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DEC 2020

Exploring the opportunity landscape of Virtual Reality at VA in 2020

INTRO TO VIRTUAL REALITY

Innovative technologies have been on the rise in healthcare with the gaining popularity of digital health solutions and telehealth services. The arrival of the global COVID-19 pandemic now highlights just how useful digital interventions can be to address many of the ongoing health challenges. Virtual reality (VR) is one of these powerful capabilities that will likely skyrocket during this challenging time. The market trends and projections reflect a greater understanding in the public consciousness of how VR can be a catalyst to drive change in all industries. This is especially true for clinical health training using VR.

The global VR market is estimated at $6.1B in 2020 and is expected to reach $20.9B by 2025, indicating anticipated growth at a CAGR of 27.9%. [1] With the primary driver for VR adoption being the easy availability of affordable VR devices, the COVID-19 pandemic is expected to increase this demand, especially in gaming and entertainment, as well as serious applications requiring training and simulation like in healthcare and defense.

For the health market specifically, global VR valued at $241M in 2018 was projected to reach $2.4B by 2026, registering an CAGR of 33.18% from 2019 to 2026. [2] Major factors include the rise in incidences of neurological disorders, growing demand for innovative diagnostic techniques, and increased awareness of the benefits of VR technology. [3]

This report will provide a high-level overview that will define VR, explain the benefits of training in VR, and show how VR is being used in clinical health training to support surgeons, providers, and patients to enhance education, democratize access, and improve patient outcomes. It will conclude with a brief discussion about considerations, next steps, and closing thoughts on how VR is poised for use in the healthcare industry now and in the near future.

Image: *Osso VR*

"Virtual reality will become an established tool in the arsenal of healthcare professionals for pain relief, mental health, therapy, and many other impotant areas by the end of the decade."

– Josh Farkas
Founder, Cubicle Ninjas

VIRTUAL REALITY IN A NUTSHELL

Virtual reality or VR can be defined as a “near-reality” where your senses are presented with a fully digital, three-dimensional (3D), computer-generated environment that simulates the real world or is an absolute fabrication, and you have the ability to explore and interact with your surroundings.

Image: “Reality to Virtuality Spectrum”, *Hackernoon*

When looking at the reality-virtuality spectrum, VR occupies the “completely digital” end, indicating that the user is in an entirely simulated setting. VR literally shuts out the physical world. On the opposite end is augmented reality or AR, which is used in a “completely real” environment and changes or adds to reality by overlaying digital content on top of a live view.

AR soared from a niche technology to mainstream with the mass appeal of the game Pokémon Go. Mixed reality or MR sits in between VR and AR. MR is an extension of AR and allows a user to interact with physical objects in a virtual world. Extended reality or XR is an umbrella term that encompasses VR, MR, and AR.

There are three main types of VR used today: non-immersive, semi-immersive, and fully-immersive.[4] Non-immersive simulations are a type of VR that is ubiquitous. Think video games. By relying on a computer or console, display, and input devices like keyboards, mice, and controller to provide a computer-generated environment, you are aware of and in control of your physical environment.[5]

Semi-immersive experiences give the perception of being in a different reality when you focus on the digital image, but you remain connected to your physical surroundings, made possible by high-resolution displays, graphical computing and large projector systems.[6]

Non-immersive

Semi-immersive

Fully-immersive

Images: “What is Virtual Reality? (+3 Types of VR Experiences)”, *G2*

Fully-immersive virtual experiences offer the most realistic simulation with sight, sound, and sometimes touch and even smell, and requires a VR head-mounted display (HMD) that creates a stereoscopic 3D effect and provides high-resolution content with a wide field of view.[7] VR HMDs can be smartphone-powered for an experience reminiscent of the classic View-Master, stand-alone (all-in-one) with all of the necessary hardware self-contained for wireless functionality, or tethered with cables to a high-end computer or gaming console.

The quality of experience will be influenced by VR HMD choice, type of input tracking (e.g., eye, hand, voice), hardware (e.g., controllers, gloves, motion capture suits), and peripherals (e.g., treadmills, suspension rigs, actual gear like minesweepers, replica gear like guns).

WHY USE VR FOR TRAINING?

The ultimate goal of VR is true immersion – the feeling that you are in another place without actually being there – and it is best used for storytelling and conveying experiences. Training in VR uses 3D-generated images to create interactive scenarios that allow usathe real world, complete with sensory stimuli, and provides immersive learning.

VR is a transformative technology platform supported by a large body of evidence of its efficacy in training across many industries, including healthcare.

- VR improves performance by 250% and can scale to any size learner population [8]
- VR reduces mistakes by 40% compared to conventional training [9]
- VR learners are 275% more confident to act on what they learned after training [10]
- VR improves retention as much as 80% to mitigate risk and improve patient safety [11]
- VR is 83% more cost effective than high-fidelity mannequin-based simulation [12]

When exploring the main reason why VR has so much potential in training, we need to start with the neuroscience of learning, where quoting Albert Einstein, "learning is experience." VR training can provide a multi-dimensional learning experience that engages each of the four distinct systems of the brain: cognitive, behavioral, emotional, and experiential.

