Facility Workforce Career Academy / Historic Preservation Training Center Immersive Learning Strategy

Objective

Apply immersive learning technologies to create engaging, scalable, and impactful learning experiences that align with organizational goals and learning science principles, while ensuring broad stakeholder buy-in and smooth implementation through effective change management strategies.

Executive Summary

Immersive Learning (IL) is the application of Virtual Reality (VR), Augmented Reality (AR), and other Extended Realities (XR) to training to enable people to learn, practice, and/or receive performance support in a context similar to where they will be performing a task. The Facility Workforce Career Academy (FWCA) within the Historic Preservation Training Center (HPTC) creates or facilitates a wide range of training for the wage grade and facilities workforce that is hands-on, in the skilled crafts and professional trades. With IL, realistically rendered "simulated" environments may be created to enable training and practice in skilled trade environments where practice environments may be expensive, hard to access, or difficult to configure (requiring complex systems or tools) or when training may pose significant safety risks (e.g., confined space and heavy equipment work). This plan outlines the rationale and proposes actions to implement an IL pilot for FWCA/HPTC training. By exploring IL guided by learning science perspectives, FWCA/HPTC may enhance and professionalize its training offerings and enable data-informed decision-making to improve its training practices overall, furthering its mission to support preservation of skilled trade work through hands-on application, with cutting-edge methodologies. FWCA/HPTC can advance training effectiveness and impact even in the face of austere budgets through strategic partnerships with academic institutions like the Shenandoah Center for Immersive Learning and alignment with other NPS/Department of Interior efforts to enable IL.

Immersive Learning Defined

Immersive Learning (IL) is an experiential training method that leverages Extended Reality (XR) technologies, such as Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), to deliver engaging, simulated, real-world learning experiences. A basic tenet of learning effectiveness is to have learners practice as much as possible in the context that they will do the work. For example, using the same processes in scenarios, decision-making, or exercises they will encounter on the job and using the resources they would consult along the way. As the term *immersive learning* implies, technology is used to simulate the environment/context that learners will need perform their actions on the job, so that their practice begins to help them build muscle memory, identify difficulties, and receive feedback while in a safe, instructive environment.

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Benefits of IL and Skills-Based Learning

Research has shown that IL is particularly useful to enable practice in simulated environments that may be expensive, dangerous, or difficult to train in. Whereas traditional in-person trainings may require elaborate/expensive practice environments (and travel to those environments), virtual environments enable extensive exposure to critical practice wherever training needs to happen. Virtual environments may be engineered to enable sensory (touch/feel/sound) inputs and responses through haptic devices to fully engage the learner in context or they may interface with equipment employees use in the field (through augmented reality).

IL environments may be built with many tiered levels of sophistication, ranging from easily captured 360 images and videos to developed VR experiences with built 3-dimensional models of complex system parts to be explored (e.g., pumps/valves, PPE, ductwork/piping). Moreover, IL may be delivered through VR headsets for total immersion or accessed through tablets and other mobile devices (e.g., 360-image/video walk-throughs as part of e-learning or AR models generated from equipment QR codes).

Challenges

FWCA/HPTC, like all NPS training organizations, faces growing demand for training support with limited budgets and personnel. Critical FWCA/HPTC workforce training is hands-on, for skilled work in facilities management and historic preservation of buildings or other physical assets that enable the NPS visitor experience and workplace. Wage grade and facilities personnel often fill multiple roles and responsibilities, making their absence from park duties difficult to justify, even as they require critical training (and professional certifications) to do their jobs. Further, these workers may lack access to dedicated computers or the internet to complete online training. These limitations to training access and exposure to novel experiences make it harder for them to perform duties, affecting not only their park but also their exposure to opportunities for career growth with the NPS.

The "return on investment" (ROI) of training organizations has come under scrutiny since the 2020 Covid pandemic. To justify resource and budget requests, agile training organizations are enabling data-informed decision-making about training and learning, which requires being able to gather/report actionable data and evaluate learning to show its effectiveness.

