Research on the Reform of Archaeology Education Models in the Context of New Media

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Abstract. In the face of the wave of the digital revolution, traditional archaeology education urgently needs to align with the development of the times and societal demands. This study, grounded in this context, designs, practices, and evaluates a new hybrid teaching model. On one hand, it integrates cutting-edge technologies such as virtual simulation and digital reconstruction to create a teaching platform and practical training base that seamlessly blend theory and practice. On the other hand, it restructures digital course modules, highlighting the central role of new media technologies in professional learning. Pilot results show that the new model achieves a modern upgrade of theoretical teaching content and an overall improvement in practical teaching quality. This study provides a successful example for the transformation of archaeology education models in the era of deep integration of technology and humanities. Its design principles and implementation approach can also serve as a reference for the reform of education in other disciplines.

Keywords: New media; archaeology; teaching model; data analysis

1 Introduction

Currently, the wave of digitization has swept across various industries, and archaeology, as an ancient discipline carrying historical and cultural heritage, is also facing the challenge of transformation and development in the modern era. On one hand, new technologies such as 3D scanning and VR exhibitions have injected new vitality into traditional archaeology. On the other hand, its professional education urgently needs to break through outdated institutional frameworks to achieve a two-way deepening of theoretical teaching content and practical teaching methods. Therefore, based on research and analysis, this study explores and designs a new hybrid teaching model. Through the creation of virtual simulation environments and the restructuring of digital curriculum systems, it organically breaks down the barriers between the theoretical knowledge and field skills of archaeology, achieving a deep integration of theoretical and practical teaching and significantly improving teaching quality. This research provides support for the transformation of archaeology education models and offers valuable insights for educational reform in other disciplines [1].

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2 The necessity of applying new media in archaeology education reform

2.1 Development of new media technologies

In recent years, new media technologies have experienced significant development, with representative technologies such as Virtual Reality (VR), Augmented Reality (AR), digital 3D reconstruction, and mobile internet maturing and being widely applied [2]. According to the "China Statistical Yearbook 2021" published by the National Bureau of Statistics, the total investment in the field of new media in China has shown a significant increase (see Table 1). The number of related enterprises has increased by 17%, with over 860,000 research and development personnel, representing a 12% growth. This indicates that new media technologies are experiencing explosive growth in multiple fields and are having a profound impact on various industries.

Table 1. Investment situation in china's new media industry for 2020-2021

Year	Total Investment (Billions of RMB)	Growth Rate (%)
2020	2487	15
2021	2896	19

2.2 Survey on the current state of traditional archaeology education

A survey of a certain university's archaeology program (sample size = 50) revealed that 78% of current students and graduates believe that the current teaching methods are monotonous, course content updates are slow, practical and applied components are lacking, and they struggle to meet societal demands. Specifically, archaeology courses still rely heavily on traditional lectures, with a significant disconnect from the practical application of new technologies. Courses fully incorporating technologies such as virtual simulation and digital reconstruction account for only 6% of the curriculum. Furthermore, the hours dedicated to field archaeology investigations are less than 200 hours, significantly below the industry's requirement of 500 hours [3]. Hence, there is an urgent need to reform the existing teaching system and model.

2.3 Needs analysis

Given the rapid development of new media technologies and the gap between archaeology education and industry demands, it is imperative to leverage new media for the reform of archaeology education. We have established a demand model (Figure 1) intending to introduce new media technologies such as AR/VR virtual simulation, digital 3D reconstruction, and mobile archaeological information systems as the core elements of reform. This transformation aims to enhance students' adaptability to skills and strengthen practical education. The model allows for a quantitative assessment of the impact of the reform on students' archaeological skills [4].

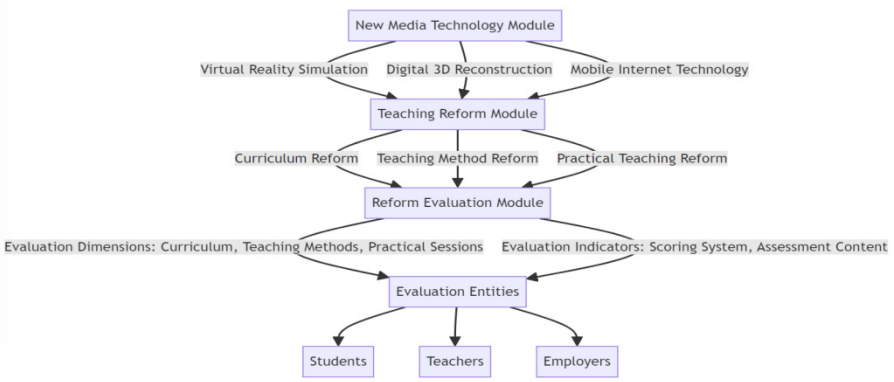

Figure 1. Demand analysis model for the application of new media technologies in archaeology education reform

