quick impressions about the place and space. They have short attention spans and have a difficult time getting influenced by the information.

Do these categories sound vaguely familiar? If you work in education you have probably related to these 3 groups of learners. When it comes to designing immersive learning experiences in virtual worlds, we want our learners to get the most out of the environments and subsequently the learning journeys we provide.

So how can we support the Scholars, Strollers and Streakers? Whilst there are a plethora of ways to differentiate and support these types of learners in our virtual worlds. Here are three ways I have found to be effective in order to make learning more impactful for these 3 groups:

1. For Scholars- give them a more enriching experience by challenging them with hidden bits of information within the Virtual World in the form of "easter eggs".

2. For Strollers- we need to give them extra help finding meaning in the experiences. So providing 3D objects that are enhanced through animations may provide them with that extra jolt of curiosity.

3. For the Streakers- this group needs help slowing down and taking the time to reflect and ruminate on content. In the virtual world, providing podiums with buttons to push based on questions we ask them and then giving them immediate feedback in the form of a sound ("ding" for correct) when a button is triggered will not only slow them down but give them a hit of dopamine to keep them engaged.

Teaching and Learning in Virtual Worlds

The VR Learning Lobby-

When designing a VR learning experience consider developing a general space for all your learning experiences similar to an entrance or lobby to a building or hotel. I call it a "Learning Lobby".

The learning lobby might have:

1) General Onboarding- These might be key introductions, setting the backstory to the learning engagement or establishing general learning outcomes.

2) Company Branding- A space to add your logo, mission, vision, company motto or slogan.

3) Introduction to Learning Assets- show the learning assets on a table or shelf ahead of the learning experience can spark curiosity and wonder.

4) Ask the User How They Are Feeling- gathering emotional data before and then after the learning experience can give the instructor and learning designer key attitudinal metrics.

The VR Omelette

Teaching and Learning in Virtual Worlds

The VR Omelette

I often get asked how one might implement VR into their instructional design practices.

Knowing when to take the time to use and design VR experiences depends on several factors.

Using the analogy of an omelette might help make this clear.

We know the foundation of an omelette is eggs. Similarly, the foundation of using VR is to enhance the interactivity and engagement of the learning material.

Additionally, we may have different types of omelettes (cheese, onion, ham, mushroom etc.) depending on the needs and desires of our customers. And, for VR we might have targeted instructional practices that work extremely well in immersive virtual reality spaces, some of these might be scenarios, gamification, creation and procedural learning.

However, seldom would we have someone order a strawberry omelette, it just doesn't work well with eggs. Furthermore, we would rarely want to use lecture methods as an instructional practice for VR.

DESIGNING AN AUTHENTIC VR LEARNING EXPERIENCE

An Example.........

When will rising temperatures prevent us from feeding our community?

1. Context

Farming and food production as a result of climate change

2. Challenge

When will rising global temperatures cause crop yield to prevent us from feeding our communities?

3. Activities

Observing, calculating, and predicting crop yield percentages as global temperatures rise over the years.

What can farmers do to increase seed viability as a result of warming temeratures?

Teaching and Learning in Virtual Worlds

I often have deep conversations with people regarding what the best use-cases are for using VR in education.

Whilst there are many, solving authentic real-world challenges is one of the most powerful use-cases for any learning journey.

Instructional designers need to be careful to ensure they:

1. Start with a compelling context.

2. Give the learner a real world challenge or problem to solve.

3. Scaffold the learning activities inside VR to ensure learners have the tasks necessary to lead them toward a successful solution.

One example of this might be to have learners consider the issue of climate change and how it is tied to food production. In the recent world climate talks many countries around the world were hoping to slow the rate of global warming to 1.5 degrees celsius. This could be the basis for an enduring VR experience. Check out my poster for more details.

Prisms of Reality developed, Pandemic, https://lnkd.in/gA_wpfAZ, which is another good example of a well-designed VR learning experience. They ground the learning in an interesting context (ie. The Pandemic) and they design the learning journey around an authentic problem (ie. When will our hospitals become over capacity?). Kudos to Anurupa Ganguly and her team for providing such a powerful and satisfying learning experience worthy of doing a VR headset

Recipe for Maintaining A VR Program in Schools

Soft Skills Training

Micro-lessons in Low-code Virtual Worlds

Simulation experiences

Wellness experiences

Serious Games

Other

Sustainability

by Craig Frehlich

Tips for Teaching and Learning With Virtual Worlds

Maintaining an educational program that uses VR as a tool to enhance teaching and learning isn't easy. One concern is sustainability. Once a school has purchased headsets and curated/purchased some fantastic applications, how do we continue to keep the program moving forward? As many people say in the VR world, "Content is key".

Having access to a variety of content that aligns well to the curriculum will provide options for teachers and students to differentiate and personalized learning experiences. Relying solely on vendor produced content may not be the answer. This strategy can prove to be very costly and often the vendors may not be able to keep up with producing the content necessary for your growth plans.

Think of content like a recipe for baking a cake.

1. Mostly Flour (Micro-lessons)

2. A few Eggs (Simulations)

3. A small amount of Butter (Soft Skills)

4. A pinch of Salt (Serious Games)

5. A tablespoon of Sugar (Wellness experiences)

6. Sprinkles (Other)

Have an approach to your educational VR content which relies heavily on micro-lessons and some vendor content will position your school toward a path of sustainability. The micro-lessons can be produced using low-code or no-code platforms like EngageVR or FrameVR. Because the teacher or instructors are usually intimately involved in helping design the micro-lessons there may be greater agency and therefore buy-in by teachers regarding the use of VR.

INTERDISCIPLINARY VIRTUAL WORLDS

The Virtual Grocery Store

- Sustainability- minimizing food waste
- Design-Symbols and Images
- Science- nutritional values of products
- Math- best value per unit
- Entrepreneurship- where to place products
- Psychology- impulse buying

Teaching and Learning using 3D Virtual Worlds

The number of companies starting to build platforms that offer 3D virtual worlds to enhance curriculum is growing.

As a consultant, I get many questions and opportunities to help teachers navigate these spaces and align them to their school learning outcomes.

Since teachers are so busy, they tend to value templates that invite them to revamp or adapt existing virtual worlds.

So what are some important characteristics of immersive virtual worlds that will enable practitioners to use them on an ongoing basis?

Ensuring the space provides a strong contextual backdrop for the learning experience and having the ability to use 3D assets to learn activity are two key elements.

Another key factor might be how "Interdisciplinary" is the 3D virtual space. Being able to connect the learning to a variety of subjects and disciplines will make the 3D space more usable and desirable.

For example, a 3D virtual grocery store has huge potential. There is so much that can be taught in this versatile real world context.   Have a look at my graphic to see how a virtual 3D grocery store might connect to a variety of concepts and disciplines.
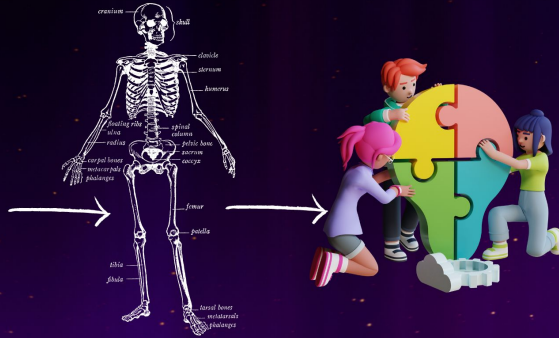
I have been reading and ruminating a lot over an interesting book by Richard Mayer called "Multimedia Learning". See citation in the image.

Whilst I do not agree with everyone he claims in his book, here are two big takeaways so far......

1. Do 2d images combined with text improve learning compared to text alone?

According to Richard Mayer in his "Book Multimedia Learning" this was a resounding "YES". He went on to say that educators who are relying on text alone in their instruction should consider ways to incorporate graphics into their lessons.

2. Do high-immersive 3D environments (inside HMD) make learning better compared to low-immersive 3D environments (on the computer)?

According to Richard Mayer in his "Book Multimedia Learning" people do not necessarily learn better with high-immersive media than with low-immersive media and states that there is no strong rationale to call for large-scale conversion of multimedia lessons from delivery on 3D computer screen to delivery in 3D immersive virtual reality.

