

A young woman with long dark hair, wearing a red and black plaid shirt, is smiling broadly while holding a white and black VR headset over her eyes. She is in a modern, brightly lit indoor space with large windows and structural beams in the background. A large, thin purple circle is overlaid on the image, framing the woman.

From Engagement to Impact

Defining quality in immersive learning

Immersive learning is gaining traction across classrooms, but its impact remains inconsistent. As adoption grows, the key challenge is no longer access to technology, but confidence in quality. This report draws on learning science and insights from more than 500 educators to define what high-quality immersive learning looks like in practice, and to provide a science-backed, validated framework for evaluating it.

Contents

- p.03 **Introduction**
- p.04 **Immersive Learning Won't Scale on Enthusiasm Alone**
- p.08 **A Multi-Stage Approach to Understanding Quality**
- p.10 **Key Findings on Immersive Learning**
- p.21 **Looking Ahead**

Authors: Abby J. Holm, PhD, Erica M. Barhorst-Cates, PhD, Meredith Reeve, and Rachel Hopman-Droste, PhD, Research & Development and Thought Leadership, Pearson Chief Strategy Office.



Introduction

Immersive learning is gaining traction across classrooms of all ages and subjects. But as the field grows, a shared standard for the **quality** of immersive learning has yet to emerge.

This report introduces immersive learning and its six most common modalities, presents our research findings, and offers criteria for measuring the quality of immersive learning experiences. It is accompanied by two practical guides: one for educators who incorporate (or who are considering incorporating) immersive learning into their practice, and another for the independent software vendors who build these experiences.

[More information on the guides is available at the end of this report.](#)

Immersive Learning Won't Scale on Enthusiasm Alone

Immersive learning is no longer experimental, but its impact is inconsistent.

The question facing many educators is no longer whether immersive technologies can support learning, but which experiences are worthy of their time, attention, and trust. What the field lacks is not content or enthusiasm, but clear, research-grounded signals of quality. As immersive learning moves from early adoption to broader classroom use, the next phase of scale will depend on educators' confidence in the quality of those experiences.

In recent years, Immersive Learning via Extended Reality (XR) tools like Virtual, Augmented, and Mixed Reality has demonstrated clear utility across a range of contexts.^{1,2,3} Students and teachers praise its impact in practical and innovative use cases, including language learning, science labs (e.g., dissection and titrations), literary immersion, field trips, soft skills development/assessment, public speaking practice, and industrial training simulations. These use cases often align to the

well-established 'DICE' framework,⁴ enabling experiences that are Dangerous, Impossible, Counterproductive, or Expensive/Rare in the real world, expanding access to learning for students in classrooms who would have otherwise missed out. In many spaces, XR is transforming what learning looks and feels like, raising more complex questions on approaches to instructional design and learning quality.

Defining immersive learning technologies

While most people tend to think of XR as high-tech virtual reality (VR) headsets, immersive technology can take many forms, ranging from holographic displays to haptic (i.e., tactile) gloves. For the purposes of this work, we've defined the six main types of immersive technologies along with examples of educational use cases:

Augmented reality



Devices that digitally overlay information or simulations on the environment

Example:

Science students point the camera of a tablet at a real-life human body diagram and see 3D organs appear on the screen, allowing them to explore anatomy interactively.

Virtual Worlds



Interactive digital social spaces accessed via desktop

Example:

English/language arts students inhabit a recreated literary universe, interacting with characters and artifacts to explore the culture, politics, and daily life of the era.

Virtual Reality



Headsets or other head mounted displays that fully immerse the user in a simulated environment

Example:

History students are "transported" to Ancient Rome or the Secret Annex of the Anne Frank house, experiencing environments impossible or expensive to visit in person.

Holographic Displays



3D displays and/or wall-to-wall screens

Example:

Geology students use floor-to-ceiling wall screens available in their media center or local library to display an immersive, to-scale map of tectonic plates shifting in real time, allowing students to visualize continental drift across millions of years.

