



Immersive Learning

Bringing Learning to Life through Immersive Experiences

With its ability to help learners absorb and retain material in a whole new way, immersive learning can boost learning engagement and retention across industries and applications.

Executive Summary

Interested in learning about prehistoric life? Just put on a headset, open an app on your phone, and start strolling next to a dinosaur in Jurassic Park, seeing and experiencing its history, anatomy and behavior in real time. Your observations and insights will stay with you long after a trip to a conventional museum of natural history would. This type of immersive experience is the future of learning and the shape – and sights and sounds – of things to come.

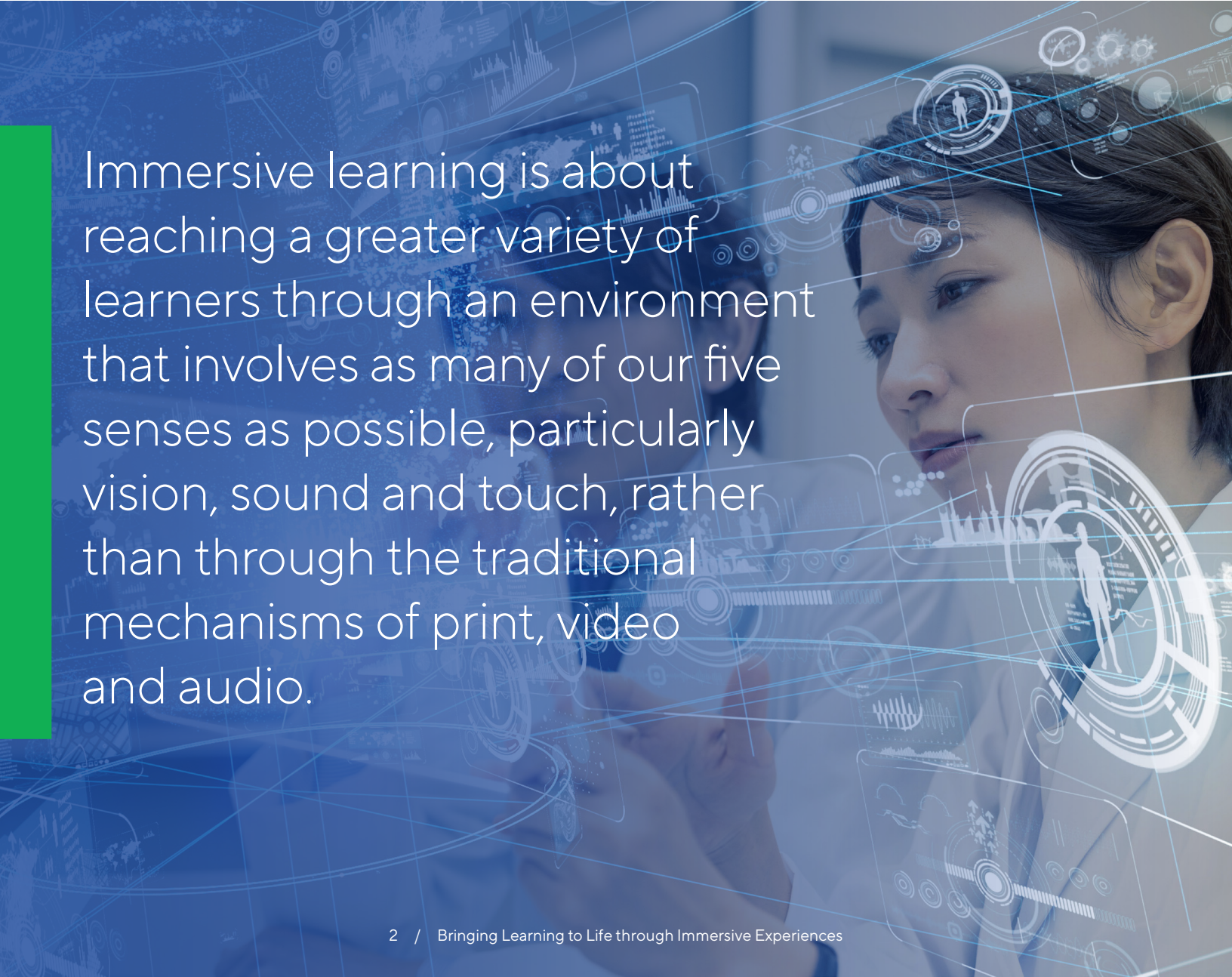
With the growing sophistication of advanced digital technologies such as artificial intelligence (AI), virtual reality (VR), augmented reality (AR) and mixed reality (MR), immersive learning is coming to life (see Quick Take, page 4). The combination of these technologies is moving the learning experience into the virtual world, in which learners can interact through gesture recognition and voice interfaces. These rich learning experiences are set to disrupt the field of education, whether it's

