Immersive Learning Standards (private)

- Immersion
- Artificial Intelligence Agents within Immersion

Immersion

> **TL;DR**
> **Immersion** is not a single thing the hardware does to you. It's a the shift in attention that dissociates you from your immediate surrounding, a **three-part phenomenon** that arises when (1) the **system** surrounds and affords action, (2) **narrative** gives meaning and coherence, and (3) participants exert **agency** that matters (from immediate operations to strategic choices). **Presence** (the feeling of "being there") is related but **not the same construct**. The shift in attention, immersion, can take place regardless or not of that feeling.

Why the term is slippery

Different traditions load "immersion" with different meanings. Technical accounts often treat it as a property of devices and affordances (e.g., FOV, tracking, spatial audio, haptics). Psychological work has at times equated immersion with the feeling of "being there,"[1] now discussed more precisely as **Presence**[2, 3]. Literary and game studies emphasize how storyworlds and player agency shape whether experiences become engrossing[4, 5]. Even within technically rich virtual reality, *plausibility* (the credibility of circumstances and one's ability to act) strongly conditions responses[6].

Bottom line: immersion is multifaceted; reducing it to optics, latency, or any single factor misses what drives learning relevance and engagement[3, 7].

A three-dimensional framework

Treat immersion as emerging from **three interlocking conceptual dimensions**[3, 7]:

1. **System (technological environment).** The substrate that surrounds the learner and affords perception and action: rendering, interaction fidelity, tracking, input, etc. System qualities enable possibilities; they do not guarantee immersion on their own.[3]
2. **Narrative (meaning and coherence).** The diegetic/task framing that makes activity matter: roles, goals, stakes, and internal logic, be it literary or instrumental (mission brief, clinical case). Narrative organizes attention and expectations.[4] Notice that symbolic meanings, even cultural meanings such as colors and other non-verbal cues such as positioning of people, convey mearning, which is part of this dimension.[13]
3. **Agency (doing and deciding).** What the learner can actually do when commited to be meaningful: moment-to-moment operations, tactical choices, higher-order strategy, and how the environment responds with consequences.[5, 10, 11, 12]

Terminology note. Earlier work labeled this third axis “challenge”; subsequent work prefers "agency" as a label, because the word expresses more clearly the wide range of operational interventions and tactical/strategic decision-making.[10], [11], [12]

Immersion vs Presence

- Abstract tasks or observer roles can yield strong cognitive immersion without a strong place-illusion.[3]
- A technically convincing place-illusion can still be non-immersive if narrative motivation or meaningful agency is weak.[6]

Designers and evaluators should therefore **analyze immersion and presence separately** and select measures appropriate to each.[8]

What counts as an “immersive environment”?

An **immersive environment** is the full surround in which immersion can occur: the **virtual setting** (rendered spaces, objects, agents), the **physical setting** (room, equipment, safety), and the **contextual conditions** (cultural, organizational, social, logistical, historical). Within this whole, **system** properties are enacted, **narrative** reaches the learner, and **agency** is afforded and constrained.[9]

Practical implications for standards

- **Design:** Treat system, narrative, and agency as **co-requirements**: plan S, N, and A together.[3], [7]
- **Evaluation:** Avoid single-metric shortcuts. Use distinct instruments for presence and for immersion-relevant factors (agency affordances, narrative coherence, system fidelity).[8]
- **Reporting:** When documenting experiences, explicitly describe S–N–A components and how they interrelate (e.g., strategic options, motivational framing, indispensable system features).[10], [11], [12]
- **Plausibility matters:** Favor credible circumstances and consequential action over photorealism alone.[6]

Attribution

This synthesis is adapted from: *Morgado, Beck & O'Shea (2025)*, with additional references to works cited therein.

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Artificial Intelligence Agents within Immersion

> **TL;DR**
> **Immersion from the perspective of an Artificial Intelligence** agent reframes immersion's three dimensions (System, Narrative, and Agency) from the AI's point of view. For current AIs, **System** means being "surrounded" by data structures, tools, and services; **Narrative** means interpreting spatial, temporal, and anomaly-driven relationships across datasets; and **Agency** means committing to meaning through operational, tactical, and strategic decisions in human-AI and AI-AI interaction. This lens treats AI as a *participant*, not just a tool, in evolving cognitive ecosystems.