There are large caveats within his book on the immersive learning claim. One relates to the fact a lot of the research he reviewed and conducted on immersive VR focused on short term studies. Moreover, subjects involved in research where unfamiliar with immersive virtual reality so more research was needed with learners who are comfortable with this medium. Richard did find that Immersive 3D environments caused greater motivation amongst learners.
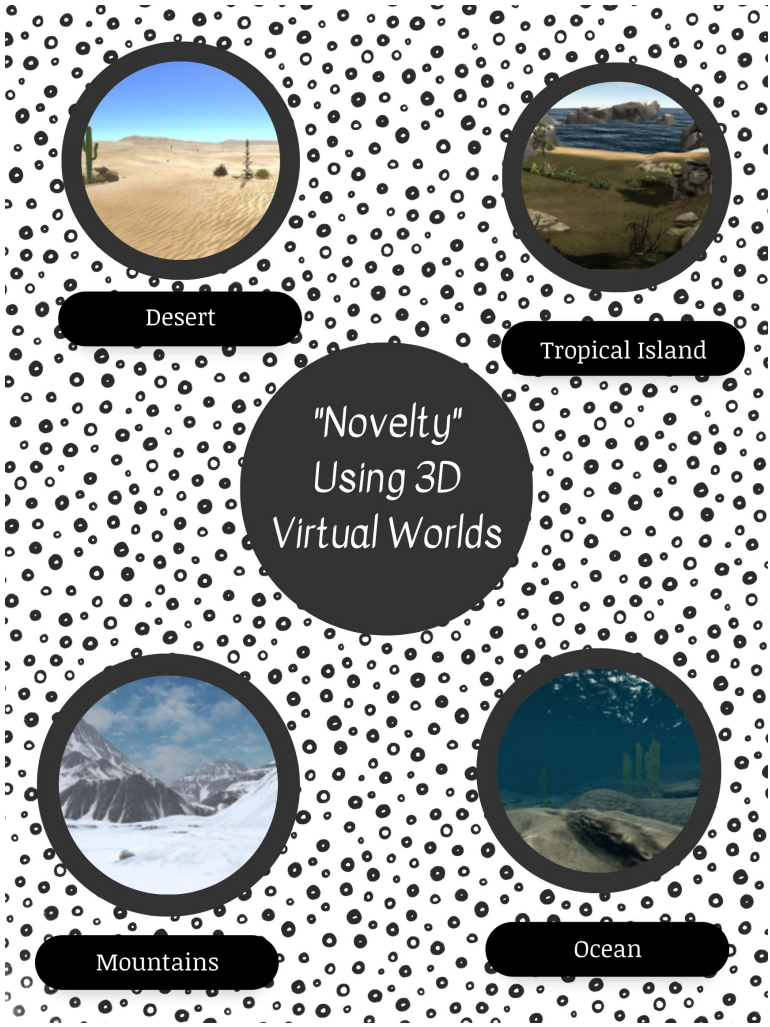
Teaching in 3D Virtual Worlds

Having the ability to vary and adapt the learning environment in which we teach and practice concepts is one of the superpowers of using Virtual Worlds to engage students in learning outcomes. Why?

One reason is Novelty.

Novelty is one of the primary ingredients for keeping the brain agile and responsive. Each time you undertake a new activity, learn a new skill or dive into a new situation, this leads to moderate levels of stress and improved memory. (Horvath PhD MEd, Jared Cooney . Stop Talking, Start Influencing: 12 Insights From Brain Science to Make Your Message Stick (p. 255).)

For example, if we are teaching biotic and abiotic factors of ecosystems. We might take students into four different environments (Desert, Mountains, Ocean, and Tropical Island) to get them to practice identifying these key features within ecosystems.

Using Virtual Worlds to Increase Perspective Taking With the Help of AI Avatars

When we grow in our abilities to understand people and situations from various perspectives, we cultivate greater critical thinking skills.

Since the unleashing of ChatGPT3, developers have found new ways of incorporating more advanced AI tools into avatars. It is now much easier to make a NPC (non-player character) more interactive thanks to recent developments.

This is good news for teachers and instructors who use low-code or no-code platforms to enhance their curriculum using virtual worlds. Some no-code platforms are offering NPC/Avatars with Chat GTP-like capabilities. For example, EngageVR will be releasing "Athena". Athena will be an AI powered virtual employee prototype capable of interacting to voice inside virtual worlds. This will open up a number of instructional scenarios for teachers and instructors:

1. More Compelling and Customized Case Studies- instead of relying solely on vendor scenarios, instructional designers will be able to more easily customize the learning scenario to meet the exact curriculum aligned needs of the school or institution and personalize the learning at a high level.

2. Enhanced Story-telling Capabilities- good lesson design is about telling a dynamic story. Interesting lessons are built on mystery and curiosity and draws the learning into a situation that deserves full attention. Doing this will be much easier when we can assign avatars specific personas and enable them to be more than just static/passive participants in no-code and low code virtual worlds.

These are exciting times on the horizon for teachers and instructors to make learning fun and impactful. Moreover, giving teachers the ability to connect learning experiences with AI avatars (without the help of a Unity developer or programer) will afford students many opportunities to build mean-making skills that link directly to their existing curriculum.

Teaching in Virtual Worlds

Best Practices

When a learner might otherwise be tempted to focus on extraneous material in a virtual world lesson, here are two strategies to help keep the learner engaged on the intended outcomes and lower their cognitive load:

1) Graphic Organizers- a powerful visual learning tool that uses words and symbols to help organize the lesson for a learner, much like a map.

2) Signaling- using visual cues like arrows, letters and numbers can cue and guide the learner's attention and reduce their cognitive processing.

Teaching and Learning in Virtual Worlds

Story matters when it comes to connecting learners to content. The power of storytelling can help us engage in concepts and develop an emotional connection. This connection can motivate learners to devote time and energy to the journey. It is part of an intimate process called "neural coupling" and it drives a resonance between the content and the learner. Having the ability to use virtual worlds to recreate the narrative or story can be a powerful way to start the learning process.

There are several types of narratives that can be used to prime learners for the content ahead. Here are three:

1) A personal Event- take learners into a story that is connected to your life. This might be an emotionally charged event or something that gives you deep connection to the learning outcomes.

2) A Historical Event- tell learners how the procedure or product you are selling was discovered or evolved over time.

3) A Controversial Event- tell learners how the product might be polarizing right now in society and what that struggle is all about.

Pause, Predict and Ponder
Using 3D
Immersive Worlds

The Ocean
Before a Disaster

The Ocean
After a Disaster

A Farm
After a Disaster

A Farm
Before a Disaster

Teaching and Learning in Virtual Worlds

3D Virtual Worlds as Time Machines

Some of my favorite movies are the ones that start in the future and you have to unravel the plot and story by visiting pieces of the past.

This "back to the future" approach leaves the viewer engaged in the plot because their brain is actively trying to pause, predict and ponder.

Pause, predict and ponder can be a great instructional strategy for teachers. Predicting forces our brain to invest in the learning journey and often triggers an emotional connection. When we are asked to pause and predict, we become curious regarding the outcome.

The use of 3D virtual worlds can help set the stage for a pause, predict and ponder situation.

Highly immersive worlds can be designed to represent a circumstance or event in the future like a disaster and learners can view this world in order to pause and make predictions; How and why did this happen? What questions should we ask?

Then, after much discussion and rumination, students can be taken to a virtual world that might represent the past to help them understand the circumstances that have led to the event.

ACTIVE IMMERSIVE LEARNING
"SHAKE THE TREE"

Passive Learning VS **Active Learning**

Content

Concepts

Content

Concepts
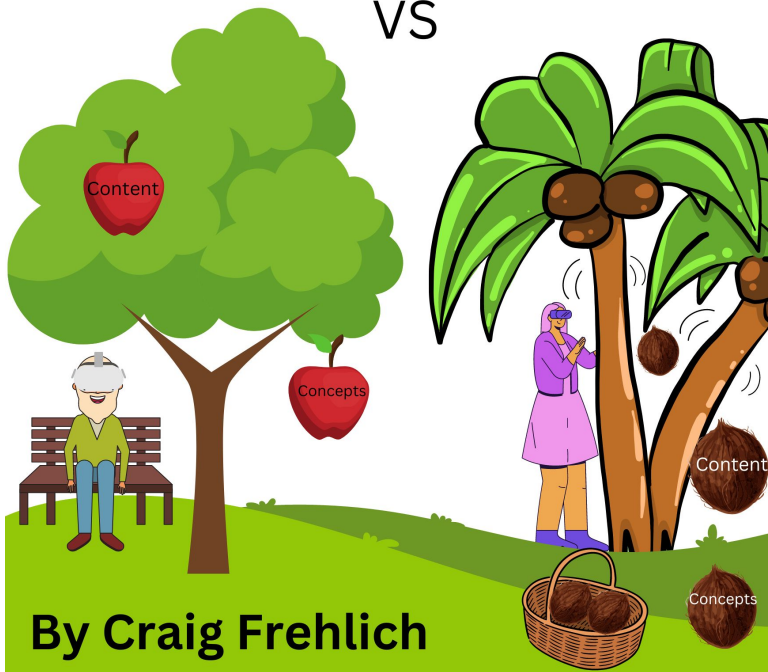
By Craig Frehlich

Legend has it that a young Isaac Newton was sitting under an apple tree when he was bonked on the head by a falling piece of fruit, a 17th-century "aha moment" that prompted him to suddenly come up with his law of gravity.

Although history does not give an exact time on how long poor Isaac sat there patiently waiting, watching, and hoping something amazing was going to happen to elicit this incredible learning moment, I doubt today's learners would have the same tenacity, reliance and fortitude.

We need to invite them to get up and "shake the tree". We should be asking our students to take ownership and agency over the learning experience by getting closer and more personal with the content and concepts that are part of the lesson and the learning outcomes.

When we design immersive learning experiences, we want to instill curiosity, wonder, and awe. And, this will happen more readily if we invite learners to engage in a learning content. Getting students to pay attention and participate in what is key and important in a lesson is easier done through active "hands-on" engagement.