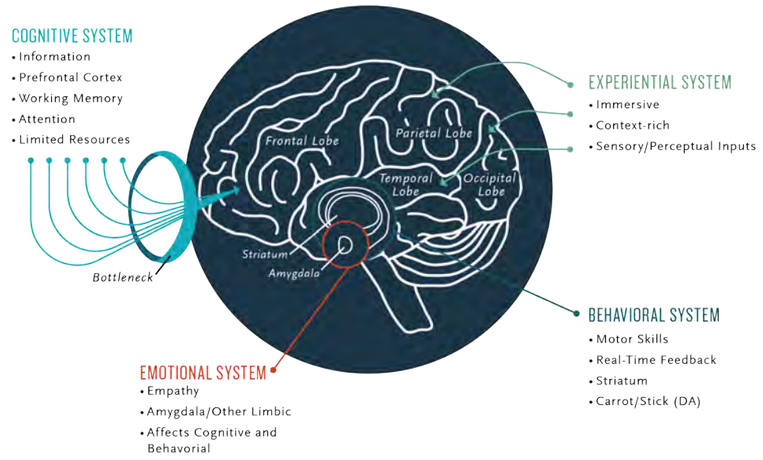


Image: *Booz Allen Hamilton*

"The best way to train effectively is to train all systems simultaneously."

– Todd Maddox, Ph.D.
Immersive Learning and Data Scientist, IKONA Health

The cognitive system is in the information system that processes and stores knowledge and facts using working memory and attention.[13] The behavioral system in the brain has evolved to learn motor skills and builds the "muscle memory" needed to achieve learning goals.[14] The emotional system provides rich motivational context and trains situational awareness, enabling learners to react quickly and appropriately to any situation.[15] The experiential system represents the sensory aspects of environmental context, whether visual, auditory, tactile, or olfactory – providing the scaffolding that grounds and contextualizes learning.[16]

While different, all four systems reside within a single brain that employs massive interconnections. Effective training, in almost every case, requires information to be stored and retained (cognitive), motor skills perfected (behavioral), situational awareness to be strong (emotional), and these skills to be applied within the relevant work context (experiential).[17] This is full brain engagement.

VR for immersive training not only taps into this synchrony in the brain, but also uses these key concepts to engage the user and improve learning and performance.[18]

- **Presence**
  The "magic" of VR is feeling that you are actually in the virtual world
- **Embodied Cognition**
  User's mind and body work together to make meaningful experiences
- **Controlled Environment**
  Captures users' attention during training with minimized distractions
- **Simulation-Based**
  Apply knowledge and practice skills in realistic scenarios
- **Active Learning and Immediate Feedback**
  Promotes "practice by doing" in real time
- **Reduced Cognitive Load**
  A more natural way of learning uses 3D and spatial mapping

Presence in VR allows users to have a sense of "being" in the simulated environment with self-embodiment (feeling that they are in a body) and autonomy (feeling that they have the freedom to explore and interact). Add in multi-sensory features like sound, touch or haptic feedback, and response to voice commands, VR creates an experience like no other. A user's brain and body perceive VR as real, true emotions are triggered, and their joy, anxiety, surprise, and even fear is used to navigate their environment. Since users respond with this level of authenticity when training in VR, it can be a powerful tool for impacting how perceptions, actions, and knowledge are transferred to the real world.

Trainees can feel what it's like to jump out of a plane, make repairs on an oil tanker, or perform complex surgery before doing it in real life. Traditional learning is degrees removed from addressing the true activity of highly engaging work. One-way lectures, passive viewing of videos, slide decks with limited visual real estate, and lengthy text manuals are disengaging, yet scalable. Lab practicums, on-the-job training, and dedicated mentorship are more effective in comparison, but are more difficult to scale because they are constrained by time, resources, and staff availability.

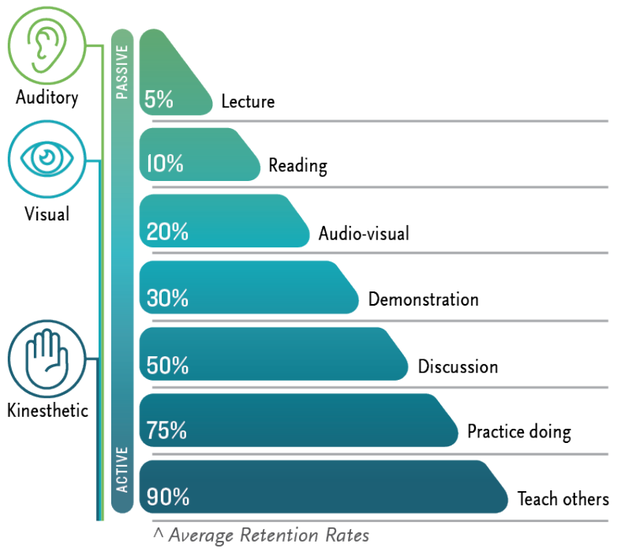


Image: *Booz Allen Hamilton*

“I hear and I forget. I see and I remember. I do and I understand.”

– Confucius

Immersive learning methodologies like VR score equally high for learning effectiveness and scalability. VR provides a way to simulate and practice with unlimited tries and that repeatability yields knowledge confidence, muscle memory, accelerated performance, and actionable feedback. It allows delivery of consistent training with standardized modules that can be updated on demand. Content can be accessed by users anytime with the minimum hardware requirements of a VR headset and controllers.