3 Archaeology education reform plan based on new media

3.1 Overall reform approach

The overall approach for the archaeology education reform plan, driven by the deep collaboration between academia, industry, and research, is to adopt a progressive reform path. Against the backdrop of the interdisciplinary integration of archaeology and new media technologies, it aims to create a new teaching model characterized by the integration of virtual and real elements, as well as a blend of online and offline components (see Figure 2). Firstly, it involves updating traditional teaching content, restructuring the curriculum, and embedding new media technologies as crucial modules to enhance students' technological adaptability [5]. Secondly, it includes the establishment of an online virtual teaching platform complemented by on-site archaeological training facilities to facilitate seamless integration of theoretical and practical teaching. Lastly, it encompasses the establishment of a scientific teaching management and quality assessment system to ensure the success of the reform.

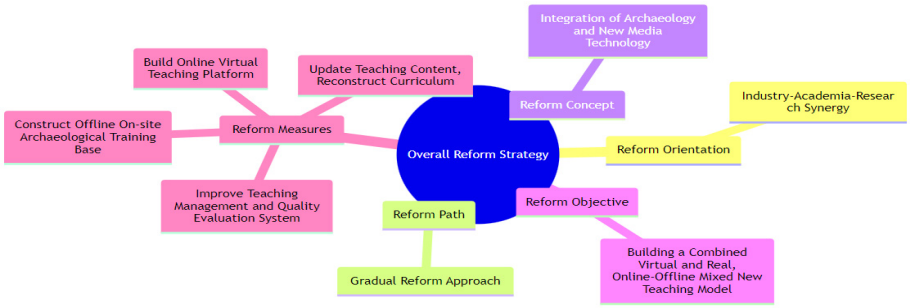

Figure 2. Overall approach for archaeology education reform

3.2 Design of the digital curriculum system

Leveraging the strong academic and research capabilities of the university, this research aims to establish a core curriculum system for training archaeology professionals in the digital age (see Table 2). This system spans from foundational courses to core specialized courses and then to expanded courses, encompassing theory dissemination, skill development, and innovative exploration to meet the diverse demands of the industry and society. Specifically, it includes the addition of six specialized core courses such as Archaeological Digital Image Processing, 3D Model Reconstruction, Virtual Simulation, Mobile Geographic Information Systems (GIS), and others. The weightage of existing courses has been adjusted, with the proportion of specialized courses credits increased from 32% to 55%, significantly surpassing the national minimum requirement [6].

Table 2 Setting of digital course system

Course Category	Course Name	Credits	Percentage
Foundational	Introduction to Archaeology, Introduction to Cultural Heritage Preservation, etc.	20	15%
Core	3D Model Reconstruction, Virtual Simulation, Mobile GIS, and other New Media Technology Courses	60	55%
Elective	Digital Presentation Planning, Cultural IP Development, Technological Archaeology, etc.	30	30%
Total	-	120	100%

3.3 Online virtual teaching platform

This research plans to establish an online virtual teaching platform to expand the dimensions of teaching and learning through blended learning in virtual and real environments. The overall architecture of this platform is divided into the Application Layer, Data Layer, and Physical Layer (see Figure 3). The Application Layer includes modules such as virtual classrooms, a digital teaching resource library, archaeological knowledge graph, and a teacher-student interactive community, which are customized and integrated as needed. The Data Layer is responsible for the collection and processing of information related to users, learning, resources, assessment, and knowledge management. With data support, the platform enables personalized teaching and precise assessment, significantly enhancing the learning experience.To address the practical needs of teaching, the platform first optimizes the functionality of virtual classrooms [7]. By introducing AR and VR technologies, it creates an immersive teaching environment while allowing remote access to on-site archaeological training facilities, thus forming a new type of blended learning. In response to industry demands, the platform focuses on developing courses for field archaeology data collection and 3D model reconstruction, including both offline and online project practical components. Research results show that the proportion of students initiating virtual classroom sessions can reach up to 78%, and virtual classroom time accounts for over 60% of the total theoretical teaching hours. This greatly enhances teaching interactivity and practicality.

