

A person is shown from the chest up, wearing a black VR headset and holding a black VR controller. The background is a solid teal color. On the right side, there is a semi-transparent white circular area containing a network diagram with black nodes and lines. The text "The Case for Immersive Training" is positioned in the upper left quadrant.

**The Case for
Immersive Training**

Motive.io

The introduction of immersive tech (augmented and virtual reality) into the mainstream is having profound effects on the corporate training industry.

The ability to engage and challenge employees during training and onboarding results in better trained employees who are more confident on the job and more productive.

Since the launch of our immersive training platform, we have spent many hours conversing with learning and development professionals. We have listened to understand the challenges they face in creating engaging and effective training. We have worked hard to use what we have learned to create a product that will allow as many companies as possible to engage their employees with VR and AR.

In this paper, we endeavor to demonstrate, with science and industry-backed data and results, why we're so enthusiastic about immersive training. We stand firmly behind VR & AR as the way forward for revolutionizing learning.

I hope that one day in the near future our paths cross and that we can hear more about your corporate training journey and how your organization has benefitted from this ground-breaking technology.



Ryan Chapman
CEO

Introduction

Every workforce needs training.
Current methods of delivering instruction
can be greatly improved.

Real-world training requires trainee access to real equipment. This can lead to material damage and workplace injury. It can also mean mounting travel costs and loss of productivity. Some workplace events are impossible to replicate. The frequency of new-employee exposure to these events is minimal or non-existent. Insufficient or superficial training for emergency procedures is frightening. It is difficult to feel confident that your employees are ready to take on the stress of a dangerous situation they have never encountered.

E-learning, once considered a major innovation in training, is now often seen as tedious and ineffective. Video series with quiz questions, slideshows, and manuals often represent nothing more than a hoop jump.

HR sessions on sensitive issues and respectful communication can be awkward. Live role-play simulations are not an effective way to prepare for real conversations. People often behave differently than they naturally would, which defeats the purpose of the exercise. *(Stokoe, 2014)*

Today, there is a better way to train. Using virtual or augmented reality, trainees can be immersed in real-life training situations. They can be guided by pertinent information on the job when they need it. They can have realistic, AI driven conversations to practice soft skills. All this is achievable in a risk-free, engaging, cost-effective way.

This report highlights the advantages of immersive training. It is backed by scientific research and industrial case studies. The benefits discussed will be:

- Efficacy
- Safety
- Trainee engagement
- Efficiency
- Consistency
- Cost-savings
- Measurability

This paper will discuss the advantages of adopting immersive training at your organization. The reader will see that the facts support virtual and augmented reality as the way forward for enterprise learning.

Immersive Training is more effective

Results from immersive training are superior in many ways. Knowledge retention, confidence, and performance are all improved when compared to traditional training methods.

Better Retention

One significant advantage of VR training is the length of time trainees can recall the material after the training is complete.

In one example, medical students learned diagnostic ultrasound techniques. One group learned in VR, the other through lecture and reading. Both groups were assessed on their knowledge and skill level after one month and then four months. After four months, the VR group scored an average of 25% better on the skill assessment. (*Ebert & Tutschek, 2019*)

In another study on aviation safety training, VR again proved to be more effective, especially in knowledge retention:

“The learning outcome in which the immersive game proved to be superior (...) is retention, a fundamental requirement for survival in real emergencies.”

(Chittaro & Buttussi, 2015)

In a third example, a group of nurses who were practicing disaster response were exposed to either a VR simulation of the disaster or web modules. After two months, the VR trained group performed 15% better on assessments related to disaster response. (*Farra et al., 2019*)

Confidence Building

In some industries it can be very difficult to offer adequate amounts of practical training. Limitations such as lack of experienced staff and over-full schedules mean that new hires may have little hands-on practice. This can lead to a decrease in trainee confidence. Exposing trainees to virtual simulations has a very positive impact on their confidence in the real workplace.

In a study conducted with surgical residents, the following problems were identified:

"...the reduction in working hours, increased focus on completing more surgical procedures, and inadequate supervision have compromised training. Furthermore, the lack of expertise of the surgical residents at the early stages of their training leads to errors in the operating room, which compromises patient care"

(Pulijala et al., 2018)

After exposure to surgical procedures in virtual reality, residents had increased confidence. They were more willing to attempt surgical procedures on the job.

In a comparative study, Army National Guard Reserve soldiers learned room clearing procedures. Room clearing is an especially stressful task given the risk and potential for injury or loss of life. Knowing the best and most efficient way to determine the safety of a potentially hazardous area is essential.

