

Museum Narrative Mechanism Construction: The Integration Path of AI and Gamification

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INTRODUCTION

With the growing integration of Artificial Intelligence (AI) and gamification in cultural communication, digital museums have become important platforms for interactive storytelling. In this study, “digital museum” refers to an exhibition space that combines interactive installations, task-based systems, and AI-guided interaction (Cameron and Kenderdine 2007; Parry 2007). AI—particularly in the form of AI-powered digital humans—actively guides, narrates, and prompts audience engagement. While previous research has addressed user experience and technical implementation, few studies have examined the structural mechanisms of narrative communication. Existing literature highlights the potential of gamified heritage displays (Rizvic et al. 2025; Li and Zhang 2025; Hu and Zhao 2025) but rarely explores the micro-level relationship between AI and narrative architecture.

This study develops a model of AI-driven gamified storytelling to explain how cultural information is transmitted and received in digital museums. It addresses three research questions: (1) How do gamification mechanisms influence visitors’ cultural understanding and engagement? (2) How do AI-powered digital humans act as mediators in narrative communication? (3) How can an interactive mechanism model link user behaviour with narrative progression in a culturally meaningful way?

Grounded in a constructivist epistemological perspective, the study adopts a mechanism-oriented approach. It draws on the Ludicization Model (Bonnat et al. 2023) and Crawford’s (2005) concept of process-driven interactive narrative to position AI-powered digital humans as narrative agents. Using qualitative structured case analysis of exhibitions in China, such as Yunshang Sanxingdui (Cloud-based Sanxingdui Virtual Exhibition), the Guangzhou Center of the National Edition Museum of China, and the Palace Museum’s Digital Cultural Creation Space in Beijing, the study compares interactive design, feedback structures, and cultural expression. The proposed communication pathway model consists of: task initiation → interactive response → AI feedback → emotional resonance → cultural understanding. A simulated “Cantonese embroidery pattern recognition” scenario demonstrates the model in practice.

The study offers a structured framework for understanding how AI-driven gamification can guide segmented cultural presentation, emotional connection, and cognitive construction in digital museums. It addresses the lack of structural analysis

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in interactive narrative research and provides a theoretical perspective for designing future human–AI collaborative cultural experiences.

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