This entry adapts and paraphrases a conceptual analysis of how *immersion* can be understood from an AI's perspective, situating AIs as active participants in human-AI cognitive ecosystems[1][2] rather than mere instruments.[1, 2, 3, 7]

From tools to participants

Cognitive ecosystems view learning as co-shaped by humans, AIs, machines, natural systems, and even abstract concepts that interact and adapt together. In this view, AIs influence and are influenced by the behaviors, representations, and constraints of other participants. Generative AI and LLMs have accelerated this shift by making AI behavior conversational and adaptive at interaction time, even when their underlying models remain fixed.[13, 14, 15]

Why immersion still matters

Immersion remains a useful theoretical lens because it separates three *interlocking* sources of attentional shift (System[1], Narrative[6], and Agency[4]) without conflating them with Presence (the feeling of "being there").[2, 3, 5, 8, 9] For AIs, each dimension manifests differently than it does for humans, yet the triad still structures how AIs engage, contribute, and evolve within shared tasks.

Reframing the three dimensions for AI

1) System (AI amidst data and services)

For humans, system immersion involves sensory surround and interaction capture. For AIs, it is their *operational surround*: pre-trained weights, context windows, tool access (e.g., code execution, retrieval, image generation), protocols, and APIs through which inputs and outputs flow. Even without continuous internal model revision, AIs adapt over the evolving context window and available services, which together shape what they can perceive, recall, and do at any moment.[18]

2) Narrative (AI over spatial, temporal, and anomaly relations)

Narrative immersion, when applied to AI, shifts from human diegesis to *relational content* in data. **Spatial** narrative corresponds to how data and tools relate across "atopic" (non-local) digital spaces such as websites, databases, and APIs; **Temporal** narrative captures ordered sequences, timestamps, and evolving streams (e.g., policy trajectories or conversation turns); and anomaly sensitivity plays the role of **Emotional** narrative salience, where deviations from learned or expected patterns reorient the unfolding "story" the AI infers from data.[9]

3) Agency (AI's commitment to meaning)

AI agency shows up in how a system chooses procedures, asks for clarifications, invokes tools, balances breadth vs. depth, and revises its own outputs. Decisions that can be **operational** (immediate actions), **tactical** (course adjustments), or **strategic** (goal/approach reframing).[10, 11] In multi-participant settings, functional "theory-of-mind" reasoning (inferring others' goals and constraints) further shapes agency in both AI-human and AI-AI collaboration[17].

Design implications for immersive learning with AI

- **Co-design System–Narrative–Agency (S–N–A):** Specify the AI's *system surround* (data, tools, services), the *narrative substrate* (relations across sources, sequences, and anomalies), and *agency affordances* (what the AI may decide and how consequences appear).
- **Scaffold atopic navigation:** Make cross-source relations explicit (schemas, API contracts, tool descriptions) so the AI can traverse digital "spaces" and compose results.
- **Make temporality first-class:** Preserve ordering, windowing, and timestamp signals so the AI can detect progressions and regime shifts.
- **Leverage anomaly cues:** Invite the AI to surface outliers and discontinuities as focal narrative events (e.g., "flag unexpected trend breaks and propose checks").

- **Shape agency by instruction:** Encourage clarifying questions, tool invocation, and revision loops; bound initiative with explicit guardrails and escalation points.[10, 11]

Illustrative prompts (adaptable)

- **System-oriented:** “Survey your available tools and sources. Choose and justify a workflow to analyze this dataset, then execute the first two steps and report outcomes and next options.”
- **Narrative-oriented:** “Integrate these sources. Map their intersections, sequence key events over time, and highlight anomalies that may alter the interpretation.”
- **Agency-oriented:** “Start broad, then propose two deep-dive paths. Ask for one clarification that would most improve the next step, and proceed once answered.”

Notes on evaluation

Evaluate presence separately from immersion. For immersion, assess (a) *system* readiness (tools/data fidelity and access), (b) *narrative* integration quality (cross-source relations, temporal reasoning, anomaly handling), and (c) *agency* behaviors (initiative, clarification seeking, revision, consequence awareness).[2, 3, 5, 8, 16]

Attribution

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