university course content, a human anatomy lesson for a medical program or a virtual courtroom experience for budding lawyers.

Indeed, by 2021, 60% of U.S.-based higher education institutions will use VR to create an enhanced simulation and learning environment, according to Gartner.¹ The market for educational VR was worth \$269 million in 2017, and is forecast to reach \$1.7 billion by 2021, a 55% compound annual growth rate.² North America is expected to be the fastest growing market due to heavier investment

and a swifter rate of technology adoption, according to VR Education Holdings.³

Given this backdrop, education providers should begin now to create strategies for immersive learning experiences. This white paper spells out a strategy for turning this potential into reality by evaluating technologies and use cases, creating an immersive learning strategy and piloting the most promising applications before proceeding to a comprehensive rollout.

A woman in a white lab coat is looking at a tablet. The image is overlaid with various futuristic digital graphics, including circular icons, lines, and data visualizations, suggesting a high-tech or educational environment.

Immersive learning is about reaching a greater variety of learners through an environment that involves as many of our five senses as possible, particularly vision, sound and touch, rather than through the traditional mechanisms of print, video and audio.

Toward vivid learning experiences

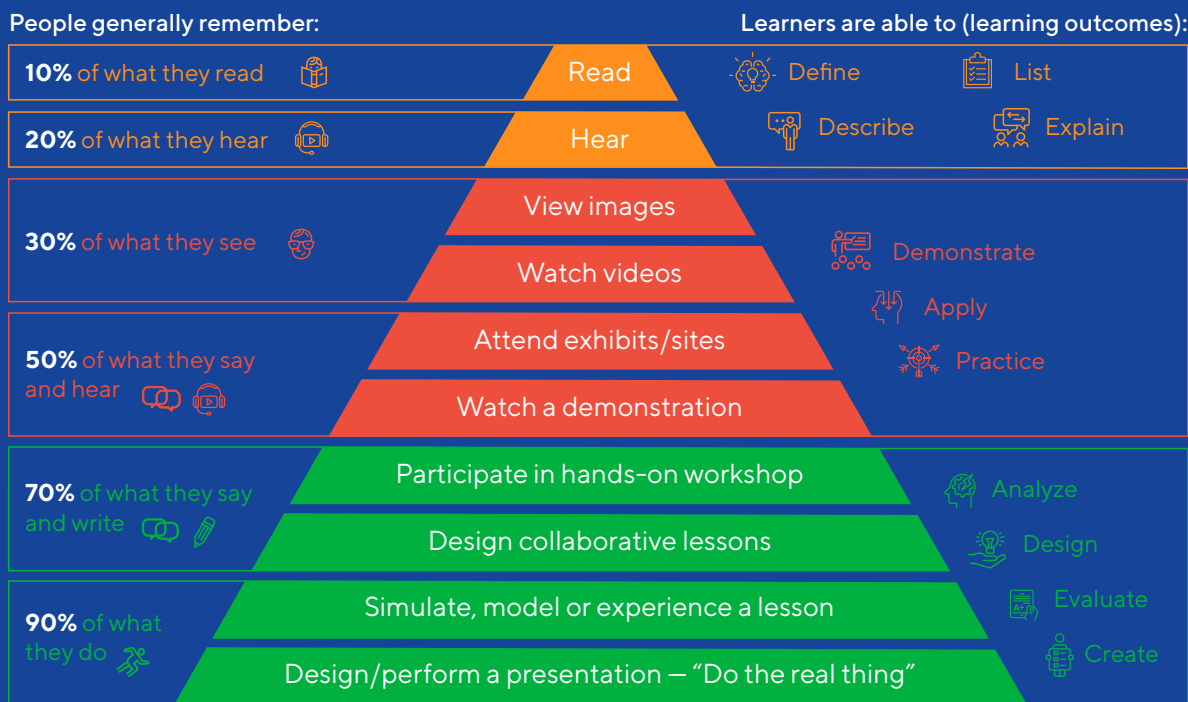
Rather than sitting with an old-fashioned paper-based chart, imagine how powerful it would be for chemistry students to instead interact with a 3-D periodic table of the elements and learn through experimentation. How about enabling them to virtually add peroxide to potassium iodide and see the column of foam that results? How exciting would it be to explore a virtual railway station and learn how to buy a train ticket through a simple conversation?