In virtual worlds this can be accomplished by staging your virtual environment with 3D models that invite students not just to "look" or "observe" but to lean forward and participate by sorting, ordering or critiquing the environment. We should be placing objects in areas that require them to "fix" a situation or move and sort to make better sense of the contextual problem they are trying to understand.

VR'S TIME TO SHINE

By Craig Frehlich
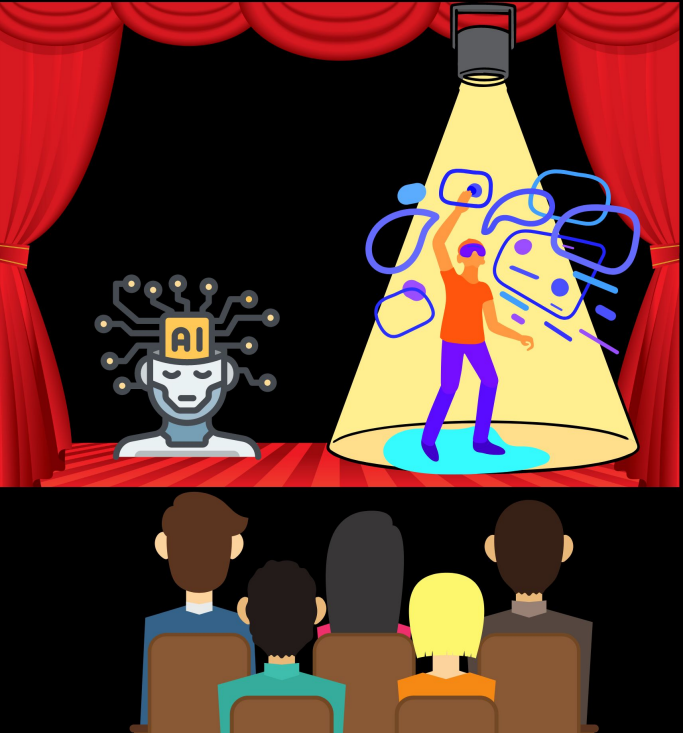
Teaching In Virtual Worlds

Is this the push VR and Virtual Worlds needed for greater mass adoption in education?

The discourse and concern around the use of Chat GPT in education over the last few weeks has been massive. Block it! Bann it! And/Or, make it create some sort of Watermark that we can track and filter! These are all predictable reactions to new technology.

It is an emotional roller coaster for many busy teachers. Teaching is hard and many educators have established amazing assignments and assessments which embrace current curriculum outcomes, and now they have to reinvent the wheel, not next year, but right away! Impossible!

I believe instructors will adjust and revamp what they ask their students to produce as evidence of learning beyond a simple essay, but this will take time.

Now is the time to start pushing curriculum outcomes in a different direction that focuses on experiential learning.

What might this look like?

Enter the virtual world experience. We know that ChatGPT does not do well with personal responses. So one adaptation to existing assessments and assignments is to use experiential learning experiences inside a virtual world to act as a catapult to new perspectives and assessments.

Virtual worlds can be customized and tailored to allow for personalized responses to learning experiences. So, creating a virtual world that is an adaptation of a chapter in the famous novel, Lord of the Flies and asking the student to enter the world and provide an in-depth personal reflection of this experience is not something ChatGTP will be able to churn out. Moreover, designing a virtual field trip to a highly customized underwater adventure whereby the learner needs to reflect on and write about what was accurate, inaccurate and challenging about the experiences is not easy for Chat GPT.

David Kolb published a lot of work about the experiential learning cycle. In his work he emphasized the need to discover new things through experience, reflecting on this journey and conceptualizing this information. I think we can draw on his work and use virtual world experiences to draft new ways to assess students' understanding of curriculum.

Immersive Learning
"Get your learner's off the bus"

Learning in The Classroom

Compliance

Limited Context

By Craig Frehlich

Learning in Virtual Worlds

Agency

Contextualized

Authentic

Get your learners off the bus!

Students in classrooms and lecture halls filled with desks in neat tidy rows often feel compliance and even disengagement in the industrial model of education.

This might be akin to taking students on a field trip and never letting them off the bus!

Is it time to get them off the bus and onto a more active learning journey using immersive learning in virtual worlds?

Using virtual worlds to enhance curriculum and instruction can improve student learning experiences by:

1. Increasing Agency- giving them greater control and agency over their learning means they can make more choices and decisions regarding the learning landscape.

2. Greater Context and Authenticity- learning is "stickier" when we are able to connect learning outcomes to real-life situations and environments.

The traditional model may be more efficient and scalable for the teacher, but is it what is best for student engagement and motivation?

Cooking up A VR Experince

Learning Outcomes and Food

In Virtual Reality	In the Kitchen
Learning Outcomes- What do we want them to understand? Skills, concepts, facts?	Ingredients- What will you make? Soup, salad, casorol?
Environment/Context- What is the storyline? Is it linear or open-ended discovery?	Pots and Pans-What will you cook your ingredients in? Frying pan, pot, double broiler?
Controllers- What do your hands look like and do? Gloves, wands, grab, create?	Utensils- How will you interact with your ingredients? Spatula, ladel, spoon?
Audio Cues and Haptics- What will you use to increase engagement and immersion?	Seasoning and Spices- How will you make your food "pop"?
Avatars- What will the identity of your user be like? Pilot,	Chef or Cook-What will your identity be like in the kitchen?

Teaching and Learning in Virtual Worlds

From the kitchen to the VR space. "Cooking up" a quality VR experience is akin to slaving away in the kitchen to make an amazing meal.

There is so much to consider when designing an educational VR experience. It is like being a chef in a kitchen. Where do you start? What will you make? It is no wonder so many people like to order in or eat out.

VR content developers who program in unity and unreal engine can't do it on their own. It is crucial that experienced instructional designers are part of the conversation when developing educational VR applications. #vrineducation
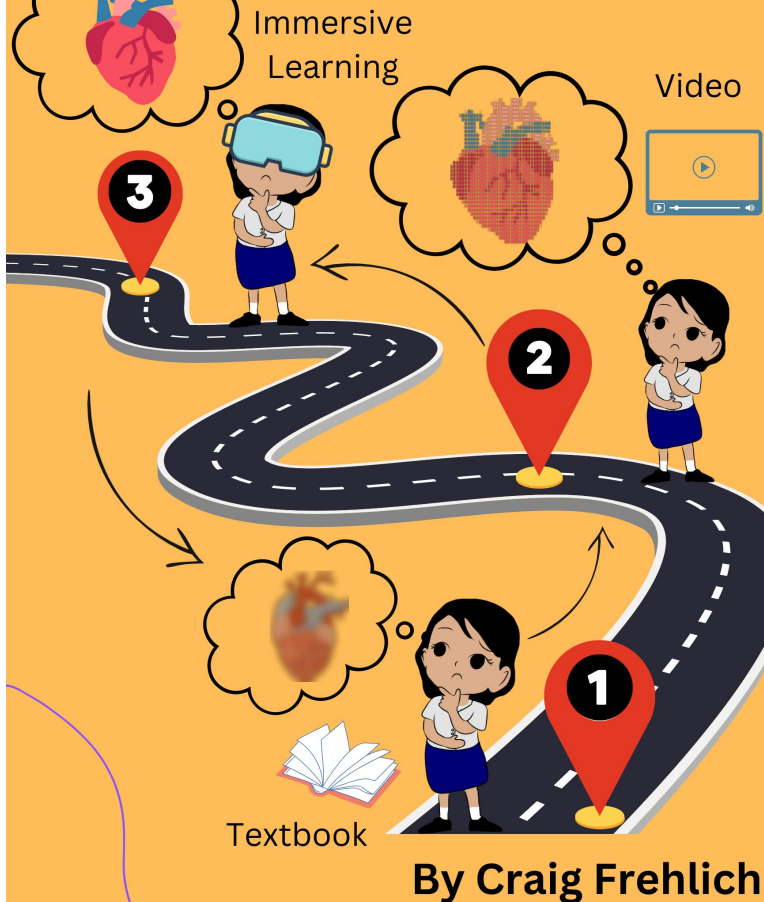
Teaching Tips with Immersive Learning

How do we become an expert and develop a deep and clear understanding of content such that we are able to transfer knowledge and understanding to new and novel situations?

In short, repetition resilience and hard work thanks to the help of using a diversity of learning modalities.

Using virtual worlds and VR should not be thought of as a complete substitute for the variety of ways content is delivered to students in order to be an expert at learning outcomes.

The adoption of immersive learning tools like VR and virtual worlds is meant to complement a plethora of other teaching strategies and content delivery methods.

Learning to be an expert at anything is a journey. When the learner is a novice they might start with a lecture or textbook to develop a basic understanding and key vocabulary. Then, the learner might use video to understand more examples and strengthen thought processes. Additionally, the learner might use immersive learning like VR and virtual worlds to build and develop deeper conceptual understandings or be exposed to experiential retrieval practices.

