Proceedings of ICEIPI 2025 Symposium: AI Am Ready: Artificial Intelligence as Pedagogical Scaffold
DOI: 10.54254/2753-7048/2025.CB25229

# *Integrated Application and Development of Unreal Engine Technology in Gaming Culture*

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***Abstract.*** Under the background of the deep integration of digital entertainment and cultural communication, the value of games as emerging cultural carriers is becoming more and more prominent, and the Unreal Engine technology has become the core driving force to promote the upgrading of game culture. This paper adopts the method of literature analysis, combines the theories of visual culture, immersive experience, and digital divide, and takes Black Myth: Wukong and other works as examples to systematically explore the comprehensive application and development challenges of Unreal Engine technology in game culture. The study found that Unreal Engine 5's nanite micro-polygon technology and lumen dynamic lighting technology, the high-precision reproduction of traditional architecture and mythological scenes, to strengthen the visual impact of cultural. The physics engine to enhance the realism of interaction facilitates the dissemination of non-heritage culture, and its high-quality graphics promote players' identification with specific cultures. However, the technology's high demand for equipment performance and society's bias against gaming have hindered its adoption and recognition of its value. The study shows that Unreal Engine technology has reconstructed the cultural expression paradigm of games, and in the future, it is necessary to break through the threshold of equipment and social cognitive limitations, and promote games to become a more inclusive cultural carrier through the optimization of technical adaptability and positive cultural dissemination.

***Keywords:*** Unreal Engine technology, gaming culture, immersive experience.

## 1. Introduction

This study focuses on the fact that in today's era of booming digital entertainment, games, as an important form of culture, not only bring people a rich entertainment experience, but also carry the important mission of cultural dissemination and communication. El-Wajeh et al. pointed out in Unreal Engine 5 and immersive surgical training that the Nanite micro-polygon technology of Unreal Engine 5 can realize real-time rendering of high-precision models, and the Lumen dynamic lighting technology can simulate the real light and shadow effects. This provides technical support for games such as Black Myth: Wukong to restore traditional buildings such as the Shakyamuni Temple of Shuanglin Temple, confirming the engine's feasibility of digitally restoring cultural scenes. However, most of the existing researches focus on the technical principles, and there is less

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DOI: 10.54254/2753-7048/2025.CB25229

discussion on “how to realize the differentiated visual expression of different cultural symbols through the adjustment of technical parameters”. In this regard, we should analyze the strategy of adapting technical parameters to cultural elements with specific cases, so as to supplement the research on the cultural specificity of technical applications. The spiral of silence theory suggests that when people express their ideas and opinions, if they see that the ideas they agree with are widely popular, they will actively participate in them, and such ideas will be more and more boldly expressed and spread; and if they find that no one or very few people pay attention to a certain idea, then even if they agree with it, they will remain silent. Existing research lacks the analysis of 'how to reverse social prejudice’, and the cultural communication cases of games such as Black Myth: Wukong can verify the communication effect of the positive value of the game, and provide a practical basis for breaking through the limitations of social cognition. This study is of great significance for how people can utilize the development of Unreal Engine technology to make games a better vehicle for spreading culture. As one of the key technologies in the field of game development, Unreal Engine technology profoundly affects the quality and cultural connotation of games with its powerful functions and excellent performance. This study focuses on an in-depth discussion of the integrated application and development of Unreal Engine technology in gaming culture. Literature analysis was utilized to locate and read relevant information and literature, as well as to analyze relevant classic cases. The advantage of this approach is that it can well analyze its role in the application of technology, content creation, and scene construction, while examining the limitations and problems it faces in the process of development, which is conducive to research. The ultimate research goal of this study is to deconstruct the technical mechanism of Unreal Engine technology to realize the digital restoration of cultural elements in games and to clarify the role of immersive experience in the formation of players' cultural identity. In this process, we identify the equipment threshold and social cognitive limitations in the application of the technology, and put forward adaptability optimization strategies and positive dissemination solutions, so as to provide theoretical references and practical guidelines for the promotion of the innovative development and wide dissemination of game culture.