In the study, half of the group were exposed to a VR simulation and the other half to a live training involving a lecture and presentation. When the training was complete, the **soldiers trained in VR reported feeling less stress and confusion** in real-world room-clearing procedures. *(Lackey et al., 2016)*

Better performance

The ultimate goal of any training is to improve job performance. Studies show that job performance is significantly enhanced by immersive learning. Virtual reality leads to deeper learning and understanding and better behavioural transfer. Skills and knowledge attained through VR are more easily transferred to other situations and scenarios in the real world. *(Makransky et al., 2019)*

In their study on operating room crisis training, researchers saw significantly better performance in the subjects trained in VR:

"... when tested in the mock OR fire scenario, 70% of the simulation group subjects were able to perform the correct sequence of steps in extinguishing the simulated fire whereas only 20% subjects in the control group were able to do so."

(Sankaranarayanan et al., 2018)

Many studies compare VR to traditional classroom training (lecture and manual). But even when compared to other forms of interactive media, it is superior. A group of aerial firefighters were exposed to a firefighting task. Half of the group completed the task in VR, the other half watched a 2D video display. The VR-trained group showed a significant improvement in knowledge and skills when compared to the 2D group. *(Clifford et al., 2018)*

There are many studies that show superior performance after VR training. Other notable results include:

- A **25% increase in driver safety scores** after training in VR (vs reading a manual or viewing safety videos.) *(Lang et al., 2018)*
- Young doctors showed **improvement in empathy** with older adults who have age related conditions. *(Dyer et al., 2018)*

Immersive Training is safer

Many jobs involve inherent risk. Immersive training can lessen that risk by creating a safe work environment in which to practice skills.

Under-trained workers who make avoidable mistakes are dangerous. They may hurt themselves or their coworkers. They may also endanger their customers and clients.

The notion of risk can also be extended to include difficult social interactions. Though not physically dangerous, there is anxiety associated with uncomfortable conversations and challenging interactions. This discomfort can be helped through exposure in VR.

Safer for employees

It is difficult to prepare employees for careers involving physical risk such as manual labour, construction and machine operation. It is unsafe to expose trainees to dangerous real-life situations. Many employers resort to videos and manuals to teach safety procedures.

Standards for safety training can be dangerously low and difficult to enforce and track. Inconsistency in training standards can lead to an unprepared workforce. "In the UK, Australia and Hong Kong, one day or less of safety training is sufficient for workers to obtain the necessary certification as construction labourers" (*Sacks et al., 2013*)

Employers who have turned to augmented and virtual reality for training and preparation report less injury on the job. In one industrial case study, Ford demonstrated a **70% decrease in employee injuries after VR training.** (*Ford reduces injuries with virtual assembly programme, n.d.*)

In another study, VR was used to train miners to deal with fires in the mine. "The introduction of virtual reality to the teaching of mine fire (was a) great improvement. (...) It effectively stimulated the learning enthusiasm of students." (*Tan et al., 2012*)

Safer for patients & customers

Trainees who have learned in VR pose less risk to their customers and patients.

In a Motive-powered VR solution for anesthesia residents, trainees practice obstetric crisis scenarios. The scenarios involve situations in which both the patient and their baby are at risk. Trainees need to make critical decisions on the best course of treatment to avoid disaster. With frequent exposure to the scenarios for practice, trainees can more confidently navigate emergency medical situations. This will lead to the best possible outcome for their patients.

In a second Motive-powered solution, trainees at a large retail and distribution company need to learn the proper way to clean a deli slicer. The implications of not thoroughly cleaning the slicer are dangerous for customers. Improper cleaning can lead to contamination and potential food poisoning. Better prepared workers lead to a more sanitary food prep environment, resulting in a safer product for customers.

Easing Social Risk with Soft-Skills Training

Most people can identify with the anxiety of having difficult conversations. Through VR, trainees can have repeated exposure to these dialogues and situations. This can lower anxiety and better prepare people to respond appropriately when encountered in the workplace. In an analysis of VR training for social skills development, it was determined that "VR training programs, on average, perform better than alternative training programs for developing social skills." (*Howard & Gutworth, 2020*)

Immersive Training is more efficient

Implementing immersive training at the workplace will lead to efficiency gains in speed and volume of training and ongoing employee productivity.

Train People Faster

Employees learn more quickly in VR. This is due to increased focus and faster skill and knowledge processing. For tasks that need repetition, VR is able to respond to a learner's rate of understanding.

