UTILIZING TRANSFORMATIVE MUSEUM-BASED MEDIA IN DIGITAL ERA HISTORY EDUCATION

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Abstract

Museums, as institutions for the preservation of cultural and historical heritage, face significant challenges in maintaining their relevance in the digital era. This article examines the utilization of museum media as a means of transformative learning by integrating digital technologies such as Virtual Reality (VR), Augmented Reality (AR), and interactive digital platforms that facilitate engaging and enjoyable history learning. Using a literature review approach, this study analyzes how Mezirow's transformative learning theory and Hein's constructivist approach can be implemented within the context of digital museums. The findings indicate that the integration of digital technologies in museums is able to create immersive learning experiences, enhance visitor engagement, and facilitate learners' perspective transformation in the process of history learning. The practical implications of this study provide recommendations for museum practitioners and educators in designing effective museum-based learning programs in the digital era.

Keywords: *Digital museums; transformative learning; history education; constructivism; digital era*

INTRODUCTION

In the rapidly evolving digital era, cultural and educational institutions such as museums face significant challenges in maintaining their relevance and appeal, particularly among younger generations (NEMO, 2022). Museums, as institutions dedicated to the preservation of cultural traditions and heritage, are increasingly adopting digital media as channels for transmitting cultural heritage and traditional knowledge to younger audiences (Pavlović, 2022). This transformation extends beyond the mere digitization of collections and involves a fundamental paradigm shift in how museums fulfill their educational functions.

Since the nineteenth century, educators have regarded museums as important informal learning environments that provide visual, accessible, and even tangible objects and exhibitions, enabling the public to explore knowledge related to art, history, culture, and science in depth (Zhou et al., 2022). However, museum educators often face challenges in designing engaging learning activities for learners. School field trips to museums are still largely guided by whole-class lecture-based models, which limit group movement to preselected exhibitions and objects.

The COVID-19 pandemic has further accelerated digital transformation in museums, as many institutions were forced to close their physical spaces (Vandermeershe, 2024). This situation has underscored the importance of alternative modes of engagement, with immersive technologies emerging as a promising solution. Within this context, this article aims to examine how museum media can be utilized as a means of transformative learning in the digital era by integrating the theoretical foundations of transformative learning and constructivist approaches into the design of museum experiences.

THEORETICAL REVIEW

Transformative Learning Theory

Transformative learning theory, developed by Jack Mezirow, explains how adults use their experiences to construct meaning and understand the world, thereby enabling them to better cope with similar situations in the future (Kelly-Hedrick et al., 2020). Mezirow defines transformative learning as an orientation that emphasizes how learners interpret and reinterpret their sensory experiences as the core of meaning-making and, consequently, learning itself (WGU, 2022).

The transformative learning process can be triggered by uncomfortable situations which, when combined with reflection and dialogue, encourage learners to question their existing perspectives. The resulting change in perspective is classified as an outcome of transformation (Kelly-Hedrick et al., 2020). Mezirow argues that perspective transformation is typically initiated by a disorienting dilemma, often arising from life crises or major life transitions. However, such transformation may also result from the gradual accumulation of changes in meaning schemes over an extended period of time (Wikipedia, 2026).

Mezirow outlines ten phases of transformative learning, which include: (1) a disorienting dilemma; (2) self-examination accompanied by feelings of guilt or shame; (3) a critical assessment of assumptions; (4) recognition that one's discontent and the process of transformation are shared; (5) exploration of options for new roles, relationships, and actions; (6) planning a course of action; (7) acquisition of knowledge and skills for implementing one's plans; (8) provisional trying of new roles; (9) building competence and self-confidence in new roles and relationships; and (10) reintegration into one's life based on conditions dictated by the new perspective (Wichita State University, n.d.).

Constructivism in Museum Education

George E. Hein is a leading advocate of constructivist learning theory within the museum context. Hein (1998) combines a brief history of public museum education with a rigorous examination of how the educational theories of Dewey, Piaget, Vygotsky, and subsequent theorists relate to learning in museums. Constructivism refers to the idea that learners actively construct knowledge for themselves, each learner individually (and socially) constructs meaning as they learn

(Hein, 1991).