Mixed Reality



Devices that merge the physical and digital world by producing simulations onto objects in the real environment

Example:

Air traffic controllers are able to practice situational awareness from home as they wear a device that changes one of the walls in their home into a simulated window overlooking the runway.

Sensory Technology



Devices that produce haptic, olfactory, and/or sound as part of the experience

Example:

Surgical students use haptic gloves to practice making incisions and sutures, receiving tactile resistance feedback that simulates real tissue.

The real barrier isn't hardware: it's time and trust

Beyond just looking futuristic in the classroom, XR is well-liked as a pedagogical tool by the educators who use it: 90% of teachers in our survey reported that XR enhanced the quality of their students' learning and 96% expressed positive sentiment toward the technology.⁵ Students also show high levels of enthusiasm about engaging with immersive technology with another recent survey finding that most (63%) teens express excitement about XR in their classes.⁶

But enthusiasm alone does not drive adoption or sustained use. Despite a market that has exploded to over 800 content providers, teachers consistently cite the same friction points: infrastructure gaps, usability challenges, and - most pertinent to this work - the amount of time required to find quality experiences worth bringing into the classroom.⁷

Beyond their role as educators, teachers who want to bring XR into their classrooms need to act as curators, technologists, reviewers, and quality assurers to simply identify the learning experiences that are truly worth their (and their students') time.⁸ This is time that today's educators simply don't have.

But time isn't the only obstacle. Teachers and researchers also report a shortage of high-quality

immersive learning content in the field, meaning that even when teachers invest the hours to seek out immersive learning experiences, they may not find what they need for high-quality instruction. Teachers consistently must distinguish between immersive experiences that look impressive and those that are instructionally/pedagogically sound. This distinction matters, as experiences that incorporate learning science components like intentional design or effective scaffolding are far more likely to translate into meaningful learning.^{9,10}

Ultimately, these bottlenecks of time and quality content create compounding friction that prevents many teachers from ever getting started with immersive learning. Those bottlenecks, combined with barriers around cost, space, technical support, and professional development, present an opportunity cost for educators who are deciding between an immersive learning experience that may deliver greater engagement and learning value and a "tried-and-true" traditional learning activity that may not offer as much value, but is easier to find and implement.

Understanding and signaling quality is therefore emerging as a central challenge for the next phase of immersive learning adoption.



You want to use the technology, you want to do the cool things. But if you have to spend 5 hours trying to find what to use, then you're probably out, because teachers just don't have time, especially in K12.

U.S. University XR Coordinator



Our Research

To address this challenge, we conducted a multi-stage research project aiming to better understand the experiences of educators using immersive technologies for learning and to identify signals of quality immersive learning experiences.

Our immersive quality research focused on two key questions:

- **How are teachers and students currently engaging with immersive learning experiences in their classrooms?**
- **What makes an immersive learning experience high-quality?**

Our goal was not only to understand current practice, but to design a tool that would identify research-grounded, consistent signals of quality that could support more confident and efficient decision-making in the immersive learning space.

A Multi-Stage Approach to Understanding Quality

To ensure both academic rigor and real-world relevance, we combined substantial quantitative data, qualitative insights, and in-classroom testing.

This approach allowed us to connect three perspectives:

- **Educator experience** – how teachers select and evaluate immersive experiences
- **Learning science** – what the research tells us about how effective learning experiences are designed
- **Implementation reality** – how immersive experiences perform in real classroom contexts.

This work is grounded in Pearson's broader approach to quality. Through the Global Quality Standards Framework, Pearson defines quality learning as that which delivers meaningful outcomes for learners underpinned by learning science, user experience, and accessibility. These standards provide the foundation for understanding what 'good' looks like across contexts, including emerging areas such as immersive learning, while also affording quality indicators unique to the field of XR.



Stage 1

Understanding the current landscape

In late 2025, we administered a survey to ~500 secondary school teachers (grades 6–12 in the U.S. and key stages 3–5 in the U.K.) who have used immersive technology in their classrooms in the last six months.

