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RESEARCH PAPER

Immersive Learning as a Catalyst for Redesigning Instructional Theory and Design

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ABSTRACT

This study explored how veteran instructional designers interpret immersive learning scenarios using traditional models such as ADDIE and Dick and Carey. It focused specifically on Pakistan's higher education design context. While immersive technologies promise enhanced engagement and presence, existing research rarely examines how design models adapt to these environments. Legacy instructional frameworks assume structured learning sequences and predictable outcomes. Immersive learning disrupts this logic through embodiment, spatiality, and learner-driven paths. A theory-informed qualitative design was used. Fifteen experts participated in scenario-based focus group discussions structured around the ADDIE model. Data were thematically analyzed using NVivo, with dual coding aligned to structured and experiential frameworks. Findings revealed model breakdowns at all ADDIE stages. Designers struggled to analyze learner readiness, sequence open pathways, define content, implement through outdated systems, and assess emergent learning. Participants improvised with constructivist and experiential strategies when traditional models failed. Instructional design models require transformation, not extension. Institutions must revise designer training, immersive infrastructure, and evaluation philosophy.

Keywords: Immersive Learning Design, Instructional Design Models, ADDIE Framework, Higher Education Pedagogy, Spatial Learning Environments

Introduction

Immersive technologies such as virtual reality (VR), augmented reality (AR), and mixed reality (MR) have introduced a fundamental shift in how learners experience, engage with, and construct knowledge in higher education. These environments simulate learning through embodied presence, spatial navigation, and multi-sensory interaction. As universities expand immersive platforms aligned with Education 5.0's aspirations of empathy, creativity, and real-world problem solving, educators must revisit the frameworks guiding instructional planning, delivery, and evaluation (Kumar, 2025; Tsarkos, 2024). While immersive learning supports experiential and constructivist engagement, it raises critical questions about the assumptions underpinning traditional instructional design (ID) models, especially those developed for digital learning contexts.

Models such as ADDIE, Dick and Carey, and Kemp emphasize structured sequencing, fixed content delivery, and measurable outcomes. These models emerged during the rise of screen-based instruction and align with modularity, linear navigation, and standardization (Abuhassna & Alnawajha, 2023). Immersive learning, by contrast, is fluid, co-constructed, and nonlinear. Knowledge arises from spatial interaction, situational decision-making, and sensory engagement rather than from pre-ordered content progression. When designers attempt to apply e-learning frameworks to immersive contexts, they encounter tensions not only in delivery strategies but in how learning itself is conceived (Tang et al., 2023). These tensions challenge the adaptability of instructional design and call for closer theoretical inspection.

Despite growing use of immersive tools in higher education, most existing studies focus on cognitive gains, learner satisfaction, or motivational outcomes (Rajabalee & Beetul, 2025). Rarely do they examine how instructional designers interpret immersive demands through the lens of structured models. Where this does occur, studies tend to isolate technology features or general pedagogical principles instead of interrogating the application of specific frameworks. Consequently, immersive learning remains conceptualized as an extension of e-learning rather than as a distinct instructional paradigm (Cao et al., 2023). The resulting literature gap obscures the friction between immersive affordances and the foundational logic of conventional design.

This lack of scrutiny creates both theoretical and practical dilemmas. Many instructional teams continue to use legacy frameworks under the assumption that they are sufficiently adaptable. However, immersive environments introduce distinct demands including continuous user control, narrative branching, real-time interaction, and embodied cognition. These features exceed the pacing and sequencing logic of linear models. Clinging to structured frameworks may hinder innovation, reduce learner agency, and fragment immersive learning experiences (Goi, 2024). Designers face a dual challenge when they must navigate immersive complexity while relying on design tools that do not address such environments.

This study addresses that challenge by examining how experienced instructional designers and educational technologists approach immersive design using established models. Instead of evaluating technologies, the research focuses on how designers interpret immersive scenarios such as a VR chemistry lab or an AR architectural walkthrough when tasked with building learning experiences through familiar models. The ADDIE framework structures the group discussions and thematic analysis, enabling both systematic comparison and open-ended critique. The central aim is to investigate whether traditional instructional design models, especially those developed for e-learning, retain their conceptual coherence in immersive contexts. The study explores how designers apply or adapt existing models when facing immersive tasks and how this reshapes their understanding of curriculum, pedagogy, and assessment.