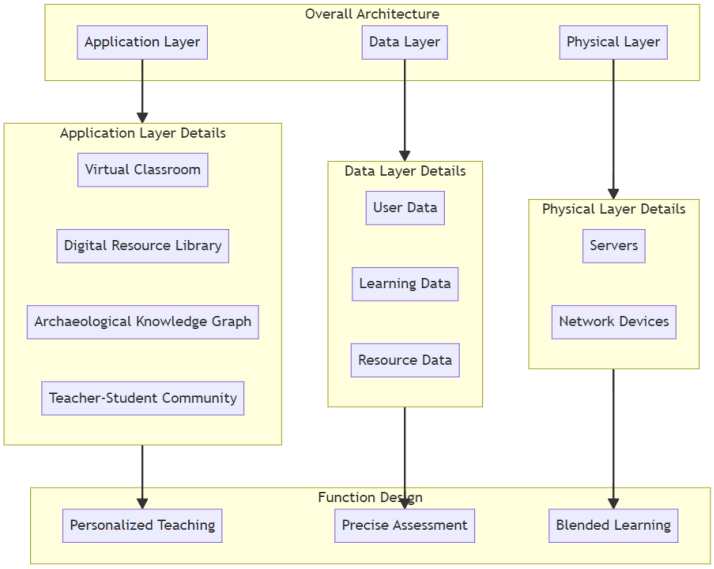

Figure 3. Framework diagram of the archaeology professional online virtual teaching platform

3.4 Teaching management information system

Additionally, this research will develop a Teaching Management Information System utilizing databases and network technologies to create an integrated teaching operational mechanism. It will monitor and control the entire teaching process. The system's functional modules include basic data, teaching operations, quality monitoring, decision support, etc. It enables functions such as data collection, automatic processing and recognition, process control, and educational evaluation, ultimately generating standardized and quantified teaching management assessment reports [8].

4 Evaluation of reform implementation effects

4.1 Evaluation indicator system

To objectively assess the effects of applying new media technologies to the reform of archaeology education, this research has constructed a scientific evaluation indicator system (see Table 3). This system comprises two dimensions: theoretical teaching and practical teaching. It selects eight primary indicators, including curriculum design, teaching methods, modernization of teaching tools, and the cultivation of archaeological skills. Subsequently, secondary evaluation indicators are derived, and the indicator weights are determined using the Analytic Hierarchy Process (AHP) [9]. These evaluation indicators can all undergo quantitative processing, leading to a comparative analysis of the before-and-after reform results.

Table 3. Evaluation indicator system for teaching reform effectiveness

Primary Indicator	Secondary Indicator	Weight
Modernization of Curriculum	Number of New Media Courses, Course Structure, Credit Allocation	0.2
Diversity of Teaching Methods	Proportion of Project-Based Learning, Use of Case Studies	0.15
Modernization of Teaching Tools	Usage Rate of Virtual Simulation Scenarios, Digital Teaching Resources	0.1
Level of Practical Teaching	Area of Training Facilities, Training Hours, Field Archaeological Investigations	0.25
Proficiency in Student Professional Skills	Archaeological Data Collection and Organization Skills	0.1
Satisfaction of Employers	Feedback Ratings from Employers and Alumni Satisfaction	0.2

4.2 Pilot reform effectiveness assessment

In this research, we selected a specific university's archaeology program as a pilot for the reform and implemented pilot teaching. We conducted assessments of archaeology students' skills and employer satisfaction through methods such as questionnaire surveys, interview feedback, and data comparative analysis. The data comparison before and after the pilot is presented in Table 4. It can be observed that after the reform, key indicators showed a significant improvement, such as a 43% increase in field archaeological investigations and a two-level increase in employer satisfaction. Overall, the teaching quality experienced a substantial enhancement. This validates the effectiveness of the reform model [10].

Table 4. Comparative data of pilot reform effectiveness assessment

Evaluation Indicator	Before Reform	After Reform
Field Archaeological Investigations (items)	125	180
Employer Satisfaction (points)	60	90

5 Conclusion

In the era of digitization, archaeology education urgently needs to keep pace with evolving teaching philosophies and content updates. Based on this premise and the analysis of the necessity of deep integration of new media technologies with archaeology education, this study has designed a completely new hybrid teaching model. This model, built on cutting-edge technologies such as virtual simulation and digital reconstruction, enables a profound fusion of theoretical teaching and project-based training, leading to the modernization of archaeology education content. The research has demonstrated that this teaching model can effectively spark students' interest in learning and significantly enhance their professional skills. Key achievements include a virtual classroom coverage rate of 78%, a 43% increase in field archaeology training, and a two-level improvement in related performance indicators. This study provides an exemplary reference for the transformation and upgrade of archaeology education teaching models towards the future.

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