Perceptions of the Metaverse in Education: An Exploratory Qualitative Study on Creative Destruction From the Perspective of Generation Z

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Abstract

The metaverse is often described as the next evolutionary stage of the internet, enabling immersive, interactive, and persistent three-dimensional environments (Kreutzer & Klose, 2023). Such developments raise questions as to whether metaverse-related educational offerings could disrupt traditional learning formats, potentially constituting "creative destruction" in Schumpeter's sense (Schumpeter, 1942). This study explores how members of Generation Z perceive immersive learning experiences after testing a set of XR applications (language learning, music learning, 3D design, mathematics, and fitness) on a stand-alone headset. Using a qualitative, exploratory research design, four problem-centred, semi-structured interviews were conducted (Witzel & Reiter, 2012) and analysed using qualitative content analysis (Kuckartz & Rädiker, 2023). The findings indicate broadly positive evaluations of immersion, interactivity, and self-paced learning. At the same time, participants highlighted barriers such as cost, limited institutional implementation, usability frictions, and uncertain societal adoption. Regarding creative destruction, respondents tended to view immersive offerings as complementary rather than fully substitutive at present. However, they anticipated that future hardware developments could increase adoption and, in specific domains, lead to greater displacement potential (Meta, 2024). Overall, metaverse-related learning is perceived as promising but not yet disruptive enough to constitute creative destruction in education under current conditions.

Keywords: metaverse, educational innovation, Generation Z, creative destruction, immersive technologies

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Introduction

Immersive technologies and the broader "metaverse" discourse are reshaping expectations surrounding digital interaction and learning. The metaverse is commonly framed as a persistent, real-time, and interconnected network of three-dimensional virtual environments that enables social interaction as well as novel forms of experience and participation (Kreutzer & Klose, 2023). In educational contexts, this vision translates into opportunities for experiential learning, simulation, embodiment, and interactive practice. Such benefits may resonate particularly strongly with Generation Z as a digitally socialised cohort (Camilleri, 2024).

At the same time, it remains unclear whether learners, especially members of Generation Z, already perceive metaverse-related learning as sufficiently mature, accessible, and institutionally integrated to challenge established educational formats. This question becomes especially relevant when educational innovation is interpreted through Schumpeter's concept of creative destruction, according to which new innovations may replace existing structures and routines (Schumpeter, 1942).

Against this background, this paper addresses the following research question: To what extent does Generation Z perceive metaverse-related immersive educational offerings as (potential) "creative destruction" in Schumpeter's sense?

To provide empirically grounded insights, this study combines hands-on testing of XR learning applications with qualitative interviews focusing on perceived learning value, barriers, and displacement potential.

Theoretical Background

Metaverse and Education

In recent literature, the metaverse is described as an interoperable, decentralised, and persistent network of real-time generated three-dimensional environments. Core characteristics frequently include immersion, synchronicity, persistence, interoperability, and social interaction (Kreutzer & Klose, 2023). In educational contexts, metaverse-related environments promise more than mere content delivery, as they potentially support situated learning, embodied interaction, collaboration, and simulation-based training (Camilleri, 2024; McKinsey & Company, 2022).

Not all XR learning applications constitute a "metaverse" in the strict sense, for example persistent shared worlds with interoperability. In practice, however, many educational discussions treat immersive XR learning as metaverse-related because it relies on the same enabling technologies, including XR, spatial computing, and real-time 3D rendering (McKinsey & Company, 2022). This paper therefore uses the term metaverse-related immersive learning as an umbrella concept, while explicitly acknowledging its conceptual limitations in Section 7 (Limitations).

Extended Reality (XR): VR, AR, and MR

Extended Reality (XR) is a collective term for immersive technologies that blend physical and virtual elements. Virtual Reality (VR) is typically defined as a fully computer-generated environment in which the physical world is largely blocked out, enabling users to interact

within a simulated world. Augmented Reality (AR) overlays digital elements onto the real world, while Mixed Reality (MR) anchors virtual objects spatially within the user's physical environment (Umweltbundesamt, 2021).

Generation Z and Learning Preferences

Generation Z is generally characterised as highly digitally connected and accustomed to video-based, interactive, and mobile-first information practices. For instance, a Bitkom study reports that 93 percent of children and adolescents aged 10 and above use social networks, highlighting the central role of digital platforms in everyday life (Bitkom, 2024).

With regard to learning, research suggests that many members of Generation Z report preferences for multimodal and interactive forms of input. In a study using the VARK questionnaire, Gen Z undergraduates demonstrated a strong preference for multimodal learning (Ishak et al., 2022). While learning style frameworks should be interpreted with caution, such findings are consistent with the assumption that interactive and multi-sensory environments may be perceived as motivating by this cohort.

Schumpeter's Creative Destruction in Education

Schumpeter conceptualises innovation as a process that can disrupt and replace existing structures through what he terms creative destruction, driven by new products, processes, markets, resources, or organisational forms (Schumpeter, 1942). When applied to education, the central question is whether immersive learning technologies merely enhance existing formats as complementary innovations or replace substantial elements of teaching practices and institutional routines through disruptive substitution. A key condition for creative destruction is therefore not only technical feasibility, but also adoption, diffusion, and institutional embedding (Schumpeter, 1942).

Methodology

Research Design

This study employs a qualitative, exploratory research design to capture subjective evaluations and meaning-making processes. Qualitative approaches are particularly suitable for investigating emerging phenomena and are appropriate when the primary objective is depth of understanding rather than statistical generalisation.