By grounding the inquiry in expert practitioner reflection, the study contributes to both instructional design theory and immersive pedagogy. It reveals where structured models hold, where they collapse, and where alternative paradigms emerge. These insights offer implications for faculty development, curriculum strategy, and institutional planning in immersive education. The next section reviews the foundational literature on instructional design models and compares their assumptions with the demands of immersive learning. This provides the theoretical and conceptual grounding for the methodology and findings that follow.

Literature Review

Instructional design emerged to formalize and sequence learning, particularly within training and early digital contexts. Models such as ADDIE, Dick and Carey, Kemp, and Morrison conceptualize instruction as a planned process structured around analysis, objective setting, content development, and evaluation (Carvalho & Yeoman, 2023; Handrianto et al., 2021). These frameworks align well with screen-based learning systems where content flows in controlled modules and learners progress through instructor-defined paths. In higher education, especially during the rise of e-learning, such models offered consistency and replicability for faculty and developers working in static, contentdriven environments (Whitson et al., 2022). Their sustained use reflects their practicality in structured digital learning, yet this continued relevance obscures their limitations in newer pedagogical spaces that defy linear progression.

At their foundation, these models assume that instruction proceeds sequentially, knowledge remains stable, and learning outcomes are pre-specified. In digital settings, where quizzes, slides, and videos are arranged within LMS frameworks, this logic performs well (Fernandes et al., 2023; Tsarkos, 2024). However, immersive environments introduce interactional complexity, learner co-construction, and spatial decision-making that disrupt structured sequencing. These contexts require designers to reconsider not just the tools but the logic underlying design models. When immersive environments demand cognitive engagement through bodily movement, narrative exploration, and environmental feedback, legacy models begin to fracture under conceptual pressure.

Applying traditional models such as ADDIE to immersive learning often results in surface-level design misalignment. Learners in immersive spaces do not move predictably across content steps but construct their experience through sensory immersion and real-time feedback. Abuhassna et al. (2024) emphasize that when designers attempt to retrofit immersive experiences into structured models, they create artificial pacing and disjointed sequences that undermine authenticity. Instructional design, in these contexts, must evolve from prescriptive sequencing to situated orchestration that supports learner autonomy. The current study explores how expert designers experience these limitations and what improvisational shifts they make under immersive pressure.

Immersive learning redefines the learner's role, moving beyond content reception toward experiential knowledge construction. Learners engage with environments that simulate real-life contexts and demand affective, sensory, and spatial decision-making. These shifts are not cosmetic but foundational. Instructional design must account for the dynamics of reflection-in-action, emotional response, and embodied problem-solving (Correia et al., 2025; Xu, Kang, & Yan, 2022). Kolb's experiential learning model provides one relevant foundation by emphasizing cycles of experience, reflection, conceptualization, and experimentation. Yet immersive contexts intensify this cycle. Learners not only reflect or act; they integrate both through continuous situational adjustment. This creates demands that legacy instructional models struggle to meet.

In simulations such as medical emergencies or architectural walkthroughs, learners must adapt instantly, interpret feedback spatially, and make decisions through engagement rather than recall (Kumar, 2025; Murtaza et al., 2024). These experiences blur the boundaries between instruction and interaction. The content exists within the environment, not apart from it. As a result, instructional models rooted in pre-packaged content delivery cannot fully govern learning pathways. Instruction emerges from interaction, not from structure alone.

Table 1
Conceptual Misalignment Between Traditional Instructional Design Models and Immersive Learning Environments

Dimension	Traditional Instructional Design	Immersive Learning Environments
Design Structure	Linear, sequenced, goal-driven	Non-linear, adaptive, emergent
Learner Role	Passive recipient of content	Active co-constructor of experience
Instructional Flow	Pre-planned modules and steps	Narrative-based and situational pathways
Feedback Mechanism	Discrete (formative or summative), post-task	Embedded, continuous, environment-driven
Knowledge Representation	Abstract, decontextualized, text or video-based	Situated, embodied, spatially anchored
Assessment Strategy	Performance measured through pre-aligned tools	Demonstrated through interaction and reflection

Instructional Control	Designer maintains control over flow and pacing	Learner controls pacing, sequence, and exploration
Learning Environment	Static screens and digital interfaces	Multisensory, interactive, simulated environments

The comparison in table 1 clarifies how immersive environments challenge the assumptions embedded in traditional design models. The literature increasingly acknowledges this tension. Obourdin et al. (2024) identify that immersive learning challenges structured instructional models through learner-driven sequencing and non-linear navigation. Similarly, Choosang, Chai-ngam, and Pongkiatchai (2023) found that applying ADDIE to immersive gamified nursing simulations limited reflection opportunities and constrained scenario divergence. These studies expose an ongoing misalignment between immersive complexity and content-first instructional logic. The limitations are not simply technical but conceptual, calling for theoretical renewal. Converting existing content into immersive formats will not address these limitations. Instruction must be reimagined as participatory, contingent, and environmentally grounded.