By no means is this learning journey meant to be linear. As students are exposed to a variety of these experiences they might go back and forth to revisit misunderstandings and strengthen areas that do not make sense.
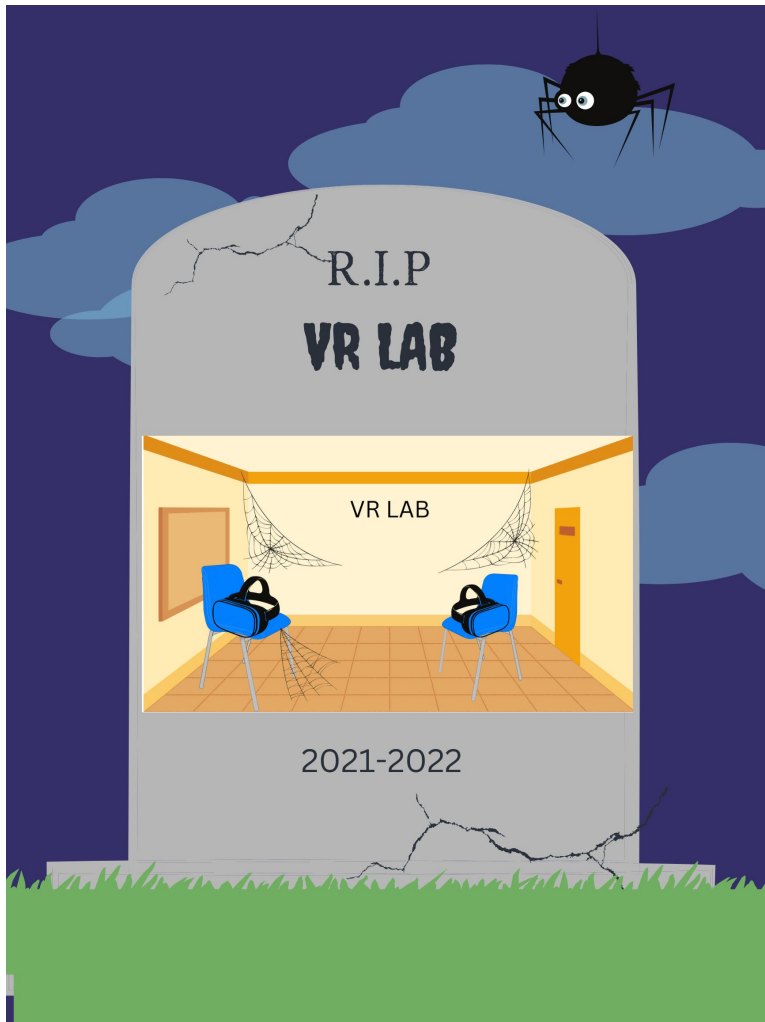
How to Prevent Your VR Space From Dying a Quick Death

When a VR lab is first set up at a school or educational setting, there is usually a lot of hype and excitement regarding the new tool. In some cases, a champion in the school introduces a few powerful apps to educators who are early adopters and risk takers.

But, the challenge is how do we make these immersive tools sustainable and an integral part of the learning landscape beyond the initial "honeymoon period"?

Here are a few strategies I have learnt over the years:

1. Work closely with instructors and educators on how to integrate Virtual Worlds that connect to bigger concepts within their curriculum.

2. Refrain from "type-casting" the VR lab and headsets to just one department or section within your school.

3. Scale up professional development that teaches educators how to use and build no-code virtual worlds and experiences and how to connect these to learning outcomes.

4. Develop a "learning in 3D" academic policy that outlines the mission and vision around how , when and why VR can enhance learning.
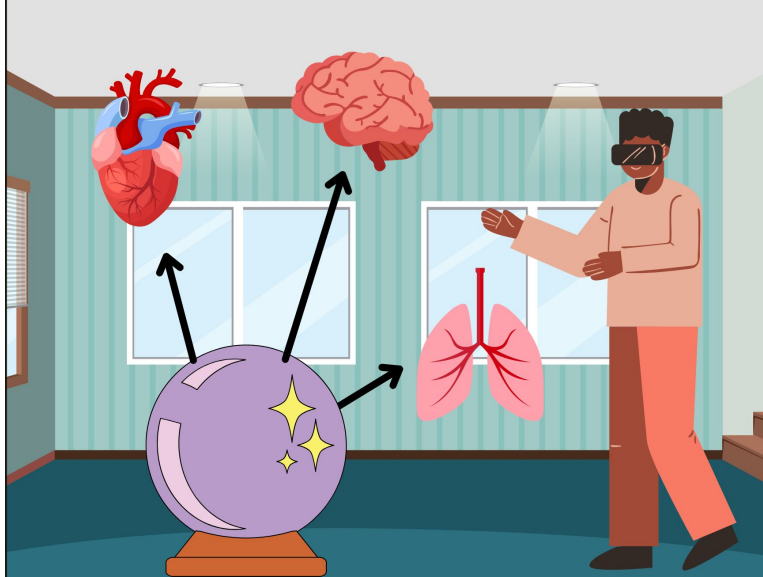
Teaching Tips in Virtual Worlds

One key way to get students to engage in a lesson is to get them "hooked" at the start of the lesson. Developing a strong sense of curiosity through mystery is a wonderful teaching strategy instructors might deploy to do this.

In virtual worlds, this might be accomplished through a technique dubbed "The Crystal Ball". This technique challenges students to look inside the "crystal ball" and pull out 3D objects or artifacts that are essential to the upcoming lesson. Once the students have revealed the artifact they can make predictions as to how the item or items might play a key role in the content of the lesson. As more and more objects are revealed students might be asked to refine their predictions.

Tips for Teaching and Learning in Virtual Worlds

Unnecessary features introduced by virtual world environments may hinder learning. There is a rule developed by researchers like Richard Mayer called the Coherence Principle of Multimedia, which states that people learn better when extraneous words, sounds and pictures are excluded from the student learning environment to avoid distraction.

Easier said than done in a Virtual World.

Immersive virtual worlds are usually filled with "eye-candy" and the user has a large amount of agency and control over their behaviour. Although we may not be able to completely avoid distraction, there are ways to not overwhelm learners with too much information that can limit their capacity to cognitively process the learning experience and make sense of the learning. Here are a few tips and tricks to prevent the learner from diverting their attention from the important material.

1. Declutter your scenes- try not to do too much in one area of scene. This might be accomplished by sectioning the learning into stages using portals or different rooms.

2. Use Sign Posts- Have small letters or numbers to highlight key 3D objects within the virtual world.

3. Limit the Number of Learning Outcomes- VR experiences that are shorter in duration and limited in the number of curriculum outcomes will make the experience more coherent.

4. Stick to the Context- try and align the relevance of the virtual environment as closely as possible to the content.

SUSTAINING AN IMMERSIVE LEARNING PROGRAM

"Navigating the Waters of Innovation"

Schools

1 Faculty buy-in

2 Learning policies and guidelines

3 Enhanced curriculum alignment
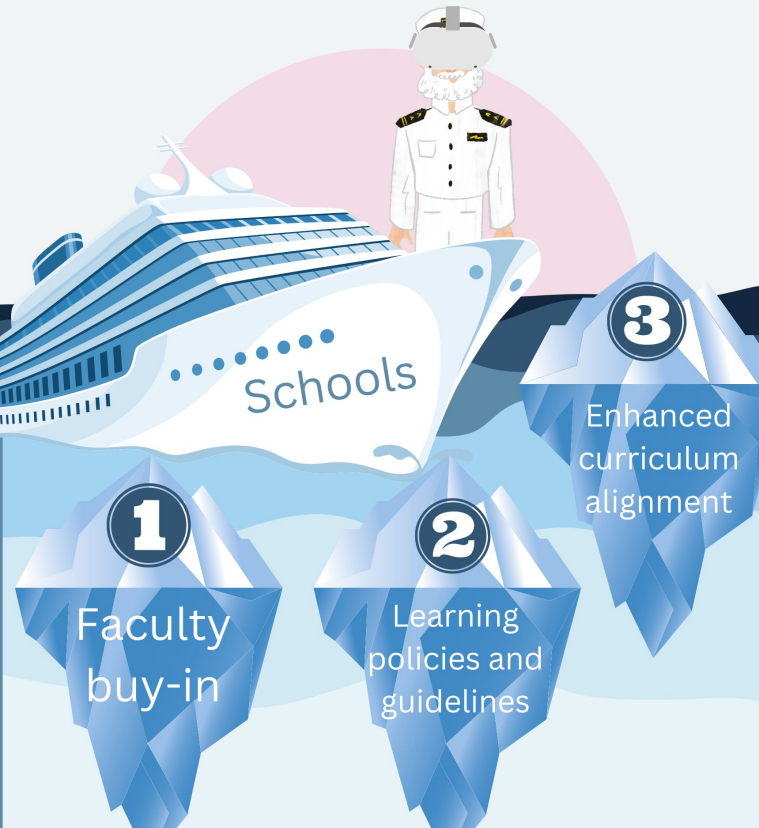
How do we Sustain an Immersive Learning Program or more specifically a VR Program ?

Many schools start up a Virtual Reality program and in the first year struggle to move past the hype cycle that comes with the novelty and zeal of a new innovation.

Like a captain trying to steer a giant ship through a field of icebergs, there are so many hidden things to consider under the surface.