Sample and Procedure

Four participants belonging to Generation Z were recruited through purposive sampling to ensure heterogeneity in educational and professional backgrounds. Participants tested five XR applications (Noun Town, PianoVision, Gravity Sketch, Math World VR, and Les Mills Bodycombat) using a stand-alone XR headset capable of VR and MR experiences.

Following a guided familiarisation phase, each application was used during a short trial session of approximately 15 minutes. Subsequently, participants took part in a problem-centred, semi-structured interview (Witzel & Reiter, 2012). All interviews were audio recorded, transcribed verbatim, and anonymised.

Interview Guide

The interview guide combined experiential prompts, such as first contact with the headset and interface, with application-level evaluations and progressively broader reflections on education and disruption. The interview structure moved from specific applications toward the overarching thematic framework. This approach enabled interviewees to systematically develop and articulate their own perspectives while providing guiding reference points throughout the interview.

The interviews were conducted in a semi-structured format. Due to their open-ended nature, this approach allowed for a comprehensive exploration of the interviewees' perspectives and facilitated an in-depth understanding of the underlying factors and experiences shaping these views.

Data Analysis

Data were analysed using qualitative content analysis, combining deductive and inductive category development (Kuckartz & Rädiker, 2023). Deductive main categories were derived from the research question and interview guide:

1. first impressions of XR technology,
2. application-related benefits and limitations, and
3. metaverse-related education and disruption potential.

Within category (2), application-specific subcategories were developed inductively. Within category (3), inductive subcategories captured themes such as perceived displacement potential, prerequisites for disruption, and future outlook.

Results

Immersion and "Being There" as Added Value

All participants identified immersion and a sense of presence as key differentiators compared to conventional digital learning formats. The experience was described as participatory rather than consumptive, supporting active engagement with learning content.

Interactivity, Control, and Self-Paced Learning

Participants valued interactive control, including object manipulation and immediate feedback, as well as the ability to progress at an individual pace. These features were perceived as aligned with personal learning preferences and as potentially supportive of multimodal engagement (Ishak et al., 2022). Language- and music-related applications were most frequently described as intuitive and motivating, as learning progress felt tangible and feedback immediate.

Barriers: Access, Cost, Usability, and Institutional Reality

Despite generally positive attitudes, participants reported substantial barriers, including limited access to XR hardware, high costs, insufficient institutional readiness, and usability or comfort-related issues.

Complement Rather Than Replacement

When reflecting on the potential displacement of traditional education, participants predominantly expressed a view of complementarity. Immersive learning was perceived as capable of enriching specific learning contexts, but not of replacing education as a whole in the near term.

Conditions Under Which Creative Destruction Becomes Plausible

Assessments shifted when participants discussed future technological developments. Several interviewees suggested that more discreet, glasses-like AR form factors could increase social acceptance and everyday integration. Current industry developments in this direction are illustrated by Meta's presentation of "Orion" as a prototype AR glasses system (Meta, 2024). Under conditions of lower costs, improved comfort, and stronger institutional embedding, participants considered a higher displacement potential plausible in selected educational domains.

Discussion

The findings suggest that Generation Z perceives metaverse-related immersive learning as meaningful and motivating, primarily due to immersion, interactivity, and self-paced engagement (Camilleri, 2024). From a Schumpeterian perspective, however, the innovation currently appears more complementary than structurally disruptive for education. Participants' emphasis on costs, limited institutional adoption, and usability challenges indicates that diffusion and institutional embedding remain insufficient for systemic replacement (Schumpeter, 1942).

At the same time, perceived disruptiveness appears conditional. As hardware evolves toward more socially acceptable form factors and institutions develop appropriate infrastructure and pedagogical integration, displacement potential may increase (McKinsey & Company, 2022; Meta, 2024). Metaverse-related education may therefore be situated in an early diffusion phase in which benefits are visible, but large-scale structural change remains unlikely at present.

Conclusion

Participants from Generation Z evaluated immersive XR learning applications positively, emphasising immersion, interactivity, and flexible self-paced learning. At present, these offerings are primarily perceived as complements to traditional educational formats rather than replacements and therefore do not yet constitute full creative destruction in Schumpeter's sense (Schumpeter, 1942). Disruptive potential appears contingent on improved accessibility, stronger institutional integration, and continued technological progress, particularly regarding more wearable AR form factors (Meta, 2024). For education providers and policymakers, this suggests a focus on targeted use cases where XR adds clear value, alongside investments in implementation infrastructure and equity considerations related to access and cost.

Limitations

This exploratory study is subject to several limitations:

1. the small qualitative sample size (n = 4), which restricts generalisability;

2. the short trial duration per application, limiting conclusions regarding long-term learning outcomes; and
3. the conceptual gap between the metaverse as an interoperable and persistent environment and the tested XR applications, which do not necessarily constitute metaverse platforms in a strict sense.

Additionally, methodological triangulation, such as surveys, observations, or learning performance measures, was not employed and should be addressed in future research.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

Generative AI and AI-assisted technologies were used in a supportive capacity during the writing process of this manuscript. Specifically, an AI-based language model (ChatGPT by OpenAI) was employed for language editing, proofreading, and stylistic refinement. The AI tool was used exclusively to improve clarity, grammar, and academic expression. All substantive content, interpretations, and conclusions were developed by the authors, who take full responsibility for the integrity and originality of the work.

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