Despite the pedagogical potential of immersive learning, much existing research remains focused on technological affordances, motivation, and usability. Scholars report increased learner engagement and improved short-term outcomes in medical, science, and language education (Khalil & Jumani, 2024; Rajabalee & Beetul, 2025; Reis et al., 2025; Yu, 2022). However, these studies rarely interrogate the instructional frameworks shaping such experiences. The emphasis remains on the medium rather than the method, leading to an inflated sense of immersive effectiveness without attention to design structure.

This trend has obscured the need for instructional coherence. Studies often attribute improved outcomes to immersion itself rather than to well-designed pedagogy. For example, in immersive chemistry labs or historical AR experiences, researchers report success without clarifying whether the learning model suited the environment (Goi, 2024; Tan, 2023). Design becomes a technical afterthought rather than a theoretical anchor. Kim and Ryu (2024) argue that the field lacks empirical studies on how instructional models function under immersive constraints. This omission prevents both academic advancement and practical innovation.

Without clear consensus, the field remains divided. Some researchers suggest augmenting structured models with iterative feedback mechanisms or adaptive stages. Others call for full departures through agile development or design thinking approaches better suited to immersion (Filatro & Cavalcanti, 2024; Gaspich & Han, 2024). The literature reflects no unified path forward. Meanwhile, practitioners must work within institutional structures that constrain innovation. Designers in higher education navigate logistical, technological, and cultural barriers. Faculty training, budgetary limitations, and LMS dependencies often restrict the scope of immersive experimentation. In these conditions, design teams default to known models. Whitson et al. (2022) observe that instructional teams often rename ADDIE stages as immersive phases without modifying their underlying logic. This cosmetic adaptation indicates not only resistance to change but also a lack of accessible alternatives.

Theoretical stasis persists in part due to limited empirical documentation of real-world design adaptation. Existing literature offers abstract critiques but lacks data on how instructional designers confront immersive tasks, revise models, or formulate new logic under pressure. The current study responds directly to this gap by examining how designers use structured models to approach immersive scenarios, and where those models succeed, break down, or invite improvisation.

This literature review identifies four central limitations. First, most studies assume the adaptability of legacy models without evaluating their fit for immersive demands. Second, immersive learning is often reported as pedagogically successful without analyzing instructional coherence. Third, existing frameworks are rarely tested in immersive design contexts, leaving practical design decisions unsupported. Fourth, no transitional model guides designers from structured to spatially responsive frameworks.

The present study offers a theory-informed, scenario-based focus group approach that engages designers with immersive challenges and captures their interpretive responses. Through this method, it reveals how legacy models operate under immersive tension and what conceptual shifts arise when structure meets spatial complexity. By foregrounding practitioner interpretation rather than tool performance, this study contributes to both theory and instructional design reform.

Theoretical Framework

Instructional design models shape how educators plan, sequence, and evaluate learning. This study draws on four foundational frameworks: ADDIE, Dick and Carey, Kolb's Experiential Learning Cycle, and Constructivism. These models represent distinct logics of instruction and provide insight into how designers confront immersive challenges (Abuhassna & Alnawajha, 2023). ADDIE structures design through five stages, Analysis, Design, Development, Implementation, and Evaluation. It supports consistency in goal-driven, instructor-led environments (Handrianto et al., 2021). Dick and Carey builds on this by treating instruction as a systems model, aligning learning objectives with instructional methods, learner needs, and assessment (Carvalho & Yeoman, 2023). Both frameworks prioritize stability and measurability, working best where outcomes and content remain fixed.

Immersive learning disrupts this logic. Learners act within evolving environments shaped by sensory input, real-time decisions, and embodied movement (Dastmalchi & Goli, 2024). These features align with Kolb's Experiential Learning Cycle, where learners engage through action, reflection, abstraction, and experimentation. Kolb emphasizes learner agency and iterative adaptation (Correia et al., 2025). Immersive learning compresses these phases into continuous engagement.