Here are three possible questions to consider as your school moves forward with their virtual reality program that might affect the longevity and sustainability of the program:

1. How do we get Faculty and Staff Buy-in? In the first year many schools adopt a few "killer" applications like amazing simulations, but it is key to grow beyond these to a variety of use cases.

2. Have you considered a comprehensive Immersive Learning Policy? Having a policy regarding why and how virtual reality and immersive learning tools are used will be a key driver to ensure consistency.

3. How do we ensure our VR and immersive learning tools are aligned to key curriculum outcomes? VR content may not completely align to curriculum outcomes and learners will need bridges to allow them to explicitly understand how the VR experiences and applications connect to core learning outcomes.

There are so many things to consider for schools and one would hate for their program to suffer the same fate of the Titanic.

Teaching Tips For Virtual Worlds

Many Virtual Worlds allow the teacher to set up whiteboards for learners in these spaces.

How might we effectively use these tools to enhance teaching and learning?

To ensure content and concepts are moved from a learner's working memory into their long-term storage system, teachers can engage students in generative learning activities.

During the learning experience students can engage in using the whiteboard for specific learning engagements. They might be:

1. Summarize the experience- this could be writing down point form notes and keywords

2. Mapping- this could be a concept map or a graphic organizer

3. Drawing-this involves asking learners to create graphic depictions of key elements.

These engagements are intended to prime and guide the learners cognitive processing during the learning. Essentially, they help learners by guiding them to:

-Select important information for further analysis

-Mentally organize material into a coherent structure

-Integrate the material with key prior knowledge

Segment Your Virtual World Learning Experiences

Part 3
Part 2
Part 1
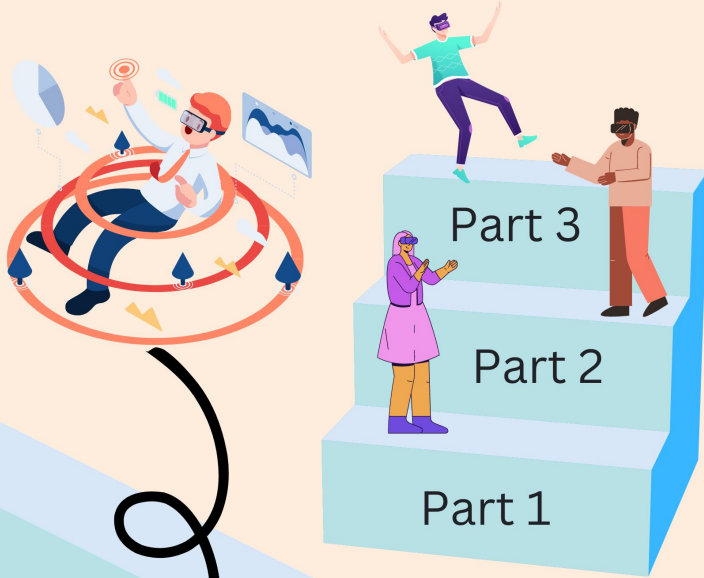
Click to Continue

By Craig Frehlich

Teaching and Learning in Virtual Worlds

"People learn more deeply when a multimedia message is presented in learner-paced segments rather than as a continuous unit. The rationale is that segmenting allows people to fully process one step in the process before having to move onto the next one. " (Mayer, Richard. "Research-Based Principles for Designing Multimedia Instruction." Harvard Initiative for Learning and Teaching (HILT), https://hilt.harvard.edu/.)

When we watch LinkedIn learning videos we see this segmentation in practice all the time, but have we considered it when designing Virtual World experiences? Especially, if we are designing asynchronous content?

Stages of Learning VR For Educators

Mastery

Competency

Exploration

Awareness
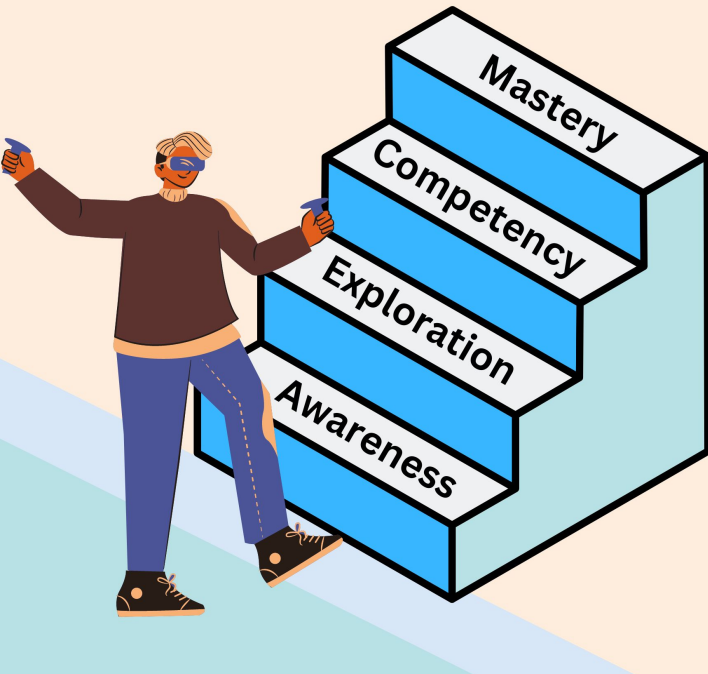
Many working in the VR industry probably remember the first time they put on a headset and entered a virtual world experience. This "light-bulb" moment undoubtedly stirred a passion and motivation to learn more about how we might harness the superpowers of VR and virtual worlds for learning. But, what about others? How can we help pull them along this journey when they may not have the same zeal? We want to be mindful that not everyone will want to go at the same pace. Identifying and understanding various stages that teachers might progress through as they learn to see and potential of VR and virtual worlds as a tool for learning might be helpful.

I recently listened to a podcast interview whereby Chris McGlone identified four possible stages based on his work as a learning and development expert. They were Awareness, Exploration, Competency, and Mastery. I like these stages and want to provide some possible explanations of how we might use these to safely progress and pull educators along in their journey to use VR in their teaching and learning.

Awareness- At this stage, we might expose educators to simple applications like Meta's "First Steps" and "Mission: ISS" to help those brand new to VR understand the affordances and ultimate potential.

Exploration- At this step, we might expose teachers to low-code or no-code platforms like EngageVR and FrameVR.io to see how contextual environments and 3D assets might enhance their instructional practices. Furthermore, we might teach them how and when to align VR experiences to key curriculum outcomes.

Competency-At this crucial stage, we might provide a micro-credential course for teachers that gives instructions and greater detail VR world-building as well as gives them exposure to other more advanced applications like simulations and serious games. It might be key to work closely with them to help them align/map various VR learning experiences directly to curriculum outcomes. We also might support educators as they adopt and use VR learning experiences in a few of their curriculum areas within courses or units they teach. As a final progression of this stage, we could invite educators to teach an entire course or unit that incorporates VR and virtual worlds more consistently into their curriculum. Teachers may spend a lot of time at this stage so patience will be key.

Mastery- At this stage, the teacher may be ready to teach and preach to others how to use VR to enhance teaching and learning and curriculum outcomes. They may be ready to help teach the micro-credential course and hopefully, they are now independently and consistently using and considering VR and virtual worlds for their curriculum. Although these are not the only stages or steps that one might consider for VR adoption by educators in schools, they do provide a reasonable pathway to help in the successful adoption of VR and virtual worlds.

Six Questions to Consider When Using a Virtual World for Immersive Learning

By Craig Frehlich

6. Can I record 3D spatial content for Asychronous learning?

5. Are the Avatars realistic?

3. Are learners able to grab and move 3D objects?

4. Can I create interactions without coding?

2. Do I have direct access to Sketchfab?

1. Can I Design my own 3D Environment?

Teaching and Learning in Virtual Worlds

With a growing list of virtual worlds becoming available to educators, here are some key factors I ponder when picking a Virtual World to design an asynchronous learning experience.

The list is by no means exhaustive.
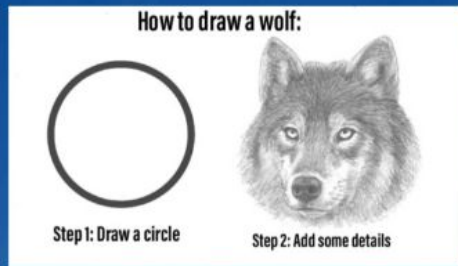
Teaching and Learning In Virtual Worlds

With careful thought, using 3D virtual spaces to enhance your teaching and learning can generate greater learner satisfaction and engagement. Here are a few things to consider:

Avoid these Practices

1. Using virtual environments that are unrelated to the content and concepts

2. Focus on teaching that gets students to mimic your material

3. Heavy use of videos and slideshows

4. Focus teaching on "TELLING"

Adopt These Practices:

1. Design the lesson around a compelling story or narrative

2. Use the plethora of virtual worlds to provide context to the learning

3. Use a variety of 3D assets to engage the learner in the space by allowing them to interact, sort, arrange, and organize objects

4. Break learning topics into smaller chunks

5. Focus the teaching on "DOING"

6. Use a variety of different teaching/learning practices

RESEARCH THAT TRANSLATES INTO PRACTICE

PRECRIPTIONS FOR SUCCESS

| | | 3D Immersive |
| Medicine | Physical Classroom | Environments |

ANITIBIOTICS TO CURE INFECTIONS	RETRIEVAL PRACTICES	ALIGNING CONTEXT TO LEARNING OUTCOMES
RITILAN TO HELP WITH ADHD	INTERLEAVING OF CONTENT	USING 3D ASSETS TO ENHANCE INTERACTIVITY
IBUPROFEN TO HELP WITH PAIN	DUAL CODING	KEEP THE LEARNING ENGAGMENT SHORT

BY CRAIG FREHLICH

Teaching and Learning in Virtual Worlds

Education Needs to Take more Action------------

I often get questions from learning leaders about what the research says regarding the efficacy of using 3D immersive spaces to improve learning. Whilst there are a growing number of studies out there, we need more time to collect data. And, even as learning scientists build greater understanding of this new medium, humans are complex systems that do not always follow the reliability and ideology of research.