Educational providers can now deliver all three of these experiences in a safe, controlled virtual environment with a focused educational outcome: learning the periodic table, experiencing chemical properties and preparing to use public transportation at a particular locale.

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The impact of experience on learning outcomes

According to Edgar Dale’s “Cone of Experience,” the greater the number of senses involved in the learning process, the more effective the learning.



Source: www.queensu.ca/teachingandlearning/modules/active/documents/Dales_Cone_of_Experience_summary.pdf
Figure 1

As such, immersive learning offers many advantages over conventional learning approaches:

- I **The opportunity to learn through experience.** Educators can create different scenarios so learners can see and understand the material in a more interactive way.
- I **Meaningful interactions in a rich environment.** Learners can demonstrate they've met the learning objectives.
- I **Curriculum aligned with accepted standards of learning.** Global standards can be embedded

into the content, such as thresholds for learning a new language, which ensures learner performance meets or exceeds expectations.

- I **Educational scaffolding (which allows students to comprehend the solution set in its entirety with supports removed over time).** Professional learning experiences, such as legal education, can be designed with real-world scenarios such as mock trials, giving students the ability to practice and gain feedback and assistance from instructors.

Quick Take

The world of immersive technology

A number of technologies and devices are involved in the delivery of immersive learning:

- I **Virtual reality** allows 3-D interactivity between the learner and the material.
- I **Augmented reality** enables interaction with 2-D and 3-D objects.
- I **Gesture recognition** allows users to interact with applications in a new way, such as those built on the Microsoft Kinect platform.
- I **Wearable devices**, including head-mounted displays, bring learners into virtual worlds where they can learn by seeing and doing.
- I **Haptic technology** allows for texture recognition through the user's fingertips.
- I **Speech interfaces** provide ease of use.

Immersive technology plunges students into virtual environments, where they not only gain academic knowledge but also practice problem-solving, critical thinking and technical and creative skills, both individually and in collaboration with other students.

How immersion supports the learning process

Learning has traditionally been a one-to-many experience, with the “sage on stage” transmitting knowledge that is passively received (or not) by the students. First-generation digital technologies allowed learners to time-shift learning sessions, running them on-demand at their convenience. This development was a breakthrough in terms of allowing learners more agency in their learning experiences, such as the ability to absorb knowledge at their own pace and replay as needed (see Figure 2).

Advanced digital technologies go further by delivering targeted bursts of knowledge in-the-moment via sensory experiences that lock in learning at a much deeper level.