Constructivist theory similarly matches immersive demands. It frames learning as context-based, interactive, and socially mediated. Learners build understanding through exploration, not delivery (Al Abri et al., 2024; Quinn, 2023; Xu, Kang, & Yan, 2022). Constructivist designers avoid rigid pathways and instead enable open engagement with learning elements. Instructional design, from this view, supports discovery rather than direction.

Table 2
Key conceptual distinctions between traditional instructional design models and immersive-aligned learning theories used in this study

Dimension	ADDIE & Dick and Carey (Structured Design)	Kolb & Constructivism (Immersive Design)
Origin of Logic	Systems theory, behavioral objectives	Learner-centered, experience-driven learning
Flow	Linear or step-wise	Cyclical or emergent
Control	Designer-directed	Learner-directed
Feedback	External, staged	Embedded, continuous
Role of Environment	Peripheral (often digital)	Central (environment = pedagogy)
Learner Role	Passive or structured engagement	Active constructor of meaning
Application Fit	E-learning, MOOCs, curriculum mapping	VR, AR, simulations, spatial learning

Table 2 makes clear how these theories differ in their treatment of control, sequencing, and epistemology. Structured models rely on fixed instructional flow, while immersive-aligned theories emphasize emergence and learner-driven experience. This contrast shapes how designers frame instructional solutions in immersive environments.

The study positions ADDIE and Dick and Carey as legacy models, while Kolb and Constructivism offer frameworks that better reflect immersive complexity. The study does not treat these theories as abstract background. Instead, it examines how designers actually apply, revise, or reject them during scenario work.

Focus group participants tackled immersive vignettes using their preferred models. When a designer altered ADDIE's Evaluation stage to capture real-time VR feedback, it revealed strain between structured assessment and embodied learning. Another designer dismissed performance tracking from Dick and Carey, replacing it with exploratory sequences that reflected Kolb's model. These moments show how design decisions reveal underlying theoretical commitments.

Table 3
Role and Function of Theoretical Models in This Study

Model/Theory	Type	Function in This Study
ADDIE	Traditional ID Model	Provides structure for coding FGD responses and organizing themes
Dick & Carey	Systems-Based ID Model	Adds alignment and objective-performance logic during scenario analysis
Kolb's Experiential Learning	Immersive Learning Theory	Explains cyclical learner actions and embedded feedback in immersive settings
Constructivism	Learning Theory	Frames learner agency, social interaction, and environmental meaning-making

Table 3 depicts how each theory functions analytically within the study. ADDIE and Dick and Carey shape coding structures and alignment themes. Kolb and Constructivism help interpret reflective choices and emergent instructional patterns across design scenarios. Theoretical framing also guided analysis. Thematic coding followed ADDIE's sequence while tracing moments of reflection and improvisation linked to experiential models. This dual lens revealed where designers adhered to structured models and where they shifted toward responsive frameworks grounded in learner agency.

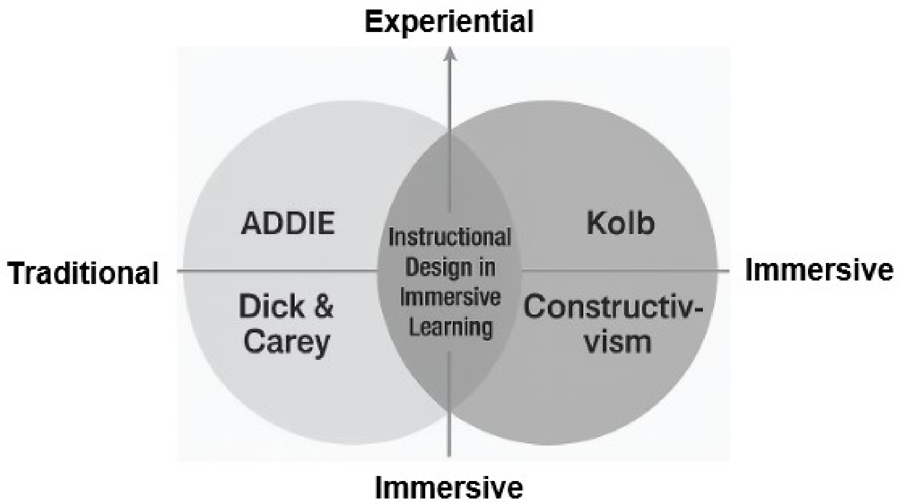

Figure 1: Integrated theoretical framework combining structured instructional design models with immersive learning theories

Figure 1 illustrates the integrated theoretical approach. Structured models provide scaffolding, while immersive theories interpret adaptive responses. This combination allows the study to analyze both consistency and transformation in instructional logic under immersive pressure.