For example, we know in medicine that certain prescriptions have proven to be effective in the treatment of health problems. Antibiotics usually work to kill bacterial infections, ritalin often works to help calm people with ADHD, and ibuprofen in many cases will act as a painkiller. Alas, not always do these research based remedies work.

In the physical classroom, there have been several highly researched methodologies that produce great learning gains in many students around the world. Some of these are using retrieval practices, mixing up or interleaving curriculum outcomes and providing dual coding opportunities when content is presented. Again, these strategies come with a caveat. They may not work for all classrooms all the time. Human learning is a complex system.

As we embark on newer mediums for learning like 3D immersive worlds, we need to keep these examples in mind. Research helps us identify a higher probability of increased gains when using the methodology, but it does not guarantee 100% success.

Recently, a study done by PWC, https://lnkd.in/gNEG4FkN , garnered attention. Some praised the study for providing quantitative data that sang the praises of the use of VR as an effective tool for learning soft skills. Others criticized it for not being a properly controlled study.

This should not halt our pursuit to innovate, experiment and tinker. We have been experimenting with retrieval practices in the classroom since 1909. Instead of waiting for research to prove that a particular teaching and learning practice is effective, education needs to take more action to help research gather more and more evidence.

Bridging the Gap

Initial Learning

Retrieval Practice

Complex Simulation

video

lecture

text

Microlearning in VR

Review Learning

no-code platform

teacher made

Short
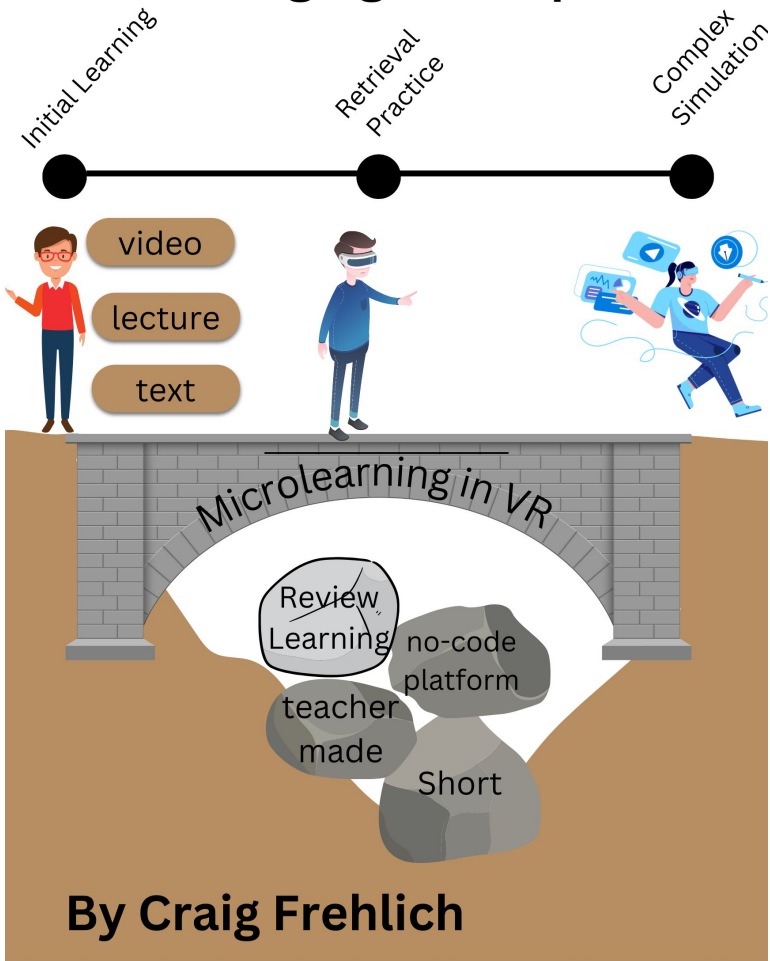
By Craig Frehlich

Bridging the Gap with Micro-Learning in Virtual Worlds

Some institutions that have adopted VR are craving more content in order to provide their learners a steady and consistent diet of immersive learning engagements over time.

One pain-point for some educational institutions in their journey to scale VR is finding ways to use VR beyond the fantastic vendor purchased learning experiences that expose learners to complex scenarios that encompass a variety of concepts. These may be in the form of full simulations or even serious learning games. Hiring external developers to design and build these wonderful immersive learning experiences is a great approach to broader curriculum objectives.

Alas, relying solely on these vendor developed experiences may leave a lull or gap in your institution's ability to sustainably use VR and virtual worlds to catapult and enhance teaching and learning. And, the cost to scale a large part of your curriculum that is appropriate for VR can prove costly.

Enter Micro-Learner Experiences in VR or Virtual Worlds

Micro-learning experiences are shorter VR or virtual world learning journeys that might be designed in no-code platforms. We can expose learners to VR or virtual worlds in order to give them shorter yet effective practice on already taught learning outcomes.

The 3D immersive nature of these experiences gives students a new perspective on a topic and may help them unlock misconceptions. For example, we might design a virtual field trip to have them see what it looks like along the streets of ancient Rome. Or, we could take learners inside the human body to see the structure and function of key organs. The level of polish, fidelity and engagement of these no-code virtual worlds may not be as high as an experience produced by a professional VR developer; however, the experience is still very worthwhile. The learning curve to teach others how to design these experiences is very low.

Whilst not all learning outcomes may be appropriate for VR or virtual world experiences, there is an opportunity to give instructors more agency to design smaller, more frequent learning experiences in VR or virtual worlds, that enable students to review and revise already taught learning outcomes.
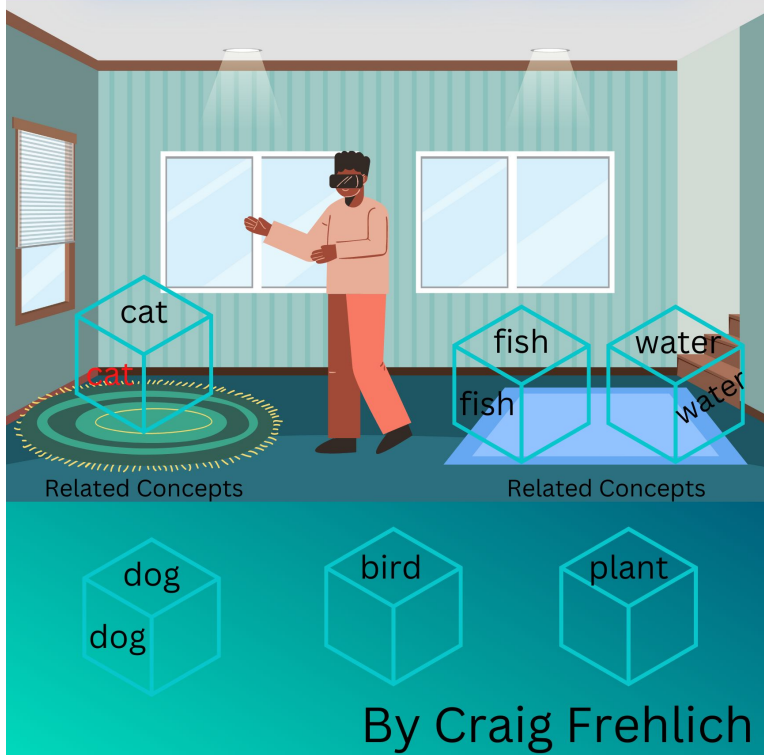
Active Learning in Virtual Worlds

The idea that learning is more effective when one spends effort on the material instead of using more passive types of review is well recognized in the field of education (e.g., Thomas & Rhower, 1986).

One practical way to facilitate this in 3D virtual worlds is using 3D vocabulary blocks. These can be designed in a simple 3D modelling program like Blender.

Once a teacher has taught a lesson inside a 3D virtual world they might invite the student to order, sort and arrange the key vocabulary concepts or terms into specific parts of the virtual space ie. a rug on the floor.

Not only does this help learners build stronger connections to the information being taught, it also acts as a formative assessment tool for both the student and the teachers.

Immersive Learning in 3D Virtual Spaces

If you live in variable climates, then you understand the need for a coat. If it is raining, windy, or cold we all rely on the comfort and superpowers of having a coat to provide us with joy. Alas, we don't always need a coat. On beautiful hot sunny days, coats can be kept in the closet.