FWCA/HPTC faces additional challenges. In the general workforce, there is declining interest in skilled trades work: Skilled trade workers are in short supply and high demand and pay for government work is below what workers may earn in private industry. There is a critical need to appeal to and upskill younger generations of workers faster and retain them in the NPS workforce to replace skills/knowledge of those seeking to retire.

Opportunities

IL is uniquely suited to generate greater workforce learning engagement for hybrid (in-person + online) training environments. It offers the capability to experience "being there" and, when implemented with spatial design and learning science concepts, can result in highly effective learning experiences.

As travel/training budgets are more austere and training demands are increasing, IL can bring the hands-on experience "to the learner." Consider, for example, how expensive and disruptive it would be for 20 people to travel to a single site that allows them to explore the widest range of wastewater treatment

functions. Compare those costs to the expense of transporting a few instructors with equipment to regional hubs or parks for hands-on training in simulated environments based on various park/unit systems. With IL, workers may have opportunities to interact in and learn from a wider variety of scenarios that they could encounter as well as chances for repeated practice, versus time-limited practice from visiting a single site.

Innovations like IL help preserve the substance of hands-on work while increasing the organization's capacity to upskill workers and support wage grade advancement along defined pathways, providing a tangible benefit to support needed workforce growth and retention.

Opportunity: Engagement with Shenandoah Center for Immersive Learning

Through contacts and discussions following the *IMTech 2024 Conference* at George Mason University, FWCA/HPTC Training Managers visited the Shenandoah Center for Immersive Learning (SCiL) in November 2024 to tour their immersive learning labs and learn about the project-based training methodologies for SCiL undergraduate/graduate students. During this visit, FWCA/HPTC Training Managers and SCiL Leadership discussed opportunities for partnership/engagement with SCiL students and mentors to explore IL for FWCA/HPTC training. As described in the tour brief, SCiL's teaching model aligns closely with HPTC's, aligning instruction through active, real-world project development to enable "on the job" learning. SCiL has previously engaged with the NPS on history-based projects (e.g., "The Great Debate") and is gaining increased attention for partnerships with industry and government to advance IL through an interdisciplinary approach that focuses on learning transfer. Its Northern Virginia location is also close to other Digital Learning innovation hubs coming online, such as George Mason University's FUSE Digital Learning facility.

Partnerships and Funding

SCiL leadership has expressed strong interest in supporting NPS projects, whether through student capstone projects/internships, student/faculty mentor project support, or faculty-led partnerships. Depending on requirements and timing, most of these options were either no- or low-cost supports that may be supported through flexible NPS funding mechanisms. Some of the available funding mechanisms discussed included direct funding or funding from other NPS partnerships/grants, external internships (SCil pays) or internal internships.

Opportunity: Engagement with Internal NPS/DOI Groups Investigating XR

Various efforts within NPS have sought to use VR technologies for visitor engagement (e.g., virtual tours of sites). For example, various park/units have sought to create visitor tours to improve access to resources, and the Harpers Ferry Center is currently collaborating with Fish and Wildlife to develop virtual visitor-experience offerings across the NPS.

Resources and Collaboration

It will be useful to investigate these resources to inform best practices for accessibility or implementation and collaborate beyond the Pilot phase to align with any developing NPS best practices. *In any engagements, it will be important to keep in mind that use of these IL technologies for* **training** *will differ*

*from development/use for **visitor exploration,** as will delivery/hosting, distribution, and evaluation methods.*

High-Level Strategy

Following are some high-level recommendations and key considerations for strategically leveraging IL for training purposes:

1. **Evaluate Feasibility and Value**: Identify use cases where IL offers unique advantages over traditional methods.
   - **Identify best use cases for IL pilots through engagement of Training Managers and key Subject Matter Experts.**
     - Use the **DICE** method to evaluate what may work best: Where training maybe **D**angerous, **I**mpossible, **C**ounterproductive, or **E**xpensive. Examples: Where use of products may make training expensive or where bringing learners a "digital twin" of a system to explore is cheaper or more possible than bringing a whole system to learners or bringing learners "to" the system.
     - *TMs/SMEs should be integrated into any IL design process.*
2. **Build a Knowledgeable Team**: Identify internal capacity to support/manage initiatives and leverage external expertise.
   - Ensure oversight of efforts by learning professionals with experience (a) applying the learning sciences to design/develop/ and evaluate content and interactions for transfer of training to the workplace and (b) providing project management for internal and external development expertise.
   - **Identify overlap and possible engagement with other NPS/DOI entities pursuing IL development.**
     - The Harpers Ferry Center is working with the Fish and Wildlife Media Services to explore IL for visitor learning experiences. *Potential to align with/adopt best practices identified by this team for accessibility and implementation.*
     - The Mather Cultural and Natural Resources Training Team is developing workforce avatars that may be leveraged for use in VR or 360-media e-learning.
   - **Determine extent of support and provide oversight for development** by external partners (e.g., SCiL).
3. **Focus on Scalable and Measurable Solutions**: Start small with pilot programs and scale based on proven outcomes, through data-informed decision-making.
   - **Develop/improve IL through data-informed decision-making:**
     - Implement IL with a "learning engineering" mindset, seeking to understand the challenge (opportunity to improve learning, thru data analysis), then create (design/build and implement with data instrumentation), implement (with data collection), and investigate (analyze gathered data). See the Appendix for more about *learning engineering.*
     - *Data gathered for each development cycle feeds the next iteration of improvement within the context of understanding the Learner audience, work context, and team available for development.*

4. **Secure Leadership Buy-In**: Tie IL initiatives to clear metrics for return on effort to meet identified strategic organizational goals.
   - Data collected/validated through a learning engineering process should provide evidence to support leadership buy-in for continued pilots or adoption.
   - Align evaluation strategy to reflect DM 410 requirements and the L&D evaluation strategy, using distinctive questioning to acquire actionable data in any analysis or surveys.
5. **Implement Change Management**: Address concerns, provide support, and involve stakeholders throughout the introduction of IL to FWCA/HPTC programs.
   - **IMPORTANT! Be intentional in the use of the term *immersive learning,* to maintain focus on the goal of learning/training versus a particular technology or tool (e.g., AR or VR).** *Focus on the toolset and equipment (the "plumbing") has, in the past, hampered VR/AR adoption as equipment "features/functionality" became more important than the learning transfer opportunity that IL presents.*
   - **Introduce and socialize IL as an addition to online or in-person training, not a wholesale replacement.** *IL experiences add the "immersive, real-life practice" that instruction alone cannot provide.*
   - **Socialize and support rollout/adoption of IL:** Identify early adopters, determine the most impactful pilot offerings, socialize concepts for those reluctant to engage, release/evaluate minimum viable products or low-entry IL experiences (e.g., with 360 images) to encourage engagement and evaluate response.

Suggested Next Steps

- Complete development of the Mock Safety Inspection (self-paced e-learning with immersive 360 images for Collateral Duty Safety Coordinators and other safety professionals), to offer an "initiation" to learning "in context." [*In Progress*]
- Possible second trip to enable key team members to visit SCiL who missed the first visit (Moss, Marcie, David?).
- Brainstorming workshop to uncover potential IL pilot projects for FWCA/HPTC that align with organizational objectives (e.g., high-profile training programs and tablet pilot/rollout).
- Discussion with SCiL regarding engagement around identified use cases.
- Load exemplar IL experiences to VR headsets and provide "show and tell" days to allow potential learners to try them out, contribute to the pilot discussions.
- Ongoing upskilling and sharing of resources relevant to adoption of IL. [*In Progress*]

Appendix: About Learning Engineering

Learning engineering, as defined by the IEEE IC Industry Consortium on Learning Engineering (ICICLE), *is an iterative process that applies human-centered engineering design methodologies and data-informed decision making to support learners and their development.*

