

Enhancing Art Education for Generation Z Through Immersive Virtual Reality

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Abstract: Effective art education for Generation Z faces challenges due to students' abbreviated attention spans and preference for visually rich, interactive content, while high school curricula demand rapid coverage of extensive artistic movements. Despite the growing availability of immersive technologies, there is limited research on their integration into modular art curricula tailored to this generation. This study investigates how immersive virtual reality (VR) can enhance engagement and understanding of avant-garde art. A pilot study with 32 secondary school graduates exposed participants to two narrative-driven VR episodes centred on Seurat's *A Sunday on La Grande Jatte* and Gentileschi's *Self Portrait as Saint Catherine of Alexandria*. Preliminary findings indicate high levels of attention, curiosity, and contextual understanding, with 87.5% of participants expressing interest in exploring additional episodes. Interpreted through Kolb's experiential learning theory and Csikszentmihalyi's flow framework, the results suggest that modular VR experiences can convert Generation Z's digital habits into structured, meaningful learning. These findings highlight the potential for immersive VR to support both cognitive and affective outcomes, informing the design of high school art curricula that effectively balance engagement with comprehensive content coverage.

Keywords: Educational innovation, Higher education, Immersive learning, Virtual reality, Game-Based engagement

1. Introduction

High school art curriculum often demands a rapid survey of a century's worth of avant-garde movements within a handful of instructional sessions. At Tecnológico de Monterrey, instructors face the compounded challenge of engaging Generation Z learners—digital natives with inherently shorter attention spans and a strong preference for concise, visually driven content—while adhering to institutional policies that limit unsanctioned mobile device use. Traditional lectures and video presentations struggle to compete for students' focus, and unrestricted access to digital assistants can further undermine sustained engagement.

Extended reality (XR) technologies, and in particular immersive virtual reality (VR), offer a promising path forward. By enveloping learners in richly detailed, interactive environments, VR can mitigate distractions and foster deep, multisensory engagement with complex subject matter. Game-based learning (GBL) mechanics augment this immersive approach, leveraging play to heighten motivation and promote meaningful understanding. This paper examines how two narrative-driven VR modules—focused on Georges Seurat's *A Sunday on La Grande Jatte* and Artemisia Gentileschi's *Self Portrait as Saint Catherine of Alexandria*—might be adapted into modular units that align with high school art curriculum's scope and pacing. Drawing on attention-span research, immersive-learning studies, and the existing VR infrastructure at Tecnológico de Monterrey, we propose a blended model that integrates pre- and post-immersion activities to maximize both conceptual breadth and depth.

2. Context

Because the student body consists predominantly of Generation Z—often called digital natives—it is essential to integrate striking audiovisual elements that immediately seize their attention. These learners are accustomed to continuous interaction with a variety of devices, including tablets, smartwatches, smartphones and laptops. In the specific context addressed here, the necessity of covering a century's worth of artistic movements within a limited timeframe poses a significant challenge. Traditional resources such as slide decks and lecture videos no longer suffice to compete for student focus; instead, learners favour concise, dynamic media formats.

Moreover, the effortless access to digital tools and on-demand information sources can foster disengagement, as many students assume that automated assistants will resolve any question in minutes. Rather than restricting device use, it has proven more effective to introduce technologies that actively support their academic growth. For this reason, immersive virtual reality has been adopted: by enveloping learners in a controlled environment, it substantially reduces opportunities for distraction.

In my role as a high-school instructor, I confront these realities daily managing shortened attention spans, permitting use of mobile devices in the classroom for academic purposes, and seeking pedagogical approaches that harness, rather than fight, students' digital habits.

2.1 Attention Span in Generation Z Students

This literature review brings together studies from 2023 to 2025 that examine how Generation Z learners—often described as digital natives—differ in their capacity for sustained attention in educational contexts. Their habitual use of personal devices, affinity for interactive content, and expectation of visual engagement have reshaped how they process and retain information.

A consistent finding is that Generation Z students display shorter attention spans than earlier cohorts. Kyong-Jee (2024) reports that medical students from this generation prefer brief, interactive modules over extended lectures. Likewise, Bunardi and Prestianta (2023) emphasize that rapid visual processing among these learners demands instructional materials that are both concise and dynamic. Traditional long-form presentations risk losing their focus early on.