This phase helped us understand how teachers currently use immersive technology in their classrooms, what barriers teachers encounter, and how they define high-quality immersive learning.

This allowed us to ground the research in real classroom decision-making: how teachers balance engagement, curriculum demands, time constraints, and perceived effectiveness when choosing immersive tools.

Stage 2

Identifying signals of quality

Building on survey insights and established learning science research, we developed a detailed list of **key criteria for quality immersive learning experiences**.

We then conducted a series of in-depth, 1-hour interviews with:

- **14 teachers actively using immersive learning experiences and**
- **5 Independent Software Vendor (ISV) representatives working in XR**

Participants reviewed, challenged and refined these criteria, providing insight into how quality is interpreted from both the educator and developer perspective.

Stage 3

Testing in practice

To understand how these quality signals operate in real-world contexts, we tested the refined criteria across immersive learning experiences implemented in classroom settings from primary to higher education.

Across these classroom tests,

- **Educators and Pearson learning science experts evaluated experiences using the criteria**
- **Teachers, and in some cases, students, provided feedback on the experiences**
- **Results were compared and several statistical tests were applied to assess alignment and overall reliability of our criteria**

Key Findings on Immersive Learning

Across all stages of the research, a consistent pattern emerged: while enthusiasm for immersive learning is high, the ability to identify high-quality experiences remains fragmented, inconsistent, and time-intensive.

At the same time, there was strong alignment between learning science principles, educator judgement, and observed experience quality, suggesting that it's both possible and necessary to articulate a shared, research-informed definition of what 'good' looks like. Four key insights from our research illustrate this:

1.

Quality, not novelty, is the deciding factor

2.

Emotionally engaging students is only the first step

3.

Experiences must fit instructor purpose

4.

Ease of discovery is key

1. Quality, not novelty, is the deciding factor

Quality learning experiences must drive outcomes.

Despite an abundance of content on the market, our teachers emphasized that quality is sometimes hard to come by in immersive learning. When we asked teachers to select the top three barriers that prevent them from using XR more frequently in their teaching, the lack of relevant XR apps/content and concerns about the quality of the content/experience were two of the most common barriers.¹¹

Our analyses further suggest that finding quality experiences makes a real difference when it comes to teachers' perceived impact of immersive experiences on learning. Specifically, the quality of an experience was critical across the spectrum of teachers we surveyed (spanning grades and subjects) and that opinion held true regardless of:

- ✓ their feelings toward XR
- ✓ the frequency with which they use XR
- ✓ the number of devices available to the classroom or teacher
- ✓ their school type (e.g., public, private, online)
- ✓ their level of experience teaching technology in the classroom

At a time where immersive learning experiences are flooding the market, teachers are hungry for quality content that cuts through the noise and shows promising learning gains.



Quality of instructional XR tools varies greatly, making it difficult to choose trustworthy apps and platforms.”

U.K. Virtual/Online School Teacher



2. Emotionally engaging students is only the first step

Educators need XR to not only emotionally engage students but also to drive real learning.

As student engagement in school has declined over the past decade,¹² immersive learning stands out as a notable tool for reversing this trend. Our research told a similar story: 76% of teachers in our survey said they were prompted to use XR because they were looking for new ways to engage students.¹³



From my time using XR in class, I've noticed students jump right into learning with this excited energy. They move around, explore things, and stay focused longer than they usually do. It feels like the lessons stick with them because the experience feels real.

U.K. Secondary School Teacher

Engagement in learning is multifaceted and can take different forms:¹⁴

- **Affective (or emotional) engagement captures students' emotional responses in the classroom, both positive and negative, including interest, boredom, confusion, excitement, and frustration**
- **Behavioral engagement involves participation in learning and academic tasks and includes things like asking questions, contributing to a group discussion, and following instructions**
- **Cognitive engagement refers to effort that is strategically directed toward learning and mastery in a self-regulated way**

And while engagement is critical for improved academic outcomes,¹⁵ engagement alone is not what determines whether experiences remain in regular classroom use.