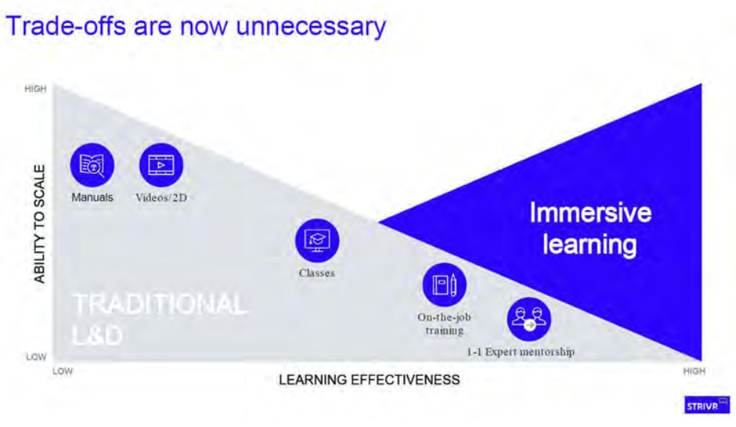


Image: *STRIVR*

VR also excels at simulating scenarios that are otherwise expensive, dangerous, or logistically complicated in reality. So, it not only offers a physically safe space for practicing these types of tasks, but also a “safe space” where making a mistake will not be awkward or embarrassing.[20] Studies show that high-quality VR can bring the same qualitative results as real-life exercises, plus reduce training costs. For example, replacing mannequin-based practice with VR training in learning to treat pulmonary disease brought successful performance results and a 3x cost reduction.[21]

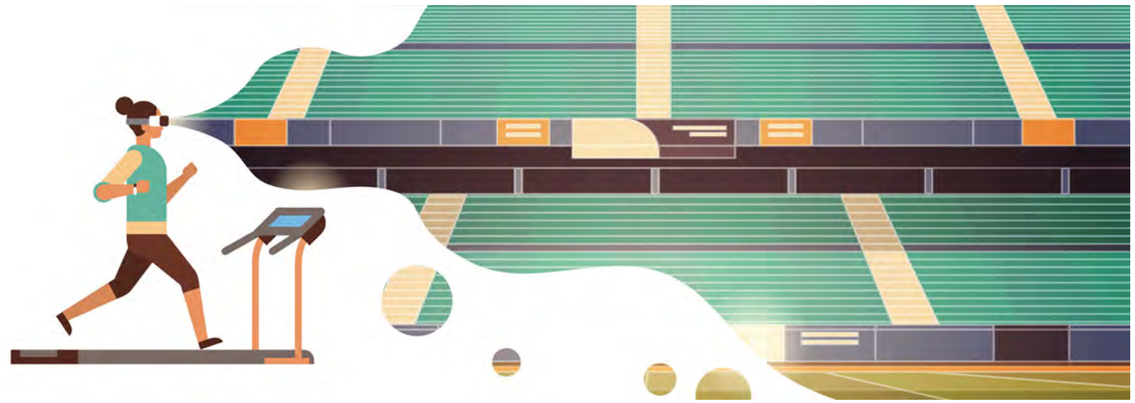
The platform can allow users to teleport into a VR world and be together as avatars in the same environment too, creating a shared experience for interacting and exchanging information and assets regardless of their location. All in all, VR is ideal for training activities that require users to experience applied learning at its fullest potential.

Image: *Oculus Connect 6*

VR TRAINING IN CLINICAL HEALTH

VR training provides the opportunity for a shift in the way people can learn and doing so in a safe environment. By taking advantage of VR's capabilities, users in the clinical health space can master the latest in medical education, refresh how to administer the best treatment options, and self-administer therapeutics. Since real-life skills typically lag behind the pace of innovation, enhancing practical experiences with VR training may play a significant role in addressing deficiencies and improving skills.

The future of VR training lies in its integration into curricula to allow simulated clinical experiences at scale, with reduced cost, and independent of geography to transform how healthcare education is delivered to users who can benefit most from it, specifically surgeons, providers, and patients.



"VR is the ultimate practice machine."

– Derek Belch
CEO, STRIVR

VR TRAINING FOR SURGEONS

One dominating use of VR for healthcare is in surgery to help improve skills in areas where it is not necessary for the technology to simulate exactly what it is like to work with fingers on the skin and for choreographing complicated procedures.[22]

Surgeons are in the unique position of having to understand and interact with anatomy that they perceive pre-surgically through 2D images that are degrees removed from the actual physical counterparts. When planning for an operation, they have to rely on piecing together a series of 2D images, such as x-rays, MRIs, and CAT scans, to understand a patient's complex anatomy and communicate the plan to colleagues.

As more practitioners are added to the team responsible for a single surgery, important clinical information can be misinterpreted or lost, much like in the classic telephone game. The team can use VR as one of the common sources for pre-operative planning and training with actual patient data.

VR's ability to standardize and democratize information is also ideal for regular skill refreshment. While the time required to train a competent surgeon is a hotly debated topic, there is agreement that learning surgery needs both cognitive abilities and manual dexterity.[23] The number of hours and how they are spent do matter. Educational psychologists have shown that about 10 years of intense involvement and 10,000 hours of practice is required to develop elite level of expertise, and a critical component is deliberate practice to improve performance with the ability to receive feedback.[24]

For example, surgeons once needing to perform 10-20 cases to reach proficiency in a new procedure may need at least 50-100 cases because of increased complexity, and they can practice repetitively at their own pace to master steps.[25] Surgery residents, a group that has up to 30% unable to operate independently upon graduation, can do the same.[26]

With COVID-19, most U.S. states enacted a temporary ban on elective surgery from March through May 2020 to reduce infectious

risks to providers and patients and conserve critical resources, such as personal protective equipment (PPE), ventilators, and intensive care (ICU) beds.[27] The ban resulted in a backlog of uncompleted procedures that continues to be delayed because of hospitals' diminished capacity.[28] This consequence not only affects an astounding number of patients failing to receive medical attention, but also surgeons who are faced with lack of access to patients to keep their specialized skills sharp.