Hein (1995) identifies two critical components of constructivist museum education: a theory of knowledge and a theory of learning. This approach emphasizes that knowledge and learning processes are inherently individual and dependent on visitors' mental frameworks. Constructivist museums enable visitors to create personal knowledge through multiple modalities and non-linear pathways. Furthermore, Hein (2005) categorizes four possible educational approaches in museums: traditional lectures and texts (systematic museums), discovery learning (discovery museums), stimulus–response approaches (orderly museums), and constructivism (constructivist museums).

The Contextual Model of the Museum Experience

Falk and Dierking (2016), in their work The Museum Experience Revisited, highlight how digital technologies can significantly enhance and transform the three overlapping contexts of museum visits: the personal, sociocultural, and physical contexts. The personal context encompasses the experiences, knowledge, interests, and motivations that visitors bring with them; the sociocultural context involves the social interactions that occur during the visit; and the physical context relates to the museum's physical environment.

Time is not merely the duration of a museum visit; rather, it extends along a continuum that includes prior experiences, engagement during the visit, and post-visit reflection, allowing meaning to evolve throughout an individual's lifetime (Falk & Dierking, 2016). Personalized content enhances the personal context; online interactions and social media shape the sociocultural context; and immersive environments redefine the physical context, enabling hybrid or fully virtual museum spaces.

DIGITAL TECHNOLOGIES IN MUSEUMS

Virtual Reality and Augmented Reality

Digital technologies such as Virtual Reality (VR), Augmented Reality (AR), touchscreens, 3D imaging, multimedia presentations, and mobile applications have gained global recognition for their transformative potential in enhancing educational experiences within museum settings (Fagan, 2023; Xu & Fagan, 2023). VR and AR are increasingly employed to support museum learning by creating engaging and immersive learning experiences (Zhou et al., 2022).

AR technology overlays virtual data onto the real environment in real time, while VR creates computer-simulated three-dimensional environments that allow users to interact with digital content. Mixed Reality (MR) integrates both real and virtual elements (Bekele et al., 2018). These Extended Reality (XR) technologies are applied for various purposes, including enhancing exhibitions, facilitating exploration and reconstruction, and creating virtual museums. Recent studies indicate that XR technologies can significantly enhance visitor experiences by increasing sensory engagement, emotional responses, cognition, and skill development compared to traditional museum settings (Dozio et al., 2021; Marcolin et al., 2021).

Meta-analytic findings reveal that AR and VR are predominantly utilized in science, art, and history museums to support science and art learning, with a primary focus on conceptual knowledge. These technologies are frequently used to overlay supplementary content onto physical exhibits, dynamically visualize complex phenomena or concepts, and simulate virtual exhibitions and

narrative scenarios (Zhou et al., 2022). Research by Shahab et al. (2023) evaluating the use of VR in museums also reports positive indications regarding visitor engagement.

Digital Platforms and Distance Learning

The Smithsonian Center for Learning and Digital Access (SCLDA) provides a model for how museums can leverage digital resources for educational purposes. Platforms such as the Smithsonian Learning Lab enable educators to discover resources and create learning experiences and were launched in 2016 following years of research conducted in collaboration with educators (AAM, 2018). Research indicates that linking digital assets to familiar pedagogical practices and instructional strategies can help bridge the gap between museum expertise and classroom learning.

In Indonesia, the National Museum of Indonesia has begun implementing digital technologies in recent years as part of its efforts to transform into a more modern and interactive institution. One significant initiative occurred in 2020, when the museum introduced the National Museum Digital platform in response to the growing need for more accessible and interactive information. Museum digitization enables museum collections to be accessed by educational and research institutions worldwide (V-cube Indonesia, 2023).

TRANSFORMATIVE LEARNING THROUGH DIGITAL MUSEUMS

Creating Disorienting Dilemmas

For learners who are more accustomed to classroom and clinical environments than to art museums, both art and the museum setting itself can serve as disorienting dilemmas that trigger transformative learning (Kelly-Hedrick et al., 2020). Interactive, group-based museum activities, along with the participatory nature of art museum–based teaching, further promote the critical reflection and discourse necessary for personal growth. These activities are intentionally designed to create the disorienting dilemmas required for transformative learning.

Encouraging learners to embrace unfamiliar contexts and confront ambiguity can enhance their capacity for growth and change. Through individual and group exercises designed to promote reflection, learners begin to question previously established cognitive and affective perspectives (Kelly-Hedrick et al., 2020). Mezirow suggests that transformation may occur following a single powerful experience or through multiple experiences accumulated over time.