The educators we spoke to also stressed that quality learning experiences must go beyond the initial thrill (i.e., novelty effects) that immersion offers. For example, when deciding on an immersive learning experience, anticipated engagement from students was the second most commonly reported factor (reported by 52% of respondents), eclipsed in importance by the relevance of the content to the learning goals or objectives (55% of teachers).



76%

of teachers in our survey said they were prompted to use XR because they were looking for new ways to engage students.

3. Experiences must fit instructor purpose

Learning experiences are only as good as their stated purpose.

To ensure learning and engagement go hand in hand, it is vital that teachers identify the core purpose(s) of using XR in the classroom, prior to selecting and implementing the immersive activity. They should consider, for example, if the experience is meant to introduce students to a new concept (e.g., providing an immersive experience that takes students to the surface of the moon prior to a science unit on space) or perhaps to facilitate practice (e.g., basic conversation in a foreign language after learning key words and phrases).



Throughout our research we identified six key purposes that an immersive learning experience might serve:

Introduction of new concepts

XR may be used to introduce students to new concepts, vocabulary, systems, or relationships by making abstract or complex ideas more concrete or accessible through visualization, simulation, interaction, or guided exploration.

Experience-based exploration and simulation

XR experiences can allow learners to explore and interact with phenomena, systems, or scenarios that are rare, dangerous, expensive, inaccessible, or impossible to experience firsthand. These may include simulations, role-based scenarios, and perspective-taking experiences. XR can also be used to create access to experiences that would be otherwise unattainable due to inequalities in resources. Teachers often use XR in this way to provide opportunities for reducing anxiety, building confidence, or increasing empathy through “direct” experience.

Application and practice

Experiences may provide learners with opportunities to apply knowledge and skills through authentic tasks, problem solving, or decision-making within a realistic, yet safe, immersive context. This encourages early exposure and orientation prior to engagement in “the real-world” and/or creates opportunities for students’ immersive practice to transfer to real-world performance.

Supplement or extend learning

Immersive experiences may be used to extend learning beyond core instruction, bringing learning to life by offering deeper exploration, enrichment, or alternative perspectives on a topic, often supporting transfer and long-term understanding.

Complement core instruction

XR can be used concurrently with instruction (e.g., lectures, discussions, readings) to reinforce concepts, support active learning, correct misconceptions, and deepen understanding as students learn new material.

Assessment

Finally, XR can be used to allow holistic, dynamic, or performance-based assessment of knowledge or skills, going beyond traditional multiple-choice tests or essays.

Many experiences can serve more than one purpose, increasing their versatility.

These purposes connect learning science with classroom implementation, helping educators move from asking “What do students do in this experience?” to “How do students learn in this experience?”

When teachers and software vendors identify the purpose(s) up front, they ensure that immersive experiences surpass student engagement and translate into real, quality learning outcomes. This leads us to our fourth and final takeaway around ease of discovery.

4. Ease of discovery is key

In our research, we found that among XR users, the single biggest predictor of how often teachers use XR is how easy it is to find experiences that fit their curriculum. We know that teachers who use XR report spending an undue amount of time and effort to sift through many different learning experiences; we also know that this time and effort is a deterrent for many teachers who are even considering getting started with XR. It has become clear that a tool that can help teachers and ISVs identify quality learning experience is needed and that this tool must be grounded in learning science.



It'd be really nice to have a label that says 'this is a good use, this is how it could be used, and this is what's good about it. Because there are millions of XR experiences out there.'"

U.K. School Teacher

The path to identifying the components of quality immersive learning

To address this gap, we developed the Criteria for Immersive Learning Quality (CILQ), a learning science and research-informed rubric for evaluating and signaling the quality of immersive learning experiences. The CILQ establishes a shared language for quality and aims to enable better learning design by ISVs and more confident decision-making for educators.

Pearson's Learning Design Principles and immersive learning research were our foundation for a first draft of the CILQ.