A significant benefit of VR training for surgery is the ability to raise competence levels by learning in an environment that poses no risk to patients and does not required limited and costly resources, such as cadavers. This advantage extends to circumstances when patients are not available because of cancelled or limited elective surgeries, as evident with COVID-19.

VR training can provide surgeons with simulated experiences to the nearest degree of reality with built-in scoring and evaluation while awaiting the opportunity for hands-on practice.

VR SNAPSHOT: OSSO VR

Osso VR is a validated VR surgical training platform designed to address learning new procedures and using novel medical devices. With its unique creative team makeup including an Oscar-award winning art director and the world's largest medical illustration team, Osso VR's immersive experience has an exceptional level of visual fidelity and haptic-enhanced interactions.[29]

This September, Osso VR and the University of Illinois College of Medicine at Chicago announced their results of a validation study that examined whether VR would show an improvement in procedural accuracy and completion for an intramedullary (IM) tibial nail procedure, which entails forcing a metal rod into the cavity of a long bone.[30] The study's 25 first- and second-year medical students were randomly assigned to the technique guide control group, the VR group, and the VR and technique guide group. The technique group could refer to the online document at their discretion and both VR groups went through Osso VR's simulation in three separate sessions every 3-4 days.[31] Following 10-14 days of preparation, all participants performed the IM procedure on an artificial model with completion rates of 25% for technical guide group, 75% for the VR group, and 78% for the VR and technique guide group.[32]

A validation study done a year earlier at UCLA's David Geffen School of Medicine indicated that training on the Osso VR platform improved participants' overall surgical performance by 230% compared with traditional training methods.[33] This study was performed over two weeks with 20 participants randomized between a traditionally trained group and a group that underwent VR training on the Osso VR platform to a specified level of proficiency, and ending with each participant performing the IM procedure on an artificial model.[34] VR-trained participants completed the same IM procedure an average of 20% faster than the traditional trained group and completed 38% more steps correctly in the procedure-specific checklist.[35]

Osso VR is used in over 20 teaching hospitals and 11 medical device companies in 20 countries and raised $14M in series A funding – the biggest investment yet in VR surgical training - this September.[36]