Each cycle in the LE process requires considering the Learner audience, available (or attainable) Team resources, and Context of learning while gathering data (from feedback, evaluations, quick interviews or observations), focusing on the identified Challenge(s) and then creating, testing, and investigating to make data-informed decisions.
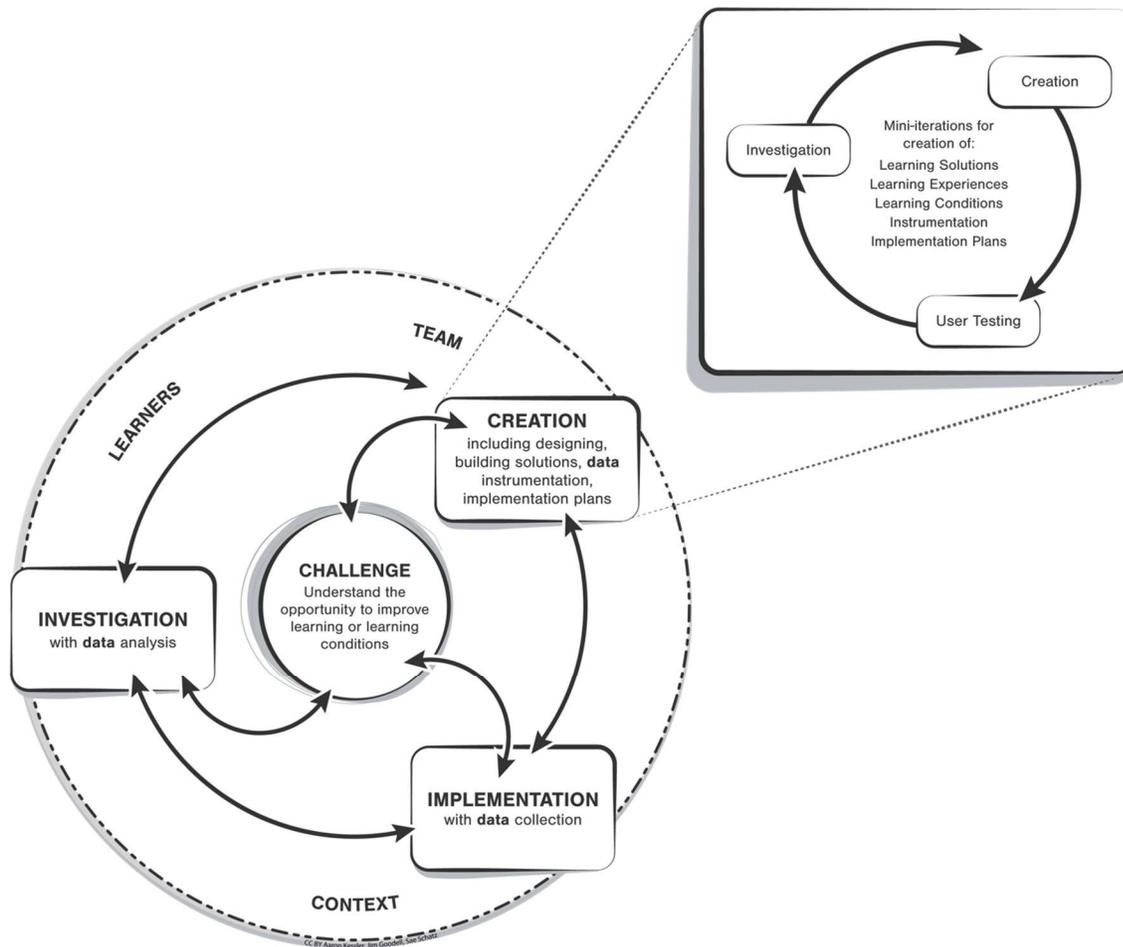
Learning Engineering Process CC BY Aaron Kessler, Jim Goodell, Sae Schatz (Goodell & Kolodner, 2022)

[More information about applying learning engineering to immersive reality training.](#)

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