Material and Methods

This study used a theory-informed qualitative design based on scenario-driven focus group discussions (FGDs). The goal was to explore how instructional designers interpret immersive learning demands using both traditional and immersive-aligned models. A qualitative approach was essential for capturing reasoning, interpretation, and adaptation as they unfolded in response to design complexity.

FGDs allowed the research team to observe collective interpretation and theoretical negotiation. This format revealed how participants engaged with immersive design problems in real time, surfacing implicit assumptions and alternatives through dialogue. The setup reflected authentic team-based design environments and allowed comparison across participants while preserving individual divergence.

The FGD protocol followed a structured process. Researchers used the ADDIE model to frame open-ended prompts for each design stage: Analysis, Design, Development, Implementation, and Evaluation. Each prompt asked participants how they would handle that stage when designing for immersive environments. Follow-up questions explored model adequacy and theoretical flexibility. When participants hesitated to describe immersive evaluation using summative logic, moderators asked whether situated or reflective strategies might be more appropriate. Two senior instructional design faculty reviewed and validated the tool to ensure clarity and alignment with current practice. Participants were selected through purposive sampling. Fifteen professionals from instructional design, educational technology, and curriculum development joined the study. All participants had over five years of experience and prior exposure to immersive technologies such as VR or AR. They were organized into three FGDs of five members each, balanced by disciplinary expertise. A conceptual primer on immersive learning was provided before each session.

Sessions were held in a university seminar room using audio recorders and digital displays. Each lasted 90 to 100 minutes. Participants engaged with two immersive scenarios: a virtual reality chemistry lab and an augmented reality architectural walkthrough. They applied their preferred instructional models to each scenario. Moderators guided discussion using ADDIE while prompting for design adaptation. When models failed to align, participants proposed alternatives or redesigned intuitively. Transcripts were uploaded to NVivo for analysis. First-cycle coding followed ADDIE stages. Second-cycle coding used pattern codes such as “model conflict” and “theoretical shift,” linked to experiential and constructivist logic. Ethical approval, informed consent, confidentiality protocols, and member checking ensured research integrity. This methodology bridges structured models with immersive theory, allowing real-time exploration of design logic under transformative pressure.

Results and Discussion

The focus group discussions revealed complex patterns in how instructional design experts in Pakistan interpret and apply traditional models like ADDIE when faced with immersive learning scenarios. Although participants demonstrated deep familiarity with structured design frameworks and displayed high theoretical awareness, their responses revealed recurrent breakdowns when attempting to apply these models to the immersive vignettes. Thematic analysis organized the responses by the ADDIE framework, exposing where instructional logic aligned with immersive design, and where it fractured.

Misaligned Analysis in Immersive Contexts

Participants across focus groups displayed confidence in traditional analysis practices, including learner profiling, device access, and LMS readiness. However, immersive scenarios disrupted these routines. One designer admitted, *"I'm not even sure what kind of learner profiling applies… it's not about laptops now, it's about mental readiness for embodied interaction."* Others identified blind spots around sensory readiness, spatial cognition, and physical stamina, dimensions absent from existing documentation. While participants suggested adapting tools from gaming or psychology, none proposed validated models. The analysis stage exposed a conceptual void: immersive learning introduces interactional variables traditional models cannot frame. Though experiential theories were not named, participants intuitively surfaced themes of presence, action, and embodiment, indicating the need for new analytic paradigms.

Sequencing Collapse in the Design Stage

Initially, participants expressed confidence in aligning outcomes with Bloom's taxonomy and mapping content across modules. Immersive design disrupted this comfort. One designer asked, "*Do I scaffold molecular structures or let learners explore freely*?" Another added, "*Design becomes environmental, not linear, it's not about sequencing but possibility mapping*." Structured models like ADDIE assume fixed content paths. Immersive learning, however, resists such logic. Participants struggled to define learning objectives for unpredictable, learner-led experiences. Several began suggesting performance triggers or exploratory goal menus, signaling a tacit shift toward constructivist thinking. They did not reject design outright but reimagined it around autonomy and discovery.