Image: *OSSO VR*

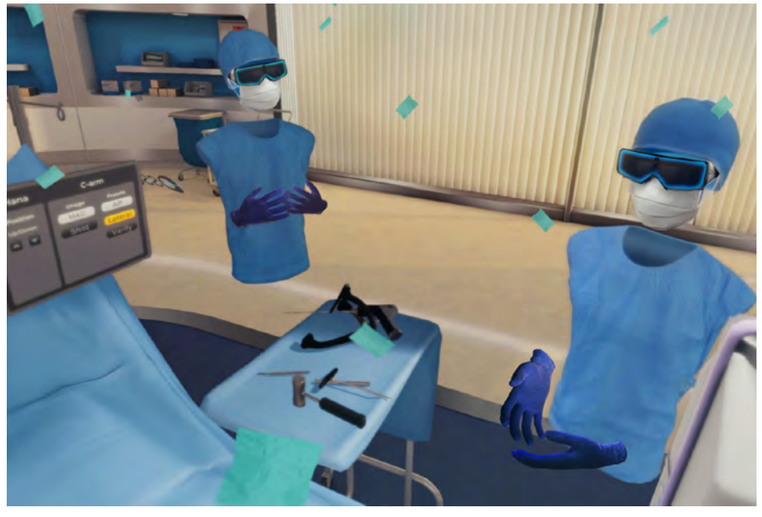


Image: *OSSO VR*

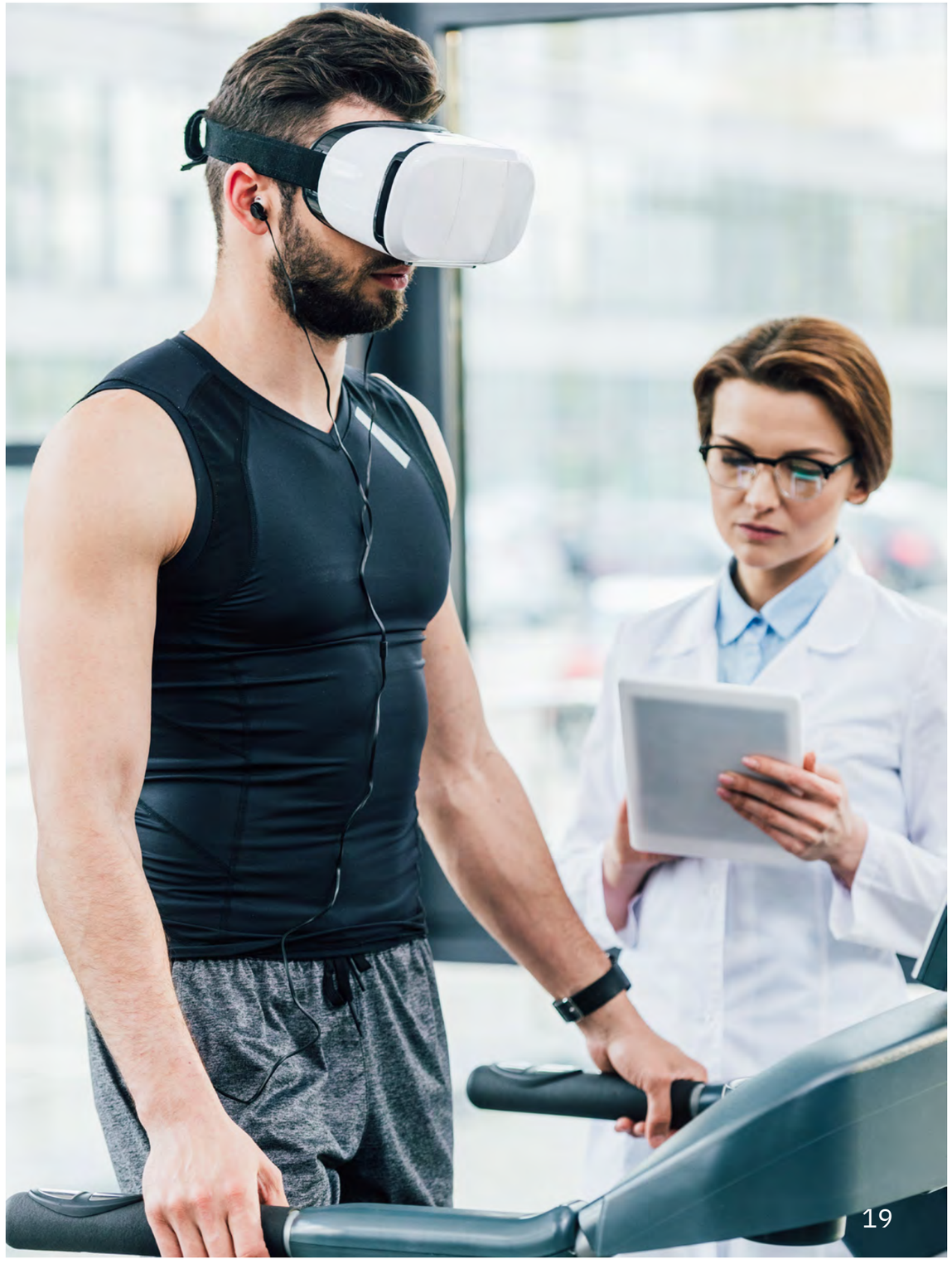
VR TRAINING FOR PROVIDERS

Nearly every interaction in a patient's health care journey, whether for an annual wellness exam or long-term care needs, involves touchpoints with providers.

From the familiar being primary care physicians or specialists to the case-by-case encounters with physical therapists, visiting or home nurses, pharmacies, walk-in clinics, medical equipment companies, and more, those individuals and companies have a vested interest in improving performance and education in a timely, effective, and consistent manner.

VR has been used by providers to onboard new employees, learn use of medical equipment, understand patient safety, and gain empathy for specific populations. These examples show how learning can be done independently and, for some cases, without relying on the availability of senior staff in the early stages.

It can also be expensive for organizations to maintain systemwide readiness. When compared to the cost of delivering in-person reenactments, VR can provide crisis simulation to develop automatic response behavior to low-frequency situations like rare emergencies, multi-casualty accidents, and disease outbreaks.[37] The return on investment from "learning by doing" in VR can be significant, yielding high rates of retention and application.



VR SNAPSHOT: HEALTH SCHOLARS

Health Scholars provides real-to-life VR simulation training for first responders and clinicians on emergency care for adult and pediatric emergency scenarios in pre-hospital, general care, perioperative and obstetrical settings.

Modules co-developed by healthcare professionals are designed to align with certification standards and professional society guidelines. Topics include advanced cardiac life support (ACLS), pediatric resuscitation, surgical fire prevention, and obstetrical hemorrhage. The Health Scholars platform also tracks performance and progress data to assess readiness, identify learning gaps, and deliver targeted training.

Focusing on ACLS, where skills decay within months of certification for individuals who work in non-critical care areas – which is the majority of the hospital, health systems struggle to provide refresher training because of the volume of individuals who require it and the limited number of educators.[38] In response, Health Scholars launched their ACLS VR training application to provide repeatable training at scale and for 50% less cost of a physical simulation.

In order to evaluate the potential impact of VR-based simulation to mannequin-based high-fidelity simulation, Mount Sinai physicians conducted a study to compare the performance of assessing ACLS competencies in July 2019 with 25 anesthesiology residents who were randomized into two groups, and then switched to the alternate group two weeks later.[39]

Results indicated that VR simulation was predictive of clinicians' overall performance in high-fidelity mannequin-based simulation and was 83% more cost effective.[40] There was no statistically significant difference in assessing clinicians' decision-making

Image: *Health Scholars*

capabilities, meaning that VR offered an objective, standardized, and repeatable modality. It also required less proctors (5 vs. 20), time in minutes (25 vs. 45), and cost ($89 vs. $193).[41]

Feedback received during high-fidelity mannequin-based simulation was reported to be more useful than that in VR, particularly for team-based training and point-of-care assessments. So, in this case, VR can be an effective option for individual practice.[42] All things considered, this study showed that VR can deliver true-to-life scenarios for assessing readiness and predicting clinical performance.