## 2. Unreal engine technology in gaming

### 2.1. Technical applications

Unreal Engine 5 features two new core graphics rendering technologies: Nanite virtual micro-polygon geometry and Lumen dynamic global illumination. Nanite technology is a highly optimized geometric compression technique that stores model data efficiently in memory and dynamically adjusts the level of detail loaded according to camera distance and field of view, thus dramatically improving rendering efficiency and picture quality. Great time saver when designing large amounts of detail. It eliminates the tedious task of loading levels of detail and allows importing movie-quality artwork. Real-time frame rate operation is possible [1]. This technology means that hundreds of millions of polygons modeled can be imported directly into Unreal Engine for rendering, greatly improving rendering speed and picture quality. For example, in the game Black Myth: Wukong, there is a level for the Valley of Ultimate Bliss in the Lesser Western Paradise - the One Thought Wall, the scene is from the Shuanglin Temple Sakya Hall in Qiaotou Village, Pingyao County, Shanxi Province, and the game team scanned the actual scene in 3D and then imported it into the engine for real-time rendering. Real-time ray tracing technology is also one of the core advantages of its graphics rendering. This technology can accurately simulate the propagation, reflection and refraction of light, making the lighting effect in the game scene more natural and realistic. And the

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metasounds technology in the Unreal Engine provides all the control and greater flexibility for managing audio. It provides workflow improvements to help manage all aspects of the sound experience [1]. This is an important means of creating cultural atmosphere, giving players a strong cultural visual impact. Visual culture, as an important part of modern culture, emphasizes the visualization of non-visual cultural elements. Through its powerful graphic rendering ability, Unreal Engine technology successfully transforms various cultural elements into vivid visual images, enabling players to understand and feel the connotation of culture more intuitively [2].

### 2.2. Application and cultural communication in content creation

Scholars at home and abroad gradually began to utilize their own research paradigms and theoretical approaches to examine the relationship between digital games and culture in depth at the beginning of the 21st century. Many scholars believe that digital games have become an important part of modern cultural literacy. Factors such as role-playing, gender presentation, and racial identity in games not only have a profound impact on players' reading, writing, and expression abilities, but also significantly affect their self-perception, social interactions, and interpersonal relationships [3]. Therefore, the game is no longer a carrier for players' entertainment only, it is also a carrier of culture, which can subconsciously shape players' cultural values, and it has become a very influential cultural communication channel in today's world. For example, in the game Black Myth: Wukong, players can experience the characters in the mythological worldview and the architectural scenery that exists in real life without leaving their homes. From the perspective of cultural identity theory, cultural identity emphasizes the individual's sense of belonging to a specific cultural group and sense of identity, and the high-quality graphics brought by the Unreal Engine technology can more accurately present the details and scenery of a specific culture, shaping a strong cultural atmosphere and allowing players to enjoy the game with a sense of belonging. The high-quality graphics brought by Unreal Engine technology can more accurately present the details and scenery of a specific culture, shape a strong cultural atmosphere, and allow players to experience the culture in the game in a more immersive way. And it can better promote cross-cultural communication.

Introduced by scholar Shi Anbin in recent decades, the concept of intercultural communication first emerged in academic circles in 2018 and has since attained widespread scholarly acknowledgment. This theoretical framework not only re-evaluates and reconstructs traditional intercultural communication theories but also, against the backdrop of the new globalization era, critiques and transcends the "Western-centrism"-dominated conceptual paradigm. Current research landscapes, however, reveal a notable paucity of studies on international communication in digital games. The sole exception is Shi Anbin’s team’s inquiry into Genshin Impact character Yun Jin’s "Divine Maiden Splitting View" video series on YouTube, which applies intercultural communication theory to this domain. Their findings highlight the significant influence of cultural hybridization on digital games’ transnational dissemination, concluding that such hybridity exerts a synergistic empowering effect on cross-cultural communication. Yet, unexplored frontiers remain in applying this theory to digital game communication—including Sino-Western cultural blending, platform cosmopolitanism, and user empowerment dynamics.