Immersive technology plunges students into virtual environments, where they not only gain academic knowledge but also practice problem-solving, critical thinking and technical and creative skills, both individually and in collaboration with other students. More than simply asking students

Learning delivery evolution

The change in learners’ expectations due to technology.

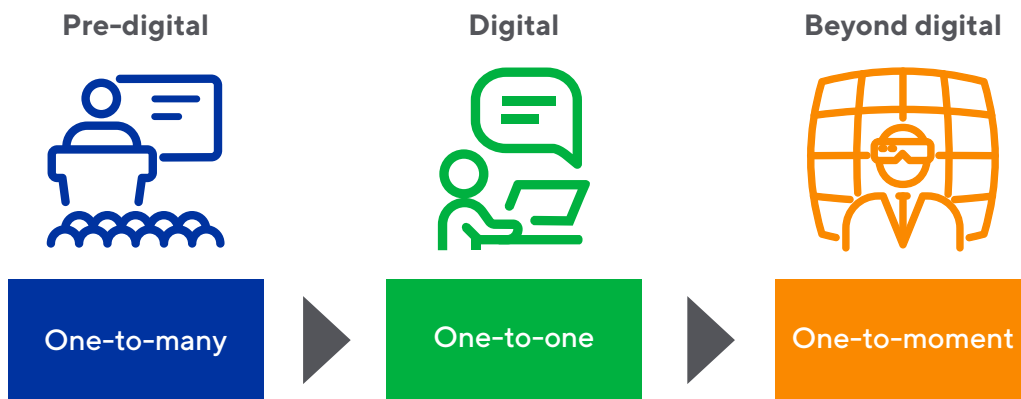


Figure 2



questions and having them provide an answer that's either right or wrong, immersive learning empowers students to strategize and make their own decisions so they learn from their successes and failures.

Such customized experiences and realistic simulation environments enhance student interest. Engagement levels can be measured by the amount of time learners spend with a learning system or game and how often they return to it, which is an important indicator of how interesting and attractive the application is.

Because immersive learning supports self-guided exploration and makes the inaccessible accessible, it has the potential to significantly improve the future of education and research. Venues that would have previously been out of reach, such as remote archeological sites, 360-degree immersive

tours and skywalks, can be fully experienced, serving as immersive workbenches for researchers.

Immersive learning spaces can also support collaboration and co-creation in a virtual environment, such as the construction of architectural models or recreation of historic or natural sites and other spatial renderings. With immersive technologies, educators can also create personalized, one-off experiences, aligned with a specific curriculum or set of standards.

Virtual simulation environments represent another area of significant potential. In sectors where a traditional training environment would pose health and safety risks, a simulated environment, such as a virtual factory, would allow learners to test valuable skills and explore the outcomes of their decisions with no threat to their safety or damage to costly equipment.

Immersive learning in the real world

All industries can benefit from immersive problem solving and the ability to tell stories aided by VR technology.⁴ Immersive learning is already enhancing learning outcomes across a variety of industries and applications:

- I In science labs**, students can perform specific measurements, conduct authentic lab procedures and get real-time assistance with hand and body movement.
- I In manufacturing**, companies can create 360-degree video manuals for equipment on the shop floor and in the field.

I In the medical field, virtual 3-D anatomical models and surgical procedure simulations can accelerate learning and retention.

I For law students, immersive mock trials can aid in trial preparation by covering court etiquette, witness and defense interactions and how to make opening and closing statements.

Other practical applications include vocational courses (such as culinary education or automotive repair), teacher training and language learning (see Quick Take, page 7 and 8).

Quick Take

VR Transforms Critical Neonatal Training

We worked with the University of Newcastle (UON) in Australia to create a VR-based delivery room for midwifery students to learn key anatomy and birthing techniques. The solution simulates a virtual emergency neonatal resuscitation event. Utilizing VR headsets such as Samsung Gear VR, HTC Vive and Oculus Rift, the students can experience and learn vital and advanced neonatal resuscitation skills in a simulated environment.