We gathered several rounds of feedback from educators and ISVs to refine the draft and create an updated CILQ rubric.



A team of learning scientists and educators used the CILQ rubric to rate real learning experiences.



We conducted several statistical tests on the ratings to assess the reliability of the CILQ rubric.



We used the culmination of data to further drop, add, or refine components.

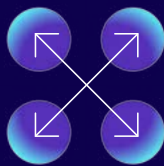


Core components of the Criteria for Immersive Learning Quality (CILQ)

The CILQ identifies six core dimensions of high-quality immersive learning experiences: Each component is grounded in learning science based on decades of research on what makes for effective learning.

Holistic XR Value:

The experience takes advantage of XR's potential for experiences that are impossible or unattainable in the real world due to physical, financial, time, or other constraints.



Learning science foundation:

Learning is engaging and impactful when an activity provides new perspectives and authentic opportunities for learners to experience content in a multisensory, interactive, and emotionally salient way.



[Pearson Learning Design Principle: Authentic Learning](#)

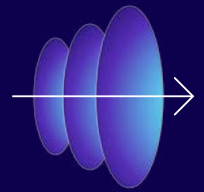


[Pearson Learning Design Principle: Active Learning, Memory, & Practice](#)



Pearson's Learning Design Principles are a set of summaries of the scientific literature on the cognitive neuroscience of learning. Each Principle explains the research behind it, including why it matters to learning and how to apply the Principle for quality learning.

Learning Goals & Intention:



The experience clearly communicates what learners will explore and what they are expected to know or be able to do as an outcome of the experience.

Learning science foundation:

Clear, measurable learning objectives form the foundation for guiding learners toward defined outcomes and ensuring transparency and relevance.



[Pearson Learning Design Principle: Objective Design](#)

Instructional Support & Scaffolding:



The experience helps the learner develop understanding and knowledge through appropriately challenging learning opportunities that build with support.

Learning science foundation:

Learning is most effective when tasks are challenging enough to require effort but achievable with adaptive support that gradually decreases as learners build competence.

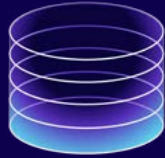


[Pearson Learning Design Principle: Desirable Difficulties & Scaffolding](#)



[Pearson Learning Design Principle: Developing Understanding](#)

Cognitive & Physical Engagement:



The experience is more active than passive, involving hands-on activities and continuous cognitive involvement and decision-making.

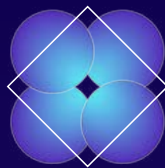
Learning science foundation:

Learning is more impactful, meaningful, and lasting when learners are actively involved in constructing their own knowledge and understanding.



[Pearson Learning Design Principle: Active Learning, Memory, & Practice](#)

Experience Design & Cognitive Load:



The experience is clear, manageable, and coherent, providing appropriate learner onboarding and user controls that minimize cognitive load.

Learning science foundation:

Effective learning design focuses attention on essential content and minimizes extraneous information to reduce unnecessary cognitive load, while promoting connections that enhance understanding.



[Pearson Learning Design Principle: Attention & Cognitive Load](#)

Accessibility & Safety:



The experience provides modifications for accessibility and provide a safe environment for the intended user group.

Learning science foundation:

Learning is designed to reach as many learners as possible by providing access to learners with a variety of sensory and cognitive needs.

In addition to the six components above, there are other “non-core”, quality components that an immersive learning experience might offer and thus, can receive ratings on:

- Assessment
- Practice & Mastery
- Feedback
- Reflection & Meta-Cognition
- Adaptivity & Personalization
- Social Learning & Collaboration
- Non-Player Characters

These components uniquely serve various learning purposes, as opposed to the six core components which serve all learning purposes. We outline these in more detail in Appendix A.

“ Immersive learning succeeds at scale when there is a shared understanding of what quality looks like in the classroom. ”



Looking Ahead

Extended reality (XR) is reshaping what's possible in the classroom, having moved from a novelty to a credible and promising pedagogy that educators and students alike are excited for.