Development as Environment, Not Asset Creation

The development stage produced the greatest discomfort. Participants frequently mentioned tools like Storyline and Camtasia but admitted these were irrelevant in 3D environments. "*I storyboard everything," one noted, "but how do you storyboard 'bend down and inspect a molecule'*?" Designers recognized immersive content as dynamic, not static. Development became about curating experiences, not sequencing modules. Participants questioned what "content" even meant in spatial contexts. Feedback mechanisms, too, became elusive. Real-time correction threatened immersion, while delayed cues risked irrelevance. Participants leaned toward embedded feedback, though none had frameworks to guide such integration.

Implementation Fractures at the Institutional Level

Implementation triggered frustration. Even designers who articulated immersive plans admitted institutional delivery systems were unprepared. *"Implementation becomes a procurement and policy failure,"* said one participant. Universities lacked headset policies, immersive platforms, and faculty training. Most acknowledged resorting to "2D simulations branded as immersive" to secure approval. Rather than logistical barriers alone, participants identified epistemological tension. ADDIE presumes stable deployment systems, while immersive learning redefines the environment as the system. Implementation, in this view, demands institutional transformation not content delivery.

Evaluation Without Visibility

The Evaluation phase marked the breaking point. Participants could not apply rubrics or standardized assessments to unpredictable, affective experiences. One designer asked, *"Is success picking the right molecule?* Or how long they explore?" Others noted the disappearance of fixed checkpoints and feedback moments. Some proposed journaling, embedded analytics, or reflection-based metrics, but lacked tools or institutional protocols to support these alternatives. One participant invoked Kolb's cycle: *"Maybe it's about documenting reflection, not answers."* Yet most remained constrained by grading systems and LMS outputs, reinforcing the mismatch between immersive logic and traditional evaluation.

Cross-Cycle Reflection

At every ADDIE stage, participants attempted to use structured models as design anchors. Yet each phase collapsed under immersive demands. Analysis failed to anticipate embodied cognition. Design faltered in sequencing. Development lost clarity in asset planning. Implementation became systemically blocked. Evaluation dissolved into uncertainty. Rather than discarding models outright, participants revealed an emergent drift toward experiential and constructivist logics. The findings suggest not mere tool misalignment but an epistemological shift. Instructional design in immersive environments requires theoretical realignment not procedural adjustment.

This study investigated whether structured instructional models extend meaningfully into immersive environments. While immersive learning has been praised for boosting engagement and retention (Siddiqi, 2023; Kumar, 2025), this study highlights a critical oversight: legacy models cannot accommodate embodied cognition, spatial navigation, and dynamic interaction without conceptual revision.

Participants experienced five points of breakdown across ADDIE. In the Analysis phase, conventional tools for profiling fell short. As Power et al. (2024) note, immersive readiness involves sensory and spatial dimensions beyond standard metrics. Participants confirmed this mismatch and called for new heuristics rooted in presence and action.

Design friction emerged around sequencing. Structured models expect learning to proceed through controlled stages. Yet immersive learners move unpredictably, uncovering knowledge through experience. As Khalil and Thakur (2025) argue, immersive pedagogy requires emergent goals. Participants reflected this shift by favoring fluid, exploratory structures over fixed objectives. The Development phase revealed collapse in asset logic. Instructional design normally treats content as objects for delivery—videos, slides, modules. In immersive contexts, content becomes spatial experience. Yu (2023) asserts that immersive space itself is pedagogy. Participants admitted they lacked both vocabulary and workflow to design interaction as instruction.

During Implementation, even theoretically strong participants encountered real-world barriers. LMS systems, funding cycles, and admin buy-in obstructed immersive delivery. As Khan (2024) observes, institutional readiness in Pakistan lags behind individual innovation. Several participants noted that they "simulate immersion" for appearances, underscoring the institutional resistance Motley et al. (2024) term "surface innovation." Evaluation prompted the deepest doubt. Traditional rubrics failed to capture the nuances of embodied reflection, emotional response, or spatial decision-making. Participants proposed tracking behavior or self-guided journaling, but no one could map these onto institutional reporting systems. Araiza-Alba et al. (2021) argue that immersive evaluation must embrace interpretive evidence and epistemological openness. The designers in this study understood this, but struggled to operationalize it.