Immersive Experiences and Active Engagement

Immersive technologies in museum exhibitions have received significant scholarly attention in recent years, with researchers, practitioners, and cultural heritage institutions recognizing their transformative potential in enhancing visitor experiences, particularly since the onset of the COVID-19 pandemic (Kwok & Koh, 2021; Lu et al., 2022). The integration of immersive technologies into museum exhibitions has brought about a revolutionary shift in conventional museum experiences, transcending physical boundaries and transporting visitors into previously unexplored realms of exploration.

In history museums, visitors no longer merely read textual descriptions of ancient civilizations; instead, they can walk through virtual architectural environments, listen to the sounds of historical marketplaces, or even engage in simulations of everyday activities from the past. From an educational perspective, this immersive approach offers substantial added value.

Learning is no longer unidirectional but becomes a multisensory experience that is more accessible and meaningful. This approach supports diverse learning styles, visual, auditory, and kinesthetic, thereby enhancing comprehension and engagement (Pine & Gilmore, 2019).

Development of 21st-Century Skills

The Institute of Museum and Library Services (IMLS) emphasizes the critical role of museums and libraries in helping citizens develop 21st-century skills, including information literacy, communication and technology skills, critical thinking, problem-solving, creativity, civic literacy, and global awareness (IMLS, 2009). Virtual museums are therefore well suited to be regarded as effective learning and teaching tools, as they address areas considered highly relevant in contemporary education and adopt information and communication technology (ICT)-based approaches.

Ott, Antonaci, and Pozzi (2013) found that virtual museums can support the development of transversal 21st-century skills, particularly social, cultural, and civic skills, as well as communication, collaboration, digital literacy, and creativity. Digital museum learning programs also offer advantages for teachers by providing valuable opportunities for professional growth and development, equipping educators with the skills required to integrate digital tools into their teaching practices (Xu & Fagan, 2023).

IMPLEMENTATION IN INDONESIA

Museums in Indonesia face various challenges in adapting to the rapidly evolving digital era. Digital transformation has altered the ways in which people access, interact with, and learn about artifacts and historical narratives presented by museums (Museum Pendidikan Nasional, 2023). Key challenges include online competition, rapid technological advancement, budgetary constraints, and gaps in digital infrastructure.

Several strategies can be implemented to address these challenges, including: developing a strong online presence through interactive websites and social media platforms; utilizing AR and VR technologies in exhibitions and museum tours; establishing partnerships with technology companies or funding institutions; providing staff training in digital technologies and digital pedagogical methods; and personalizing visitor experiences based on data analytics and visitor insights (Museum Pendidikan Nasional, 2023).

Recent research on the Multatuli Museum as a source of local history in design thinking–based learning in the digital era indicates that design thinking approaches can be applied in history education with appropriate modifications. These include the use of visual research methods to assess learning outcomes, such as infographics, mind maps, and videos (Chronologia, 2021). With its facilities and collections, the museum demonstrates strong potential for fostering students' historical awareness and empathy.

CONCLUSION

The utilization of museum media as a means of transformative learning in the digital era offers significant opportunities to enhance the quality of education and the preservation of cultural heritage. The integration of digital technologies such as VR, AR, and interactive platforms within museums enables the creation of immersive learning experiences, supports diverse learning styles,

and facilitates learners' perspective transformation in accordance with Mezirow's transformative learning theory and Hein's constructivist approach.

Falk and Dierking's contextual model of the museum experience demonstrates that digital technologies can enhance all three contexts of museum visits, personal, sociocultural, and physical, thereby creating richer and more meaningful learning experiences. In the Indonesian context, digital museum transformation is not merely about showcasing advanced technologies, but about how design, historical narratives, and visitor experiences are integrated into a cohesive whole that can inspire younger generations to appreciate and preserve the nation's cultural heritage.

Recommendations for implementation include: (1) developing museum-based learning programs that integrate digital technologies with formal curricula; (2) providing training for museum educators in the use of digital technologies and constructivist pedagogical approaches; (3) fostering collaboration among museums, educational institutions, and technology companies; (4) conducting continuous research to evaluate the effectiveness of digital museum learning programs; and (5) formulating national policies on museum modernization and the democratization of access to cultural heritage.

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