A reliable and effective coat will contain several characteristics: waterproof, windproof, breathability, and warmth are just a few key traits.

The same goes for virtual learning experiences. We should rely on the powers of 3D immersive worlds to help us in times of need. Teaching big ideas and difficult concepts trigger us to go into our instructional design closets and pull out a C.O.A.T.

In the immersive learning world, an effective C.O.A.T relies on several characteristics: having the right context, providing order and structure, giving the learning agency and including several 3D assets are key properties of an effective immersive learning C.O.A.T.

But, be cautious, as we don't always need to use or put on a C.O.A.T. when teaching every curricular outcome.
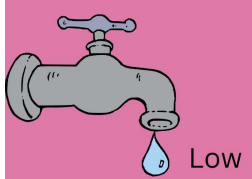
EVOLVING RETRIVAL PRACTICES IN EDUCATION

STRATEGY

The highlighter   The worksheet   Virtual Worlds

POTENTIAL IMPACT ON MEMORY

Low

Medium

High

Is it time to trade the highlighter for a well-designed virtual world?

There have been several ways we have invited students to retrieve knowledge and concepts we have taught in a course in order to store it in long term memory for use later.

1) Highlighting Text- this strategy, although used a lot by many students, has been shown to provide little impact on our ability to remember key ideas in order to use them later. The highlighted words and phrases have little context to our overall understanding of the broader learning outcomes.

2) Worksheets- this strategy has been proven beneficial, especially if the problems and questions are low stakes and allow students to be pushed or challenged on reviewing and recalling the material. However, most worksheets do not have much contextual connection to the content making them less engaging and more difficult for students to make larger connections to deeper more holistic learning.

3) Virtual Worlds- whilst there is not a lot of direct evidence yet to provide strong support for this emerging strategy, research on cognitive science indicates that the closer we connect the context of the learning experience with the content the greater likelihood the learner will engage in the material. Well-designed virtual world learning experiences that explicitly and overtly stage the content inside a relative learning environment may also trigger a stronger emotional connection to the learning. Furthermore, by allowing the learner inside a virtual world to interact and engage with 3D assets in order to think deeper about their connections may strengthen the probability that students will remember the learning content.

HARNESSING VIRTUAL WORLDS FOR LEARNING

1 — Access Prior Knowledge

2 — Engage in Virtual World

3 — Reflect and review

Using Virtual worlds for Teaching and Learning

When designing the instructional activities for learners using virtual worlds and VR, it should be a balancing act.

One good practice around the design of a learning experience is to set up your lesson as follows:

1. Introduce the concept, access prior knowledge through discussion and outline expectations when inside the virtual world or VR.

2. Provide a virtual world experience that is contextually appropriate to learning outcomes and helps catapult active learning.

3. Allow learners time to reflect and unpack the virtual world learning experience via discussions and other follow up activities.

Not all the learning needs to happen inside the virtual experience.

Anatomy of A Virtual World To Foster Good Teaching
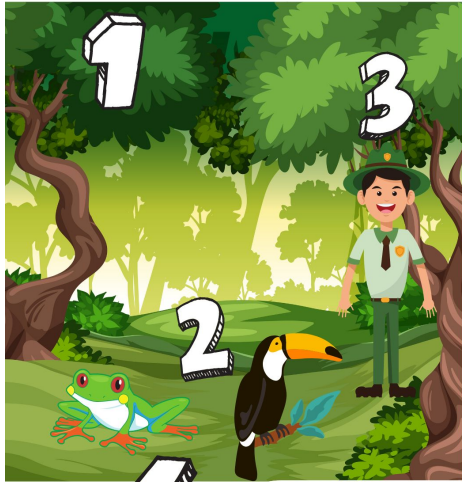
1. A Contextually Relevant World

2. Props or 3D Assets

3. Avatars as Characters

A learning journey with a compelling story

Tips for Teaching in Virtual Worlds

The parts or anatomy of a virtual world that necessitates good teaching and learning.

1. A Character or Persona-your virtual avatar may represent someone who will be a key person in your lesson like a doctor, fireman, or nurse.

2. A Setting or Virtual Environment that is Contextually appropriate-the virtual world should be a setting that is consistent with and reinforces the learning outcomes of the lesson.

3. Props or 3D Assets-in order to support your lesson plan including assets that learners can interact with to think more deeply about the lesson. Invite learners to play with the assets through sorting, ordering and integrating them.

4. A Story-line-"With a good story, anything is possible." You should guide your learners through an interesting learning journey with a clear introduction, micro-learning, scenario and conclusion.

What Can We Learn From Ikea to Apply to Virtual Spaces?

Virtual Spaces

1. Furniture Self Assembly

1. Interactive 3-D Assets

SELECT

2. The Labyrinth store journey

2. Contextually designed learning experiences

Teaching and Learning in Virtual Worlds

Ah, the Ikea experiences. The cheap hot dogs, the inexpensive Poäng chairs, what's not to love.

So, what can the immersive learning designers take away from the "Ikea Experience".

1. The Furniture Self Assembly system- having customers take home furniture in flatpack boxes and put it together at home helps create a psychological effect that is usually beneficial to the organizations. The process of putting invested time and effort into the building of the piece of furniture capitulates a stronger emotional attachment to the product. This will usually translate into greater customer satisfaction.

The same might be said for strategically using 3D assets in immersive virtual worlds. When we allow participants to interact with these objects to grab them, sort and order them we create work of the learner that can translate to a stronger emotional attachment to the learning experiences.

2. The Store labyrinth Journey- An Ikea store is not a maze, as mazes are puzzles with hidden turns and dead ends whereby the customer could end up lost forever. The Ikea store is a purposefully built labyrinth which takes the customer on a vision quest. As they are carefully navigated through various sections customers are compelled to follow and imagine what their home could look like as they see the many displays. This leads them to buy more products.

This might be analogous to a well designed Virtual experience whereby the context is aligned to the learning outcomes and the learning journey is crafted in the form of a real-life problem. The stage is set for a carefully orchestrated labyrinth that guides the learning toward discovery.
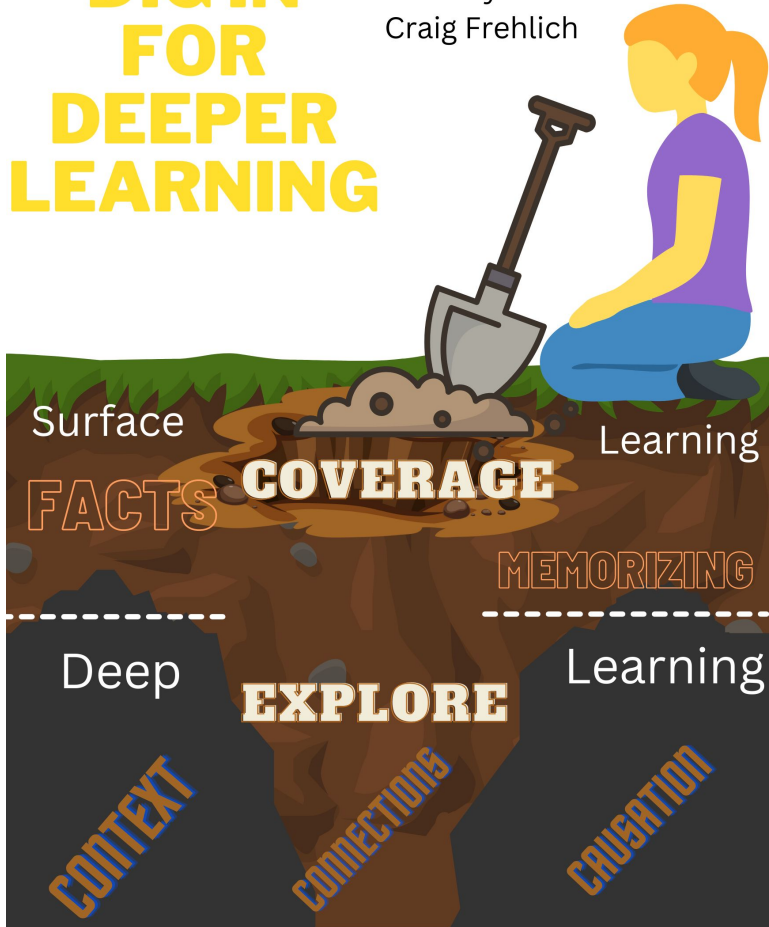
Teaching and Learning in Virtual Worlds

What is the difference between Deeper Learning VS Surface Learning?

Here is a visual to represent the difference between surface learning and deeper learning.