Our VR solution allows students to undertake a series of steps to pass the time-critical scenario, either with a virtual “helper” in practice mode, or individually in a formal test. As the simulation is easily accessible and portable, students can study anywhere at any time. Run via an app developed for Microsoft Windows, iOS and Android, the technology is designed to maximize the learning experience by allowing students to train outside the classroom at their own pace.

Quick Take

Immersive Experience for Language Learning

Language mastery is an area that's ripe for experiential learning. We developed an immersive program for English language learners preparing for an assessment such as Test of English for Foreign Language (TOEFL), International English Language Testing System (IELTS) or Pearson Test of English (PTE). Currently, such learners (most from non-native English-speaking nations) use textbooks, audio tools or conversations over the web to learn and improve their skills. What they lacked was an engaging solution that would help them learn a country's culture as well as improve their language skills through real experiences.

We crafted a learner-centric, task-based learning module, available via mobile devices, in a flexible and engaging format. Aligned with global language standards, the rich content includes VR-based experiences that allow learners to engage in the foreign language while performing everyday tasks, such as buying a train ticket.

The program covers three major aspects of English language teaching and assessment: reading, listening and speaking. As learners practice these skills on the immersive language solution, their work is compared with the global language-learning standards of the Common European Framework of References for Languages (CEFR). The system suggests next steps to help learners continually reach higher levels of mastery. A learner at the A2 CEFR level, for example, would be shown words and phrases to advance to the B1 CEFR level.

Looking forward

To move ahead with immersive learning, education providers should map out a strategy with the following elements:

- I An in-depth needs assessment** using a tool such as our 4Si Framework.⁵
- I Feedback from all constituents**, including students, to ensure the immersive offering meets all requirements.
- I A readiness plan** to deliver the immersive experiences to learners.

As with any learning solution, time to market is a key consideration when it comes to immersive learning. With our Immersive Learning Platform (ILP) and specialized widgets for education (such as assessments and reports), we can help

organizations quickly and cost-effectively create immersive learning experiences. The ILP contains application programming interface (API) gateways for integration with enterprise systems in key areas, such as identity management, single sign-on, learning path, gradebooks, student information systems and institutional financial systems. The platform is one way for education providers to quickly and cost-effectively innovate while minimizing the risk of developing immersive learning products that engage learners.

Immersive learning offers great potential to speed acquisition and retention of learning materials. The critical success factor is the ability to deliver the right content for each learner to achieve the desired learning outcomes.

Endnotes

- ¹ Marty Resnick, "Virtual Reality in Higher Ed," Gartner Blog Network, Aug. 3, 2017, <https://blogs.gartner.com/marty-resnick/2017/08/03/virtual-reality-vr-in-higher-ed/>.
- ² VR Education Holdings: www.vreducationholdings.com/archive/admission-document.pdf.
- ³ Ibid.
- ⁴ "Master Storytelling: Using Virtual Reality," Cognizant Technology Solutions, Dec. 21, 2016, <https://youtu.be/3cvvqTBlrcA>.
- ⁵ "Helping the Education Industry Learn and Ascend the Digital Technology Curve," Cognizant Technology Solutions, July 2017, www.cognizant.com/whitepapers/helping-the-education-industry-learn-and-ascend-the-digital-technology-curve-codex2580.pdf.

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Manoj Chawla is a Senior Manager within Cognizant's Education Practice. He has served global customers in the higher-ed, K-12 and continuing education spaces. In these roles, Manoj has helped customers define and develop learner-centric digital solutions. His areas of expertise include digital strategy, solution envisioning and process consulting. A Certified Scrum Product Owner (CSPO), Manoj also holds an MBA from Great Lakes Institute of Management and an engineering degree in electronics. Manoj can be reached at Manoj.Chawla@cognizant.com.

About Cognizant

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