To measure these spans objectively, Simon et al. (2023) used quantitative time-on-task curves, showing that Generation Z peaks sooner than older groups. Complementing this, Villegas-Ch. et al. (2023) developed an online system that computes real-time attention scores via multi-threaded algorithms—especially valuable in virtual learning environments where continuous engagement monitoring is crucial.

Researchers have also tested interventions aimed at extending attention. Sundareswaran et al. (2024) introduced a serious-game framework in physiology courses that shifts learners from passive listening to active problem-solving, which led to prolonged focus and deeper critical thinking. Drnach-Bonaventura et al. (2024) highlight the value of interactive discussions and digital tool integration in large classes, while Carvalho et al. (2023) demonstrate that brief, structured breaks (e.g., on-site yoga in calculus lessons) can mitigate cognitive fatigue and restore attentional capacity.

The broader digital context further influences attention control. Moreno, Torres, and Zhang (2024) found that extended screen exposure correlates with diminished sustained attention, a trend echoed by Sahu et al. (2024) in their study of medical and nursing students. Chen (2023) cautions that without aligning content design to Generation Z's need for quick, visually rich information, technology-rich settings may inadvertently foster disengagement.

Together, these findings suggest that educational environments for Generation Z must be responsive to their shorter attention spans through bite-sized learning modules, gamified experiences, periodic cognitive breaks, and real-time engagement feedback. Such adaptive strategies promise to optimize focus and deepen learning (Mishra, Sipi, & Menon, 2024).

2.2 Immersive Virtual Reality Experiences in Art Education

Recent investigations highlight how immersive virtual reality (VR) aligns with avant-garde art's experimental ethos by fostering multisensory, interactive learning environments. These platforms allow students to engage directly with non-traditional art forms, encouraging exploration beyond conventional media and promoting creative, disruptive pedagogies.

Affective engagement lies at the heart of VR's pedagogical value in art instruction. Λαμπρόπουλος et al. (2024) demonstrate that embedding affective-computing features within immersive systems enables these environments to detect and respond to learners' emotional states, thereby deepening their connection to challenging aesthetic content. Similarly, Lie et al. (2023) describe educational tools that deliberately evoke and harness emotional responses, a capability especially pertinent when grappling with avant-garde works that defy familiar artistic conventions.

Empirical studies underscore instructors' recognition of VR as transformative. Antón-Sancho, Fernández-Arias, and Vergara (2024) report that faculty in art disciplines value VR for its capacity to render and manipulate digital artworks in three dimensions—an affordance traditional media cannot match. In the field of digital media art, Xu (2024) illustrates how VR curricula empower students to extend the boundaries of expression through interactive platforms, reinforcing both technical proficiency and critical inquiry into the nature of art.

By integrating immersive VR with established taxonomies of learning, educators can support higher order thinking and experiential discovery. Hutson and Olsen (2022) present a case in which VR experiences, structured around revised Bloom's taxonomy, guide students through nonlinear narratives and unconventional

aesthetics—approaches that resonate with avant-garde pedagogy’s emphasis on experimentation over rote assessment. He, Zulkifli, and Ayub (2023) further outline strategies for intelligent teaching modes that leverage VR’s dynamic capabilities to sustain motivation and stimulate novel artistic methodologies.

Despite these advances, challenges persist equitable access to high-quality hardware, faculty development in emerging technologies, and the need to integrate VR experiences without compromising curricular goals. Liao (2024) calls for collaborative frameworks that unite technologists, artists, and theorists to tailor immersive experiences to the unique demands of avant-garde art education.

Collectively, this body of work suggests that immersive VR offers a powerful means of reimagining art instruction in higher education—one that engages learners affectively, encourages hands-on exploration, and aligns with the disruptive spirit of avant-garde practice.

3. Rationale for the Virtual Reality Experience

Extended reality (XR), encompassing both augmented reality (AR) and virtual reality (VR), refers to technologies that blend virtual elements with the physical environment to deliver interactive, immersive experiences. In educational settings, XR enables students to engage with digital content in real time, thereby clarifying abstract concepts and strengthening information retention. Meanwhile, game-based learning (GBL) integrates game mechanics and dynamics into instruction to enhance motivation, foster engagement, and promote meaningful understanding. This approach rests on the notion that play is fundamental to human nature and can serve as a powerful vehicle for learning.