Health Scholars currently works with hospital systems across the U.S., inclu ding St. Jude Research Children's Research Hospital and Cedars-Sinai, and closed $17M in series B funding this January.[43]

VR TRAINING FOR PATIENTS

As the largest user group seeking and receiving health care, patients have the potential to benefit significantly from VR training, especially with therapeutics for pain management and mental health and remote care for patient education and adherence.[44]

VR can assist in distracting patients suffering from acute or chronic pain by immersing them in fantasy adventures, thereby engaging pathways in the brain that would otherwise be occupied to translate pain – and possibly reducing opioid consumption used in treatment at the same time.[45] For mental health, VR exposure therapy – where the stimulus can be presented in a very controlled manner and adjusted precisely to each patient – has been used in phobia treatment for two decades.[46]

It complements anxiety management, and is emerging in the post-traumatic stress disorder (PTSD) field. In addition to swimming with dolphins or reliving a public speaking moment, patients can use VR to learn about complex diseases, symptoms, and treatment options in plain language and with digestible visuals at their own pace.[47] According to a January 2018 study, 89% of patients said they felt better informed about their health status after using VR and would like to see more in healthcare.[48]

HOW CAN VETERANS BENEFIT FROM VR?

Looking specifically at U.S. military service members and veterans, their specialized line of work can result in health issues similar to civilians but from very different circumstances. After discharge, most veterans are concerned about their physical and mental health. A study on 10,000 newly discharged veterans found that nearly 53% suffer from chronic physical health conditions, while 33% suffer from chronic mental health conditions in the months after separating from military service.[49]

Specific types of injuries, such as gunshot wounds, hearing loss, and lost limbs, can lead to chronic pain, physical disabilities, and limited range of motion. Exposure to high stress and environmental hazards as well as being separated from family or finding it difficult to reconnect with others can induce sleep, anxiety, depression, PTSD, and substance abuse.[50] There is also the tragedy of suicide, from which approximately 17 U.S. veterans die every day – a rate that is about 1.5 times that of non-veterans after adjusting for age and sex differences.[51]

These conditions can have a huge impact on many areas of veterans' lives because most may be unaware of how to get help. Those who do may be encouraged to connect with support organizations, including the Veteran Crisis Line, Real Warriors, Make the Connection, and others where they can talk about various issues and get advice from other veterans who understand their experiences. [52] Others may see psychologists or psychiatrists for behavioral therapy and other evidence-based interventions, but there can be a limitation to these approaches if they require multiple sessions and cannot be easily implemented.

HOW MIGHT WE ADDRESS ACCESS BARRIERS?

Accessibility is essential for administrating treatment plans that do best in in-person settings and is also a concern for populations seeking care based on their geography. These include veterans located in rural areas, veterans of older age – a group more likely to obtain health care services via the U.S. Department of Veterans Affairs (VA) – with limited choices based on VA hospitals and clinics being sparsely distributed throughout the country, and veterans with disabilities facing the dilemma of a low percent of counties containing a VA medical facility.[53]

Telehealth or video-based health care can help address access gaps for patients. For example, when the VA began distributing video-enabled tablets to provide video visits to veterans with health care access barriers in 2016, many reported that video care was equivalent to or preferred to in-person care.[54] With the COVID-19 pandemic, expanding telehealth has become the most prominently employed access strategy across the majority of healthcare systems with projections estimating 1B virtual visits conducted in 2020, compared to the original pre-COVID projection of 36M.[55]

This March, a number of providers started to prescribe VR therapy through a telehealth clinic, giving patients an opportunity to experience a primarily inpatient practice at home for remote care. Patients purchase a recommended VR headset (a rental option is coming soon), install an app, learn how to use the hardware and go through treatments with a clinician, and await feedback from their provider who receives detailed reports weekly. This model can be adopted to offer VR therapeutics at scale, including those enabling social interaction for individuals experiencing isolation and loneliness.

VR SNAPSHOT: APPLIEDVR

AppliedVR is a leader in digital therapeutics, designing VR therapies to be self-administered at home that are easy to use, engaging, and create lasting neurobehavioral change for patients suffering from pain.[58] Their platform is aimed at everything, including labor pains during childbirth, pain from burns, discomfort experienced undergoing infusions for cancer treatments, and sharp cramps from intestinal ulcers from Crohn's disease – just to name a few.

Through evidence-based therapies and incorporating modular experiences mapped to acute and chronic treatment programs, AppliedVR helps patients learn coping skills to manage their pain, while also potentially reducing depression, anxiety, insomnia, and reliance on opioids and other drug options.

In one of the largest at-home studies completed to date, patients suffering from chronic pain used AppliedVR's platform in a randomized control trial. The programs included cognitive behavioral therapy (CBT), information on how thoughts and emotions can impact pain, diaphragmatic breathing exercises, and mindfulness content.[59] The 92 patients were asked to rate their pain from one to 10 on the Defense and Veterans Pain Rating Scale (DVPRS) four times during the 21-day treatment.[60] The results published in July 2020 reported that patients' pain intensity was reduced by 30%, and they experienced 30-50% improvement in key quality of life metrics, such as pain, sleep, mood, activity and stress.[61]

In a different study of the effect of VR in emergency department patients with acute pain, findings showed that the applications are feasible and acceptable for use and may lead to reduced pain, anxiety, and anger levels.[62] The effect of VR was also impacted by the patient's ethnicity, educational status, and health or quality of life.[63] In parallel, a 20-person pilot assessing VR-based biofeedback and guided meditation in a rheumatology clinic indicated that there was a significant reduction in pain.[64] Although the small sample size underpowers making definite conclusions about efficacy, initial results suggest possible benefits of intervention.