Conceptually anchored in the Community of Human Destiny, intercultural communication fosters equitable dialogue and mutual comprehension among civilizations. Departing from paradigms that prioritize one culture through self-replicative dissemination, it emphasizes cultural symbiosis, reciprocal construction, and transformative interaction. Through selective absorption of alien cultures, it achieves self-redefinition, manifesting as a "mutual inclusion" hybridity. Black Myth: Wukong, a game interweaving traditional Chinese culture, aims to showcase Chinese cultural

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uniqueness and facilitate cross-cultural empathy in global exchanges. Drawing inspiration from Journey to the West, a cornerstone of Chinese classical literature, its narrative revolves around the Tang Monk's disciples' westward pilgrimage—an allegory for ancient China's proactive engagement with the world. This narrative aligns with intercultural communication theory's core tenet: constructing an international milieu of tolerance, harmony, mutual respect, and equitable exchange through cultural dialogue [4].

## 3. Application of unreal engine technology in game scene construction and immersion theory

### 3.1. Realistic scenario building and immersive cultural experiences

Traditional immersion theory focuses on the ambience created by the media technology and the user's psychological experience within it. In contrast, the theory of embodied cognition (EC) emphasizes that human cognition is limited by the type of body we possess and stresses the importance of action for cognition. In the EC approach, many authors emphasize the importance of action for cognition and the role played by the state of the body [5]. For example, in the immersive experience of games, the theory of concrete body-knowledge suggests that bodily perceptions, actions, and experiences affect the player's level of engagement and immersion in the game activity. This is a very demanding technology for the physics engine in a game engine, which is a computer program that simulates a Newtonian mechanics model using variables such as mass, velocity, friction and air resistance. It can be used to predict the effects of such different situations. It is mainly used in computational physics and in video games and computer animation. Unreal Engine Generation 5 provides a powerful physics engine that provides simulation of various physical effects such as rigid body, fluid, fabric, carrier, scene destruction, physical constraints, scene query, and other physics-related functions to enhance the game's expressive power and enrich physics-based game mechanics and gameplay. In Final Fantasy 7: Rebirth, for example, the fabric on heroine Alice's dress sways, and her pink ribbon and hair naturally flutter as she approaches the fountain. In real life, crates and debris appear with every attack, and even enemies in the sewers have physical effects on their tongues as they sway from side to side. They also facilitate social interaction, involving the use of technologies such as avatar customization, immersive environment design and robust communication systems. Players use Unreal Engine technology to design their own avatars in the game, which plays a key role in socializing among players. This is because these visual and behavioral representations enable users to communicate and collaborate effectively in virtual spaces. Through customization, avatars enhance user engagement by fostering a sense of ownership, individuality, and social identity, which are key elements that underpin meaningful interactions and connections in immersive virtual worlds. Recent research has emphasized the significant impact of avatar representations on social connectedness and self-esteem, suggesting that enabling users to self-represent through avatars enhances their sense of identity and fosters a sense of belonging and acceptance [6].

### 3.2. Interactive game scenarios and non-heritage culture dissemination

In the game Black Myth Wukong, the technical director achieved a precise coupling of the physics engine and narrative pacing, and the character animation team introduced a Ph.D. in computational neuroscience to optimize the biomechanical performance of the monsters when they are struck by the muscle dynamics model [7]. Make the game scene and interaction more real. And this technology has a huge impact on the dissemination of non-heritage culture, many film and television

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works as well as virtual reality technology exhibitions can show the traditional material culture, but it is difficult for people to experience the fun of non-heritage culture, such as traditional folk dance and handmade production methods, but these can be experienced in the game, for example, in the game Shadow Blade: Zero, the official team in order to restore the Chinese martial arts in the game traveled to The official team in order to restore the Chinese martial arts in the game to open the Chinese martial arts around the country to search for the roots of the journey, to explore the fusion of Chinese martial arts and domestic game method, and through the unreal engine real physics engine, will be these difficult martial arts action restored to the game, the player with the body to operate the character to use these skills, you can be completely immersed in the cultural atmosphere. Playing a game can be interpreted as agentic immersion in an environment that is different from the regular and usually planned one: As the player continues to play the game, the game itself begins to impose its own rules [8]. Immersing the player in the mechanics and rules of the game can even lead to a state of flow. Flow is the state of total concentration and dedication that people show when they are doing something. In this state, people don't even feel like time exists and feel energized and satisfied when the task at hand is complete. The flow experience is a balance of challenge and skill, and can only be achieved with high challenge and high skill. The fact that such an immersive experience can bring the player into a state of flow shows that the game design can make the user feel the cultural connotation well and thus be immersed in it.