3.1 (Hi)Story of a Painting Analysis and Course Curriculum

The two applications under review—both developed by Fat Red Bird and Monkeyframe in partnership with Catapult Digital and Arts Council England—demonstrate the potential of immersive narrative to deepen students’ understanding of landmark artworks. Episode 1, *What’s the Point?* released on March 21, 2021, for Meta Quest devices, focuses on Georges Seurat’s *A Sunday on La Grande Jatte* (1884). Through a three-act structure and the voice of Speech DeBelle, learners traverse a late-nineteenth-century Paris rendered with anthropomorphic architecture and period detail. Interactive “Story Bonuses,” unlocked by the user’s gaze at chapter conclusions, offer supplementary insights without disrupting the core narrative flow. User feedback highlights the application’s ability to anchor historical context, convey artistic significance, and engage even casual observers in an accessible, memorable format.

Episode 2, *The Light in the Shadow*, narrated by Cerys Matthews, turns its immersive lens to Artemisia Gentileschi’s *Self Portrait as Saint Catherine of Alexandria* (1615–1617). This three-act journey charts Gentileschi’s ascent in a society that denied women official standing, underscoring both her technical mastery and her resilience. By situating students within environments that mirror the social and cultural realities of the Baroque era, the application fosters empathy and a richer grasp of how Gentileschi’s personal narrative intersects with broader art-historical currents.

Although both titles excel in delivering deep, focused encounters with single works, they do not align seamlessly with the Tecnológico de Monterrey’s preparatory curriculum, which requires coverage of approximately a century of avant-garde movements within five fifty-minute sessions. The density of this thematic span, combined with Generation Z’s abbreviated attention spans and existing mobile-device policies, renders traditional lecture and video resources inadequate. To bridge this gap, an adapted curriculum must integrate these VR experiences as modular units—each tailored to a specific movement or artist—while supplementing them with concise pre- and post-immersion activities that reinforce key concepts and maintain momentum across successive class periods. This approach ensures that immersive episodes enhance rather than supplant the rapid survey required by the course framework.

3.2 Technological Context and Feasibility

Tecnológico de Monterrey already boasts a robust technology infrastructure capable of supporting immersive virtual reality (VR) implementations across its network. In late 2017, the university inaugurated Mostla—an innovation hub—at the International Congress of Innovation and Educational Research, and opened it to students, faculty, and staff in January 2018. Within its first ten months of operation, Mostla welcomed over 5,000 visitors, demonstrating both strong institutional engagement and widespread community interest.

Since then, Mostla has expanded to twenty campuses, each featuring a dedicated VR Zone equipped with four HTC Vive Pro stations. These facilities enable participants to explore intricately rendered virtual environments

and interact with immersive simulations. The name “Mostla,” drawn from the Nahuatl term for “tomorrow,” encapsulates the hub’s mission to cultivate curiosity and digital proficiency among both students and educators. To satisfy this mission, Mostla pursues four strategic goals: integrating advanced technologies into academic and extracurricular initiatives; mentoring students on interdisciplinary VR applications; advising faculty on pedagogically sound use of immersive tools; and aligning VR projects with the university’s broader objectives.

In addition to hardware access, Mostla offers structured group demonstrations, bespoke consulting services, and an online reservation system for VR equipment and spaces, ensuring that immersive resources are readily available across disciplines. However, while the hardware ecosystem is well established, there remains a shortage of software tailored specifically to higher education needs. Many existing VR titles lack direct relevance to curricular objectives or institutional priorities, which limits their instructional effectiveness. This software gap presents a clear opportunity: by developing or adapting VR applications that address the requirements of university and high school courses, Tecnológico de Monterrey can leverage its substantial infrastructure to deliver immersive, game-based learning experiences that enhance student outcomes.

3.3 School Policies About the Phones Usage in Classrooms Versus Reality

Institutional guidelines at the preparatory level strictly prohibit students from using smartphones or smartwatches during class unless expressly permitted by the instructor. At the same time, educators are encouraged to introduce learners to various artificial intelligence tools—as instruments to enhance academic work, not as replacements for original effort.