AppliedVR has delivered scientifically designed and validated digital health solutions to over 30,000 patients in more than 250 hospitals and in 10 countries globally since its founding in 2015.[65]

Image: *Cedars-Sinai*

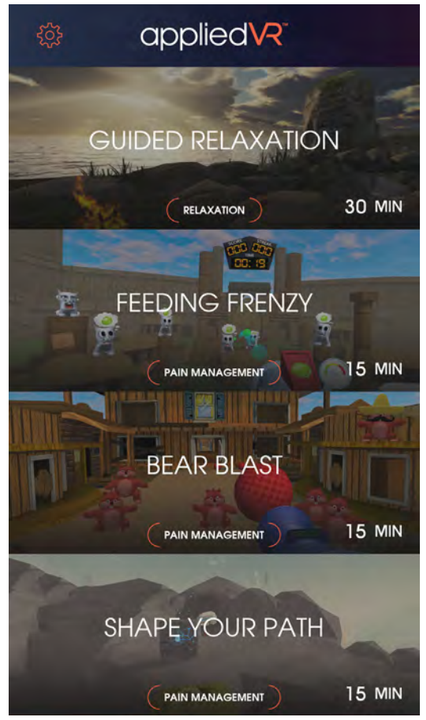
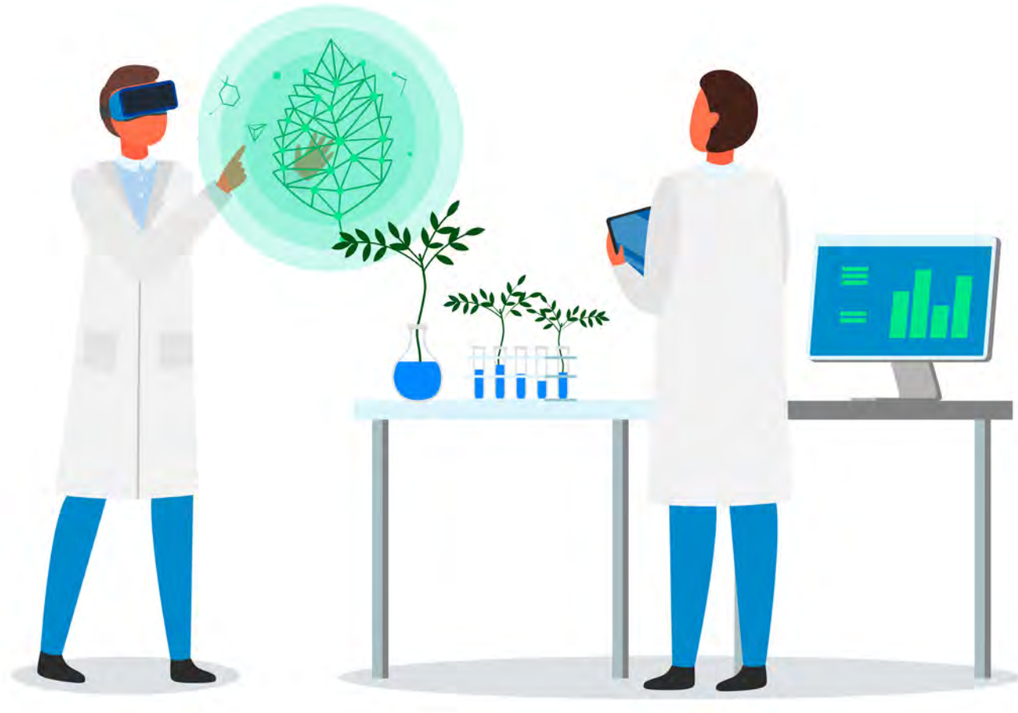


Image: *AppliedVR*

LOOKING AHEAD

Given that emerging technologies like VR can positively impact significant training activities, such as surgical planning and practice, 3D radiological imaging and education, and pain diminution, hospitals are trending towards increasing budgets for clinical simulation centers to allow purchase of them.[66]

There is also increased understanding of how the up-front cost of VR is recouped with simulated experiences becoming less expensive over time, whereas expenses for live exercises remain fixed. Harnessing the power of VR training for any industry involves looking at considerations for implementation, identifying where VR can play a role, and assessing developments and forecasts that may expedite adoption.



CONSIDERATIONS FOR ADOPTING VR

For a health care facility, key challenges to integrating VR training may include lack of knowledge and awareness regarding the technology, cost, and its uses and benefits. There can be technical limitations such as availability and access to infrastructure, platform friction, and energy consumption. Physical space and resources might be inadequate for training, maintenance, and storage. Other potential concerns include a new capability's lengthy procurement process, fit into the regulatory environment, support of broader programs and organizational goals, and long-term value and return on investment.