This study affirms Obourdin et al.'s (2024) call for design pluralism. Participants did not abandon structured models entirely. They used them as scaffolds until immersive demands forced realignment. Their gradual shift toward experiential and constructivist logic illustrates what Shihab, Sultana, and Samad (2023) describe as functional improvisation born from systemic gaps. The findings carry implications for instructional design theory and practice. Structured models must give way to ecosystem-based approaches (Carvalho & Yeoman, 2023). Instructional education should shift toward environmental prototyping, presence modulation, and co-design. Institutions must prioritize immersive infrastructure alongside content planning.

Immersive learning is not just a design challenge. It redefines what it means to teach, learn, and assess. Instructional design must now evolve from delivering content to constructing dynamic learning worlds.

Conclusion

This study examined how experienced instructional designers interpret immersive learning scenarios through the lens of established instructional design models. By organizing focus group discussions around the ADDIE framework and analyzing responses across five stages, the study revealed structural incompatibilities that emerged not from user error but from epistemological disjunctions. Participants possessed strong conceptual fluency and practical expertise, yet their design logic collapsed when applied to environments governed by presence, embodiment, and learner-driven navigation.

The findings showed that immersive learning does not merely challenge implementation or media development. It disrupts the logic of design progression, assessment control, and instructional sequencing. Participants improvised new strategies, such as open-ended goal structures, embedded reflection points, and environmental learning cues. However, these improvisations surfaced only after their legacy models failed to provide pedagogical coherence. This breakdown confirmed that immersive learning does not require model augmentation; it requires model transformation.

Theoretically, the study contributes to a growing body of literature that calls for post-linear, experience-centered instructional design frameworks. It positions immersive environments not as delivery tools but as learning ecologies. Traditional models may still serve as design scaffolds, but they no longer suffice as pedagogical engines. Designers must now engage with spatial sequencing, interaction mapping, and emergent evaluation logic grounded in constructivist and experiential learning theories.

Practically, institutions must revise instructional design training. Designers should develop fluency in immersive interaction design, multimodal feedback systems, and spatial cognition. Universities must invest not only in immersive technologies but also in rethinking design teams, policies, and faculty development structures. Without these shifts, immersive learning will remain pedagogically incoherent despite technological availability.

This study, while grounded in simulated design contexts, highlights urgent realities for higher education systems preparing for immersive integration. Future research should explore actual implementation cases, learner response patterns, and institutional enablers that allow for coherent immersive design. As immersive environments expand, design models must evolve beyond screens, modules, and timelines. The instructional designer's task is no longer to organize content for delivery but to choreograph experience for meaning. That shift demands not just new tools but a new design imagination.

Recommendations

This study recommends a multidimensional redesign of instructional design practices, models, and institutional systems to meet the pedagogical demands of immersive learning environments. The findings demonstrate that legacy models such as ADDIE and Dick and Carey cannot be simply stretched to accommodate immersive complexity; instead, instructional design must evolve at theoretical, procedural, and infrastructural levels.

First, instructional design education must expand beyond content-centric course planning to include immersive prototyping, presence modulation, and environment-based thinking. Design curricula should incorporate scenario-based training, collaborative design studios with XR developers, and assessments that reflect real-time interaction and non-linear navigation. Practitioners need exposure to emerging design logics grounded in experiential and constructivist theory.

Second, institutions must build infrastructure that supports immersive implementation. This includes investment in WebXR platforms, headset integration policies, multisensory lab spaces, and technical onboarding for faculty. LMS systems must be reimagined to host dynamic, spatial learning experiences rather than static modules. Without institutional readiness, even well-designed immersive courses will remain theoretical exercises.

Third, evaluation practices require reconfiguration. Immersive learning demands assessment frameworks that capture reflective practice, spatial behavior, and affective engagement. Institutions should pilot alternative approaches such as performance journaling, embedded analytics, and co-designed rubrics tailored to simulation-based learning. These tools must align with institutional reporting while honoring the fluidity of immersive experiences.

Fourth, collaboration between instructional designers and immersive technology developers must become standard practice. Co-design approaches will ensure that pedagogical integrity is maintained in technologically mediated environments. This collaboration must be framed as iterative and exploratory, not transactional.

Finally, policy reform must accompany design transformation. National and institutional education policies must acknowledge immersive modalities as distinct pedagogical spaces and provide strategic support for their integration. Without policy alignment, instructional innovation will continue to stagnate at the margin of mainstream practice.

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