In practice, however, many teachers confront a generation for whom digital devices have become indispensable. Students often report stress or anxiety when separated from their screens, driven by a constant need to check notifications. Some even experience sleep disturbances—spending late-night hours on platforms such as TikTok—which can lead to physical exhaustion by morning. The phenomenon known as “FOMO” (Fear of Missing Out) exacerbates this cycle, as learners feel compelled to stay connected to avoid missing any online activity.

Recognizing that educators cannot match the brevity and appeal of the short-form videos preferred by today’s centennials, many have shifted toward integrating these devices as pedagogical aids. Rather than attempting to enforce complete disconnection, teachers leverage mobile technology to deliver content in formats that resonate with students’ habits. This approach also addresses the marked decrease in voluntary reading among this cohort: instead of lengthy texts, learners respond more readily to visual or experiential materials that align with their expectations and attention patterns.

4. Methodology

This pilot study adopted an exploratory quasi-experimental design with a mixed-methods approach to assess the potential of narrative-based virtual reality applications to enhance art appreciation among Generation Z upper-secondary students.

The study was conducted in September 2023 with a cohort of thirty-two secondary school graduates aged 18–19 years. The research design employed a quasi-experimental approach with two parallel groups to examine the potential of immersive virtual reality (VR) applications in enhancing art historical knowledge among Generation Z learners. Participants were initially surveyed to determine their prior familiarity with two selected artists: Georges Seurat and Artemisia Gentileschi. The initial questioning revealed that only one participant could identify Seurat through his work *A Sunday on La Grande Jatte*, while none recognised Gentileschi by name or oeuvre.

Following this baseline assessment, participants were divided into two equal groups. The first group engaged with the VR application *(Hi)story of a Painting: What’s the Point?*, which explored Seurat’s artistic contributions and techniques. The second group experienced *(Hi)story of a Painting: The Light in the Shadow*, focusing on Gentileschi’s life and work. Both applications were delivered using VR headsets, offering gaze-triggered interactive elements, spatial audio, and narrative-driven sequences designed to immerse learners in the historical and artistic context.

Upon completion of the VR experience, participants were invited to indicate their willingness to explore the alternate episode. Twenty-eight out of the thirty-two expressed an interest in doing so, suggesting a heightened level of engagement and curiosity. A focus group session was subsequently convened with all participants, employing a semi-structured interview protocol to capture their reflections. The discussion explored the extent to which the content was new or previously known, perceptions of artistic movements, and recognition of specific works. Notably, while few had prior knowledge of either artist, most participants reported familiarity

with the artistic movements depicted, and a majority recalled having seen Seurat's *A Sunday on La Grande Jatte* prior to the session, whereas Gentileschi's works remained largely unfamiliar.

Data collection employed a mixed-methods approach. Quantitative data included pre- and post-experience recognition rates, while qualitative insights were drawn from thematic analysis of the focus group transcripts. This combination of numerical indicators and narrative accounts provided a multidimensional understanding of learner engagement and knowledge acquisition in an immersive VR context.

To illustrate the proposed instructional design, Figure 1 presents the *Modular Immersive VR Curriculum Alignment*. This model integrates four interconnected layers: (1) curriculum modules tailored to specific artists and art movements, supported by pre- and post-immersion prompts; (2) immersive VR experiences featuring narrative-driven, gaze-triggered content designed to maximise learner engagement; (3) the theoretical foundations of Kolb's Experiential Learning Cycle and Csikszentmihalyi's Flow Theory, which underpin the sequencing and design of activities; and (4) targeted learning outcomes across cognitive, affective, and behavioural domains. The diagram visually demonstrates how the modular structure enables both flexibility and coherence, ensuring that each VR activity aligns with curricular objectives while fostering deep, sustained engagement.

Figure 1: Diagram showing how VR art history modules integrate pre/post activities and engagement mechanics to align with learning objectives

5. Preliminary Results

The pilot study yielded several insights into the effectiveness of narrative-driven virtual reality applications for fostering art historical knowledge among Generation Z learners. Baseline assessment indicated minimal prior familiarity with the selected artists: only one participant recognised Georges Seurat and his painting *A Sunday on La Grande Jatte*, while none identified Artemisia Gentileschi or her work. Despite this limited prior knowledge, participants demonstrated rapid engagement with the VR content.