With VR technology becoming more affordable and its potential use increases, it is important to first determine where VR is a viable solution and if so, where it can be applied to have the most impactful business outcome. VR is by no means a universal solution for all clinical training needs or meant to replace everything prior to it. VR, along with other immersive learning media, helps to accelerate and augment learning in a way that current modalities cannot possibly accomplish.[67]

NEXT STEPS TO TAKE

If VR is a best bet for your training needs, your investment will vary depending on your desired solution. You might want to adopt an existing solution or consider customized content development. Other factors include level of interactions for the user, amount and quality of headsets, and if any extra hardware and equipment is required.[68]

Investing in VR training can be spread across a large number of users and for a longer period of time with little additional cost, while each live offering requires additional costs that scale with the number of participants.[69] If non-VR training is likely to consume additional resources for each user or incur extra costs and logistical complications each time it is conducted, then VR may prove the better and more economical alternative.[70]

Additional items to note include: (1) the longevity of the training across number of years that the training can be deployed with minimal ongoing expenses; (2) the reach of the training across number of staff members that costs can be distributed; (3) design choices, specifically ways to make the simulation simpler to develop, such as limiting the size of the virtual environment; and (4) the degree to which the alternative costs scale over time and staff.[71]

The decision framework can help determine when and how to use VR in learning

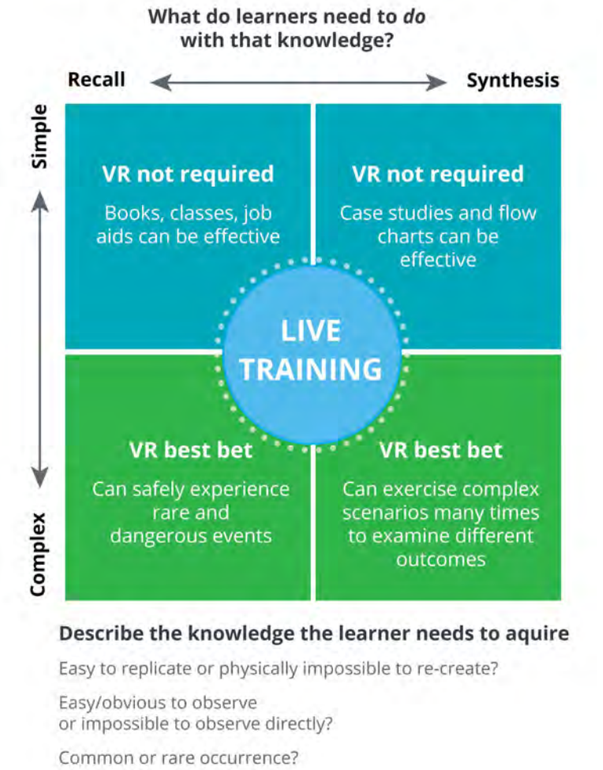


Image: *Deloitte Digital*

FINAL THOUGHTS

Keeping current events top of mind, three are significant when looking at VR in clinical health.

- The U.S. is in a doctor crunch with a shortage of nearly 122,000 physicians projected by 2032 [72]
- COVID-19 is taking a toll on mental health and especially for essential health care workers
- People limited by social constraint guidelines are relying on digital technologies for interaction

An existing physician shortage now compounded by COVID-19's physical distancing and mask requirements increasingly affects medical training where hired actors or mannequins in group settings is no longer an option. The public experience with anxiety, isolation, depression, and sleeplessness caused by COVID-19 is substantial, and for essential health care workers, it is intensified. Being in the line of duty, they have heightened fears of COVID-19 transmission, clinical challenges, perceived lack of control, and concerns about family and home life.[73] With a third wave coming soon, their feelings of moral injury and burnout will become burnover.[74]

It is too early to understand the pandemic's effect on mental health issues and how it will exacerbate conditions like chronic pain and substance abuse and give rise to new cases. Yet, with only one mental health practitioner available for every 50,000 sufferers pre-COVID-19, the need for scalable digital solutions has never been more important – and the FDA's relaxation of enforcement on claims made by digital health manufacturers focused on psychiatric conditions is an acknowledgment of that.[75]

It is evident that VR can potentially assist a surgeon's ability to deliver less innovative treatments and operate with decreased medical errors. Frontline staff like nurses and emergency medicine technicians can expedite their training by immersing themselves in various simulated real-world situations, ranging from triage in an emergency room to an exact replica of a hospital with patients that can be programmed by gender, race or age.[76] Their sustained feelings of stress, as well as their patients', can be alleviated by self-guided VR therapeutics.

The pandemic has also highlighted the extent to which digital technologies are increasingly relied upon for many daily activities. People working from home are glued to screens, bagged groceries arrive at doorsteps, and family and friends socialize during virtual happy hours. While no substitute for real-life gatherings, these platforms are invaluable for staying connected with other people, including health care providers.

Many doctors saw their telehealth visit volume increase by a factor of 50 to 175 over days and at most, weeks.[77] Video helps people see other's full faces and screen-sized capture in 2D. VR boosts this interaction in spades by literally and figuratively creating worlds where people can learn, communicate, and experience familiar social events, such as training and concerts, without having to be concerned about traveling, touching, and to a degree, timing.

Knowing what we know, the question then arises:

How can we take advantage of more affordable VR technology knowing its benefits for training and adopt it for our workforce and patients' exponential need, especially with COVID-19 and its potential long-term effects?

Using VR, you can reimagine current clinical health practices and amplify reach to those who need it most.

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