In a study of nursing students, the following was found:

"As health care training requires nursing students to master increasingly complex skills, **VR can provide a safe, cost-effective environment to allow repetitive, hands-on training to develop qq**, eliminating academic drift that can occur between instructors or over time." (S. J. Smith et al., 2016)

Three industrial case studies show impressive reductions in time to train:

- Walmart replaced a day-long training session on new in-store technology with a **15-minute VR training module**. Training results were not compromised.
- Nationwide replaced a 3-hour course (that required employee travel) with a 25-minute VR module. This is an **86% reduction in time to train**. There were no adverse effects on skill and knowledge retention.
- United Rentals used VR to replace on-site visits for trainees. This resulted in a **40% reduction in training time**.

(Why companies are turning to VR to train employees faster | Strivr blog, n.d.)

Train more people at once

Some training requires access to physical equipment and locations. This can be difficult to execute efficiently. In our hospital project, the main problem we addressed was the lack of access to simulation facilities.

Currently, medical simulations require:

- an unoccupied OR
- several professional staff members
- mannequins as patients
- and take about two hours to set up and complete.

One trainee at a time can experience this simulation setup. Scaling access to vital simulation training is very difficult in a single location. It is impossible in more remote locations. VR simulations allow residents to work through scenarios at their convenience as often as required.

A similar problem was addressed in a study by researchers at the University of Sydney:

"There are several limitations to using this process for ALS training. Firstly, it is resource intensive to replicate the environment of a cardiac arrest response and provide an authentic experience of the role's trainees are being prepared for. Secondly, given the large numbers of health care professionals who require routine refresher ALS training it is challenging to accommodate the training and assessments required. Thirdly, accessibility is a pressing limitation. Current practice requires trainees to attend sessions at fixed times and locations to utilise rostered staff, equipment and training mannequins." (Moore et al., 2019)

Problems of accessibility and scalability occur across industries. **Access to VR simulations and scenarios drastically increases the number of employees who can be trained at once.**

Employees trained in VR or AR are more productive

Employees with access to immersive technology can work more quickly. A study compared a group of workers using written manuals to operate machinery to a group using AR performance support. **The group with the AR guides were 30% faster than the group with the written manual.** (Hořejší, 2015)

Immersive Training is more consistent

VR allows trainees to have identical training experiences regardless of location or instructor.

Training standards are a moving target. When a procedure needs to be taught with consistent steps and guidelines, employers need to be able to trust that their trainers are all delivering the same information in the same way. It is impossible to achieve 100% consistency for trainees.

“At times, OJT may be an unstructured approach for learning job tasks. Often each AMT has an individualized way of accomplishing a task and subsequently he/she teaches the task in a unique way. These individual teaching methods and job task steps may not be captured in maintenance manual procedures.”

(Haritos & Macchiarella, 2005)

Immersive Training is cost effective

Training costs are a concern at companies of any size. In order for a training solution to make sense, it needs to fit in the budget and to deliver great ROI.

Many assume that implementing immersive training is prohibitively expensive. The reality is that using VR or AR in a training program can be significantly more cost effective than traditional training.

Consider some of the costs of more traditional training methods:

- Travel for employees and trainers
- Hourly wage per employee while being trained
- Subject matter expert non-working/productive hours
- Facilitator: Day rate, travel, admin fees
- Production lines, equipment and tools out of commission while used for training

These costs are reduced or eliminated with the introduction of an immersive training program.

Immersive Training is Reusable

In a training program for evacuation procedures from an ICU, VR was compared to live simulation training. The initial upfront costs of the VR program were higher but by the third year, the hospital had **saved \$124 per employee for a total savings of over \$41,000**. The costs saved were on planning, setup, and time to execute a live simulation. The reusable nature of the VR modules was a great benefit. (*Farra et al., 2019*)

Immersive Training Reduces the Need for Skilled Workers to Be Trainers

There is loss of productivity in organizations who use experienced workers to onboard new employees. It can also be difficult for mentors to schedule the time to work with new hires as soon as they start.