With that maturity and enthusiasm comes the new challenge of scalability. Immersive learning succeeds at scale when there is a shared understanding of what quality looks like in the classroom.

Grounded in learning science and informed by data from teachers, students, ISVs, and immersive experiences, this research has helped to define the core components of quality immersive learning.

In doing so, we contribute to a more shared, evidence-informed understanding of what high-quality immersive learning looks like, providing a foundation for more effective decision-making across the immersive learning ecosystem.

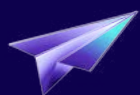
Because when immersive experiences are high quality, learning moves from engagement to impact.



This report is accompanied by two guides meant to empower those closest to immersive education:

Educator Guide: Created to support teachers in selecting and implementing high-quality immersive learning experiences, no matter their experience level with XR.

Independent Software Vendor Guide: Created to support vendors in creating or refining immersive experiences so that they meet quality standards informed by learning science.



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Appendix A

In addition to the six core components, immersive learning experiences can also be evaluated on the following optional components, though they are not required for quality learning to take place:

Component	Learning Science Foundation
<p>Assessment: The experience provides learners with multiple, well-aligned opportunities to demonstrate learning, supporting the development and monitoring of mastery over time in relation to learning goals.</p>	<p>Effective assessments, grounded in evidence-centered design, use clearly defined models to collect valid, reliable evidence of learning progress, guiding both instruction and learner outcomes. (Pearson Learning Design Principle: Assessment & Evidence-Centered Design)</p>
<p>Practice & Mastery: The experience provides learners with multiple, well-aligned opportunities to practice applying skills or knowledge in a low-stakes, supportive environment, with the goal of achieving progress toward mastery.</p>	<p>Learning is strengthened through deliberate, spaced, and varied retrieval practice that challenges learners appropriately while providing feedback to build fluency and long-term retention. (Pearson Learning Design Principle: Active Learning, Memory & Practice)</p>
<p>Feedback: The experience should provide timely, actionable feedback aligned with learning objectives that explains learner performance and supports reflection.</p>	<p>Feedback is most effective when it provides timely, specific, actionable information that helps learners close gaps in understanding, regulate their learning, and make progress toward goals. (Pearson Learning Design Principle: Feedback for Learning)</p>
<p>Reflection & Meta-Cognition: The experience should encourage self-regulated learning to make learning more effective and to be the most beneficial for learners in their lifelong learning journey.</p>	<p>Learning is enhanced when learners actively monitor, evaluate, and adjust their understanding and learning strategies through reflection and metacognitive practices. (Pearson Learning Design Principle: Self-Regulated Learning & Meta-Cognition)</p>
<p>Adaptivity & Personalization: The experience should adapt to the individual knowledge, ability level, or performance of the learner and provide personalized progression paths.</p>	<p>Personalized learning uses adaptive systems to tailor content, feedback, and support to individual learners' needs in real time, creating efficient, engaging, and self-directed learning experiences. (Pearson Learning Design Principle: Personalized Learning & Adaptive Systems)</p>
<p>Social Learning & Collaboration: The experience should leverage social and collaborative learning to increase motivation and feelings of belonging.</p>	<p>Learning is enhanced when learners interact, share ideas, and co-construct knowledge in supportive, inclusive environments that foster belonging and collaboration. (Pearson Learning Design Principle: Social & Collaborative Learning)</p>
<p>Non-Player Characters: Characters, avatars, or agents in the experience are designed to support learning, provide feedback, or provide opportunities for collaboration. Interactions with non-player characters are naturalistic, yet purposeful, improving guidance or feedback.</p>	<p>If implemented intentionally, non-player characters are a unique component of XR that can be used for simulating Social Learning & Collaboration, Feedback, and/or Scaffolding.</p>



This is just the start of the conversation. We'd love to hear about your experiences using immersive technologies for impactful learning. We welcome your thoughts and feedback.

Reach out to us at efficacy@pearson.com

Learn more at
pearson.com/efficacy.learning-evidence.html