## 4. Deliberations

### 4.1. Audience segmentation of games and the digital divide theory

The theory of the “digital divide” connotes “the gap between the information rich and the information poor”, also known as the information gap [9]. The audience of the game has some limitations. On the one hand, games created with Unreal Engine technology tend to require high device performance, and some devices with lower configurations may not be able to run smoothly, which limits the participation of some groups of players. This will lead to the exclusion of those groups of players who are unable to own high-performance equipment due to economic conditions and other factors, thus creating a digital divide. The inability of these groups to fully enjoy the quality gaming experience provided by the Unreal Engine further exacerbates inequalities in access to information and cultural entertainment, limiting the scope of the game's audience. On the other hand, players of different age groups, cultural backgrounds and interests have different levels of acceptance and needs for games. At present, the audience of online games mainly focuses on young people, many of whom are eager for the culture shown in the games, but on the one hand, they may not be clear about the channels through which they can play the genuine games, and on the other hand, they think that the difficulty of the games is too high, the mechanism is complicated, and the difficulty of getting started makes them give up to play the games. This hinders the dissemination of game content.

### 4.2. Popular perception and the spiral of silence theory

The Spiral of Silence is a theory of mass communication developed by Elizabeth Noelle-Neumann to describe the process of public opinion formation. Noelle-Neumann defines the 'spiral of silence’ as the process an individual undergoes when “he may find that the opinions he holds are losing ground; the more it seems so, the more uncertain he becomes about himself, and the less willing he is to express his own opinions.” What the authors call a lack of self-certainty is driven by how an

DOI: 10.54254/2753-7048/2025.CB25229

individual perceives his or her social environment. Noelle-Neumann calls this the “quasi-statistical picture of the distribution of opinions” Noelle-Neumann goes on to say that people with opposing opinions eventually feel isolated or in danger of isolation, and that if their views are expressed openly or publicly they risk being isolated by the majority of the population [10]. Despite the important role of games in cultural transmission and entertainment, there are still some prejudices in the public perception of games. Some people believe that games cause players to become addicted to them, affecting their studies, work and life, and ignore the positive role of games in cultural transmission, creativity development and social interaction. This negative perception not only affects the development of the gaming industry, but also silences those who see positive value in gaming, further reinforcing prejudices against gaming and creating a definite obstacle to the application and promotion of Unreal Engine technology in gaming culture.

Based on the above existing problems, it is necessary to optimize the adaptability of technology, continuously optimize the technology, lower the threshold of equipment performance, expand the audience group, and promote the wider dissemination of game culture. On the other hand, we should strengthen the positive publicity of game culture, change the public's view of games, and create a social environment conducive to the development of the game industry. In addition, we should strengthen the innovation of cultural narratives, enhance the effectiveness of dissemination, and promote China's excellent traditional culture.

## 5. Conclusion

In summary, the findings of this study show that Unreal Engine technology can realize high-precision visual reproduction of traditional architecture and mythological scenes, as well as promote the dissemination of non-heritage culture through interactive realism construction, while high-quality graphics enhance players' sense of identity by strengthening the cultural atmosphere. However, the high technological demands on equipment performance have led to a digital divide, and social prejudice against gaming has created a “spiral of silence” effect that restricts the widespread recognition of its cultural value. This study further concludes that Unreal Engine technology has reconfigured the expression paradigm of games as a cultural carrier, but its application needs to break through the double barriers of technological thresholds and cognitive limitations. This study provides a lot of valuable references for future research in this direction, mainly in the combination of Unreal Engine technology and communication science and psychology, which provides an interdisciplinary analytical framework for the study of game culture and analyzes the impact of the social environment on the development of games. Future research should focus more on the following directions to explore whether the scenes generated by Unreal Engine technology can replace the real scene experience, and whether the technology can correctly disseminate traditional culture without misinterpreting its meaning.

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