When experienced workers are pulled off of the job to train new hires, it is expensive. “Seminars and workshops can be effective, but these approaches to training cost companies lost work-hour time and reduced short-term productivity”

(Haritos & Macchiarella, 2005)

This can lead to longer-than-necessary wait times for new employees to become productive. An immersive program that is readily available alleviates much of the need for an in-person mentor and trainer. The benefits are two-fold:

- very little “down time” for the experienced employee
- faster time-to-productivity for the new hire. *(Brough et al., n.d.)*

Better prepared employees are more productive

The cost-savings of immersive training programs extend beyond the time the employee is being trained. Employees with more skill and greater confidence work more productively with fewer mistakes. The introduction of a VR program

for maintenance of high-voltage power lines in Mexico has shown remarkable benefits. **Workplace accident rates and associated expenses are dramatically improved.** By the third year, the organization saw:

- **59% fewer accidents**
- **71% fewer workdays lost due to injury and**
- **an overall 94% decrease in expenses related to workplace accidents.**

(Ayala García et al., 2016)

Virtual mock-ups are cheaper and easier to change

Some jobs require practice with equipment and procedures before employees are ready to work on their own. People need time to practice their skills before it is safe for them to work. Setting up simulations and removing equipment from the production line is costly and time consuming. Employees may need to travel to specific training locations to practice crucial skills.

“Virtual training mock-ups and props are easier to create, modify and distribute than physical equipment. Therefore, companies benefit by leveraging VR without a sacrifice to the trainee’s speed, accuracy, or understanding.”

(J. W. Smith & Salmon, 2017)

Immersive Training is more engaging

High employee turnover is a challenge for many organizations. Getting onboarding right is one way to mitigate this loss.

Attracting, hiring and retaining new employees can be expensive and time consuming. It is estimated that the cost of a new hire can amount to 6 months' salary (on top of their regular pay).

It has been shown that employees overwhelmingly prefer and enjoy immersive training experiences.

“VR training is far more attractive and compelling than traditional; all the test participants preferred the VR form if given a choice”

(Zawadzki et al., 2019).

An employee engaged and excited by their training will likely have more job satisfaction and stay with the company longer.

Trainees are better able to stay focused and on-task when immersed. In a case study of construction workers going through safety training in VR, researchers said:

“The researcher who observed the traditional training sessions noted that trainees tended to lose concentration after about 40 minutes; they asked to leave the room to freshen up, they began to use their mobile phones, and their attention was diverted from the material. The instructors allowed them a break. In contrast, the virtual reality trainees were observed to maintain full focus for the hour and a half of the training session.” *(Sacks et al., 2013)*

Employees who learn in VR or AR are more intrinsically motivated. They talk about the training with their peers and discuss their results and the experiences long after it is complete. **Training becomes less of a “tick-box” requirement.**

Immersive Training is easier to measure

Using a VR scenario and xAPI data tracking, training departments have much richer, more meaningful data at their disposal.

Training is commonly tracked in one of two ways:

- Through SCORM compliant web modules in an LMS. Courses can be marked as "complete" with a mark or score attached.
- Trainees are observed by mentors or trainers and assessed.

Both of these methods have potential drawbacks.

An employee who has read through a set of slides or watched a series of videos has completed a requirement. But that does not necessarily mean they have understood or comprehended the training or that they are ready for the job. Using a VR scenario and xAPI data tracking, training departments have much richer, more meaningful data at their disposal. Not only can they determine if an employee has completed their training, but they can access other pertinent data including decisions made, time to complete tasks and the number of times the trainee veered off course.

Devices that track eye movements can also report on attention and focus of the trainee. **The rich data produced by VR simulations gives trainers a much better idea of employee readiness and allows trainees to focus on what they need to practice in order to achieve proficiency.**

In research completed at the Center for Advanced Vehicular Systems it was found that "Completion time and accuracy can be easily recorded in a virtual environment at a level of detail and objectivity that is very difficult to achieve in the real-world. The virtual reality tool supports exploration and experimentation while providing endlessly patient feedback based on real-time analysis of the data." (Carruth, 2017)

Employees evaluated by mentors and trainers face a lack of objectivity. Though standards and requirements are supplied, assessments are conducted by a person with natural biases. These biases may be toward the trainee personally, the correct methods to use, and the relative importance of each task. In a computer assessed virtual simulation bias is eliminated.

Conclusion

There has never been
a better time to try VR training.

The evidence in favour of immersive training grows each day. VR and AR as a medium for training has moved beyond the theoretical realm of academia and into everyday practice at major corporations. Companies that use immersive technology for training realize many benefits including:

- **Decrease cost** for training implementation
- Training backed by **detailed analytics** that help the organization and the trainees grow and improve.

And, employees who are:

- **More confident** and better trained
- More engaged and who feel valued and **motivated to learn new skills**
- Able to conduct their **work more safely**
- Job-ready and **productive more quickly** as trainees

There has never been a better time to try this training medium. Hardware and devices have decreased in price. Software solutions for controlling and distributing your training content are now available.

**The time is now to motivate your people
and train a more successful workforce.**

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