Following interaction with the applications, 28 out of 32 participants (87.5%) expressed interest in exploring the alternative episode, suggesting that the immersive experiences stimulated curiosity and motivation to extend learning beyond the initial exposure. During the subsequent focus group discussion, students reported enhanced understanding of both the artworks and the broader artistic movements represented. While Seurat's painting was visually familiar to several participants, Gentileschi's oeuvre was largely unknown prior to the activity. Nonetheless, participants were able to contextualise both artists within the appropriate historical and stylistic

frameworks, demonstrating that the VR experiences facilitated meaningful connections between individual artworks and larger artistic currents.

Qualitative observations indicated that the immersive narrative structure, including gaze-triggered bonuses and three-act segmentation, contributed to sustained attention and emotional engagement. Participants frequently highlighted the interactive elements as particularly effective in anchoring historical and technical knowledge, supporting the notion that VR can provide a concentrated, multisensory learning experience that traditional media cannot replicate. Overall, the findings suggest that modular VR-GBL interventions hold significant potential for enhancing both interest and comprehension in art education, particularly when tailored to curricular objectives and the cognitive profiles of Generation Z learners.

6. Discussion

The preliminary findings indicate that narrative-driven virtual reality (VR) applications can effectively foster engagement and enhance art historical knowledge among Generation Z learners. Participants demonstrated rapid attention to the content, significant interest in cross-exploration of episodes, and improved contextual understanding of both Seurat and Gentileschi, despite minimal prior familiarity. These outcomes suggest that immersive VR interventions can serve as a catalyst for experiential learning, aligning with established theoretical frameworks.

Kolb's experiential learning theory (1984) posits that knowledge is constructed through a cyclical process of concrete experience, reflective observation, abstract conceptualisation, and active experimentation. In the present study, students engaged in concrete experiences via immersive VR episodes, followed by reflective discussion in focus groups. This sequence allowed learners to situate individual artworks within broader artistic movements, thereby reinforcing conceptual understanding through reflection and discussion. The structured, modular VR approach operationalises Kolb's learning cycle by providing repeated, discrete experiential units that can be scaffolded with pre- and post-immersion activities to consolidate learning.

Csikszentmihalyi's flow theory (1990) further elucidates the high levels of engagement observed. The immersive narratives, gaze-activated bonuses, and interactive tasks created conditions conducive to flow, characterised by focused attention, intrinsic motivation, and a sense of temporal distortion. Participants' expressed willingness to explore alternative episodes and their sustained concentration during the VR sessions provide empirical support for the notion that well-designed immersive experiences can facilitate optimal learning states. By integrating these elements into a modular curriculum, educators can channel students' natural preferences for dynamic, visually rich experiences towards structured, educational objectives.

Collectively, these findings underscore the potential of combining game-based learning mechanics with immersive VR to address the challenges inherent in rapid-survey art curricula. The alignment with experiential learning and flow theory suggests that such interventions do not merely serve as engaging novelties but can substantively enhance cognitive processing, contextual understanding, and emotional resonance. Future iterations of this curriculum should continue to employ real-time engagement metrics and iterative feedback to optimise module length, interactivity, and alignment with learning outcomes, thereby ensuring both breadth and depth of educational impact.

7. Conclusions

Art education for Generation Z faces the dual challenge of engaging learners with abbreviated attention spans while covering extensive artistic movements within limited instructional time. This study demonstrates that immersive virtual reality (VR) experiences, structured as modular, narrative-driven episodes, can address this challenge by fostering sustained attention, curiosity, and deeper contextual understanding. The pilot study revealed that students not only engaged actively with the VR content but also expressed interest in exploring additional episodes, suggesting that immersive approaches can transform digital habits into focused, meaningful learning. Interpreted through Kolb's experiential learning theory and Csikszentmihalyi's flow framework, these findings indicate that VR experiences facilitate concrete engagement, reflective observation, and emotional immersion—key elements that support both cognitive and affective learning outcomes. By aligning immersive modules with curriculum objectives, educators can ensure that rapid-survey art courses maintain both breadth and depth, transforming high school art instruction into an engaging, effective, and learner-centred experience.

Future work should expand the empirical evaluation of these VR modules, integrating quantitative engagement metrics and qualitative feedback to optimise design, pacing, and alignment with learning objectives. Such

iterative refinement will further establish immersive VR as a viable pedagogical tool, bridging the gap between Generation Z's digital proclivities and the educational demands of comprehensive art curricula.

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