As educators we are so lucky to have access to a variety of tools to help students in their journey toward DEEP LEARNING.
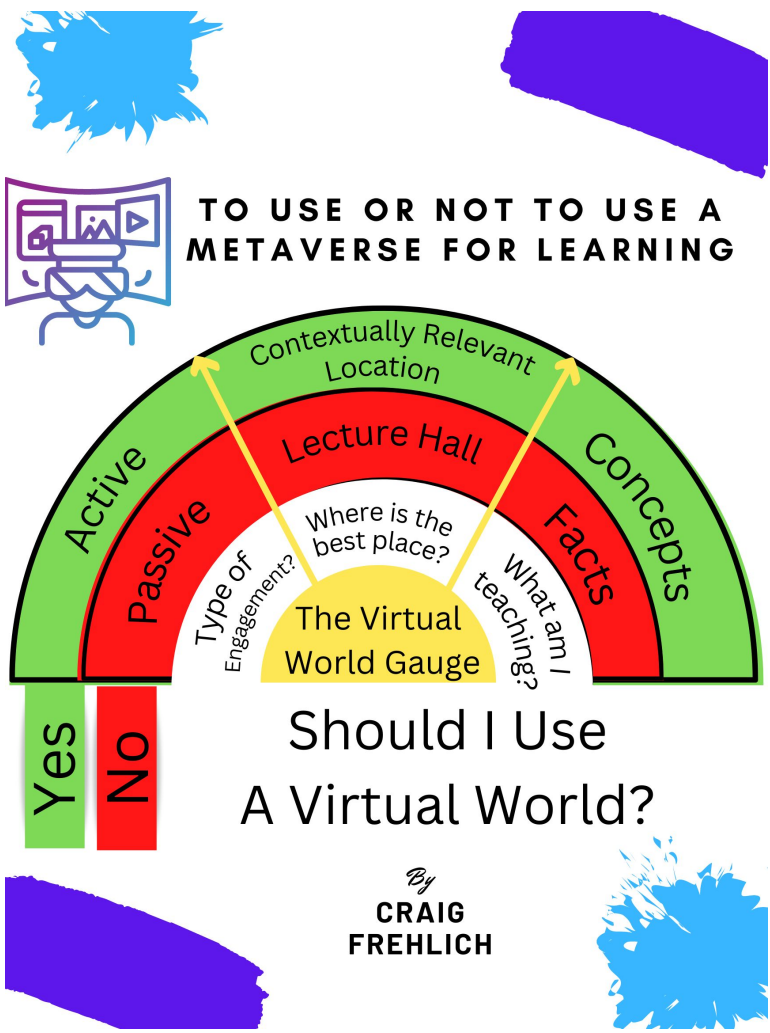
One of those is using Virtual Worlds to allow students to:

-Make CONNECTIONS to a variety of concepts
-Provide rich CONTEXT to the learning
-Allow students to see CAUSATION (ie. before and after scenarios)

Teaching and Learning in Virtual Worlds

The Virtual World Gauge

Some thoughts on when to use a Virtual World for learning.

Cognitive Apprenticeship in Virtual Worlds

According to the cognitive apprenticeship model, learning involves more than just receiving information from a teacher or other expert. It also involves actively participating in the practices, observing and interacting with skilled members of the community, and receiving guidance and feedback from those members. This process helps learners to develop a deep understanding of the skills, knowledge, and values of the community, as well as the ability to apply those skills and knowledge in a variety of contexts.

Virtual worlds can be a great place to develop cognitive apprenticeship activities to help learners hone their knowledge, skills and understandings. Here are two ways to facilitate this in a virtual world:

1. "Repeat after Me"- Once a learner has built up a basic understanding of a concept they can jump into a virtual world to practice and reinforce their learning by watching a 3D recording of an expert or teacher conducting an exercise or procedure and then inviting the learner to repeat the activity.

2. "Identify the Mistakes"-Additionally, the cognitive apprenticeship activity could invite the learner to watch a subject matter expert or teacher carry out an activity or procedure whereby they are making mistakes or errors and invite the learner to point out the deliberate mistakes once the 3D recording has been completed.

It should be noted that not all virtual worlds offer the ability to record cognitive apprenticeship performances in 3D. Having the ability to walk around a recording in full 3D affords the learner embodiment and greater perspective that might unlock misunderstandings and misconceptions.

Teaching and Learning in Virtual Worlds

Our learners come to us with a mosaic of different needs, wants, experiences and skills.

Therefore, when we use immersive learning tools like 3D environments, we want to be mindful of this and adjust or differentiate our approach to teaching and learning accordingly.

If a swimming coach was teaching a diverse setting of swimmers, he/she might find different ways to engage their participants.

They could challenge the expert by putting them in the deep end on the diving board.

They could take steps to ensure the new swimmer was not overwhelmed by giving them a "floaty" and gently introducing them to swimming by taking them to the shallow end of the pool.

They could put the intermediate swimmer in a lane to practice different strokes.

Teaching is never a "one-size-fits-all". If we want our unique set of students to enjoy learning in immersive environments we should consider a differentiated approach to these wonderful spaces.

Check out my poster to learn more ways to adjust our approach when teaching in 3D immersive spaces.

Tips for Teaching in Virtual Worlds

There are several different types of instructional experiences we can provide in VR or virtual worlds for our learners. Some experiences utilize 360 images and videos, whilst others may offer the ability for the user to move around, grab and manipulate 3D objects. As an instructional designer, who has watched 100's of students use VR for learning, I prefer the latter.

Although more interactive virtual world scenes may take more time to build and design than 360 images and video, there are several reasons why this time might be well worth the effort. Here are two.

Giving the user the ability to interact within the scene allows them more control, immersion and agency.

 1. If the user is asked to learn by doing, there is a greater chance that the information is moved from their working memory and stored into their long-term memory.

2. When the learner is asked to be more involved and active in the lesson, there is a greater opportunity to provide formative feedback on whether they are learning and understanding the content.

Supporting Teacher Adoption of VR for Immersive Learning
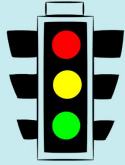
Provide cost-effective TPD and support systems for Immersive Learning tools

Three Ways to Help

1 Give VR lesson planning advice on what to do before, during and after a VR experience

2 Support teachers on how to build no-code virtual worlds that allow students to solve problems

3 Help teachers align VR experiences to big ideas related to conceptual understanding
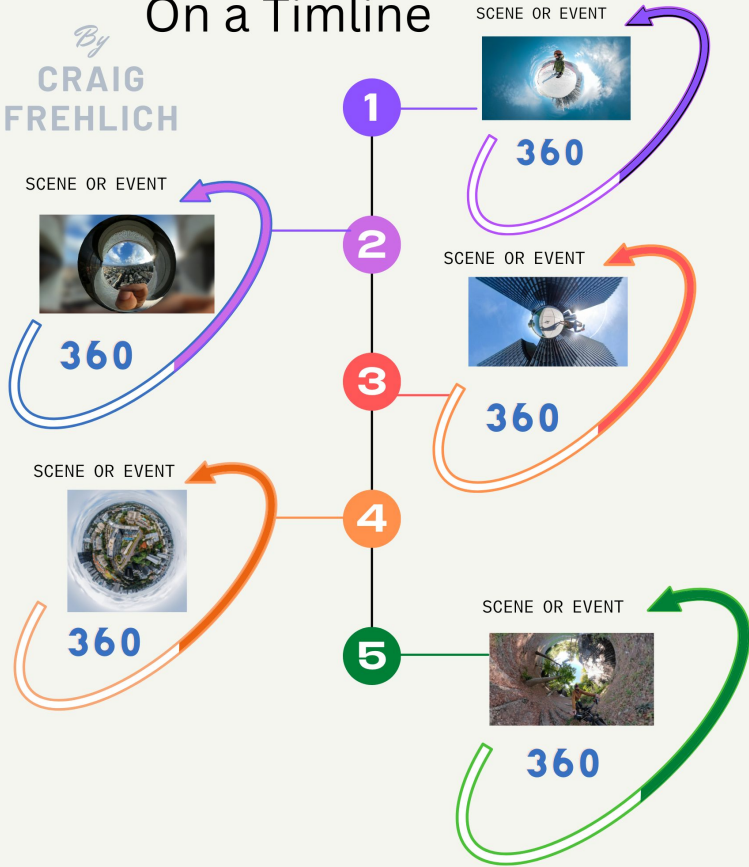
Teaching and Learning in Virtual Worlds

Navigating the complex system of using VR as a tool for immersive learning can be overwhelming. Like many new technologies ongoing support and guidances is the key to scalable and sustainable use.

The poster outlines three key topics to address when supporting teachers as they learn to use VR in their classrooms.

Using 360 Photos as **ADVANCED ORGANIZERS** On a Timline

By CRAIG FREHLICH

Teaching and Learning in Virtual Worlds

Advanced organizers are great instructional design tools to ensure learners have the necessary basis for what they are supposed to learn in a lesson. Essentially, advanced organizes can help learners acclimate to the lesson. They can be presented before the learning event to help form a conceptual framework of the learning of new information.

When used effectively, advanced organizers can connect prior knowledge, organize information and help modify and create new schema to new knowledge. Whilst there are several ways instructors might use advanced organizers, one way to effectively do this in a 3D virtual world is by using 360 degree photos on a timeline. Here are examples of what this might look like in various subjects:

1. Science- students could view various steps or stages to a cycle like ecological succession.

2. Language Arts/English- students would view events that might unfold in a novel or story.

3. Geography/History- students could view scenes or events in a specific area that demonstrates change or development over time.

Additionally, instructors could rearrange the 360 degree photos in a virtual world and students might have to put them back in order at the end of the lesson.