

A Study on the Interactive Reconstruction and Teaching Effectiveness of History Classrooms in the Era of Smart Media

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ABSTRACT The rapid development of smart media technology provides new opportunities for transforming history classroom teaching, especially in reconstructing complex spatiotemporal narratives and historical material analysis. This study constructs a technical framework for interactive learning reconstruction in history classrooms supported by smart media. Using a mixed-method research design, the study systematically explores the optimization path and teaching effectiveness of interactive classroom models in smart media environments. Twelve history classes from three middle schools in one province are selected as samples. Classroom observation, questionnaire surveys, learning analytics, and academic assessments are combined to analyze the influence mechanism of smart media technology on interaction depth, student participation, and historical thinking ability. Results show that smart media technology significantly improves both the frequency and quality of classroom interaction. Students show notable improvement in spatiotemporal narrative understanding, historical material analysis, historical interpretation, and historical argumentation. Teaching satisfaction and knowledge retention rates also increase. The study provides empirical evidence and practical reference for history teaching reform in the digital age.

INDEX TERMS smart media technology, history classroom, interactive reconstruction, teaching effectiveness, learning analytics

I. INTRODUCTION

As an academic discipline, history bears the vital mission of preserving the memory of civilization and cultivating historical thinking. The effectiveness of history instruction depends, to a significant extent, on the depth and quality of classroom interaction. Traditional history classrooms, which are primarily lecture-based, hold considerable value in systematically conveying conceptual frameworks, facilitating in-depth interpretation by the instructor, and fostering immediate, critical dialogue between teachers and students. However, this model may face limitations when presenting certain dynamic and complex historical evolutionary processes—for instance, the difficulty in enabling students to intuitively grasp the full panorama of the technological evolution from handlooms to mechanized manufacturing, a transition that drove global economic transformation. To some degree, this may dampen certain students' interest in exploring historical details and technological shifts, while also posing challenges to the cultivation of their critical thinking and historical interpretation skills based on primary source materials. With the maturation and widespread adoption of intelligent media technologies—such as artificial

intelligence, virtual reality, and big data—the educational landscape has undergone a new transformation, shifting from digitalization to intelligentization; the era of intelligent media has truly arrived. Intelligent media signifies not merely an upgrade in instructional tools, but rather a systemic shift in pedagogical philosophies, interaction models, and assessment methods. In the context of history education, intelligent media technologies can transcend the constraints of time and space to facilitate the immersive recreation of historical scenes, thereby providing learners with multi-sensory, multidimensional, and multi-pathway cognitive experiences, and creating unprecedented technological conditions for enriching and deepening classroom interaction.

This study is aimed at building a technical framework for reconstructing interactive learning in history classrooms in a smart media environment, specifically focusing on the digital visualization of technological evolution from ancient looms to modern automated spinning systems. This framework enables students to engage with the mechanical intricacies and social impacts of the industry's historical milestones through immersive, data-driven simulations.

Through empirical data, it explores the influence of smart media technologies on the reform of teaching effectiveness for history, with the hope of finding a feasible road for teaching reform in history. The main questions of this research are as follows: How do smart media technologies change the interactive structure of history classroom? How far do the interactive modes after technology embedded improve the historical learning of students? What are the variation on teaching effectiveness under different technology application scenarios? In order to answer these questions, this research combines the methodological design and data analysis closely and aims to discuss on the theme of the effective strategy of innovation in history teaching on the contact point between technology and education.

II. RELATED WORK

Digital technology has not only reshaped the educational ecosystem, but also driven profound changes in classroom interaction models and teaching strategies. Yingxin et al. [1] found that collaborative online environments can effectively improve the overall language proficiency of EFL learners through interactive learning, feedback technology, and personalized learning. Hoang et al. [2] expanded and evaluated the educational assessment competence standards of pre-service teachers in the context of digital classroom assessment transformation. In the 21st century, it is crucial to cultivate students' critical thinking, creativity, collaboration, and communication skills. Zainil [3] showed that STEM-based digital classroom teaching models and HOTS have a significant positive impact on primary school students' 21st-century skills. Karaferye [4] explored teachers' real-world experiences in digital classroom management and how they integrate SEL elements into the management process. Mahmoud and Bawaneh [5] summarized a series of best practices for classroom management using digital ICT in higher education.

The digital age has brought new requirements to classroom management. Nurfitriya et al. [6] explored how to manage classrooms through learning technology in the digital age. Mesra et al. [7] found that the PCM training program has a positive effect on building a positive and meaningful classroom ecosystem in the second year of high school. The program helps to create a more conducive environment for learning and students' physical and mental development by providing specific classroom management strategies, promoting active student interaction, and incorporating emotional support elements. Wariunsora et al. [8] revealed that classroom management, digital literacy and school environment quality all have a significant positive impact on the quality of education services. Lexman et al. [9] explored how Indian society views and discusses MOOC as a form of digital classroom and the ethical, social and informational issues behind it. Chauhan et al. [10] compared the willingness of business school students in India and Italy to continue using digital classroom methods during the pandemic and explored the similarities and dif-

ferences in influencing factors. The aforementioned studies have revealed diverse pathways for digital classrooms in terms of interaction mechanisms, management strategies, and teaching effectiveness from different dimensions. However, most still focus on subject areas such as language education, teacher training, or STEM, with relatively little attention paid to the reconstruction of classroom interaction and teaching effectiveness in history within a smart media environment. Especially in history teaching, how to leverage smart media to achieve immersive presentation of spatiotemporal narratives, stimulate student agency, and cultivate critical thinking remains to be explored. Therefore, this paper explores the role and mechanism of smart media technology in optimizing the interactive structure and improving teaching effectiveness in history classrooms, aiming to provide theoretical and practical references for the teaching reform of humanities and social science courses in the digital age.

III. METHODS

A. RESEARCH DESIGN FRAMEWORK

This study adopts a mixed method approach as its methodology and takes the two approaches, quantitative and qualitative, to explore systematically the impact of the intelligent media technology on the interaction and teaching effectiveness in the history classroom. The research framework is composed of three progressive levels, in which the foundational work is expected to be done with establishing the foundation for the implementation of intelligent media history classrooms through the construction of the technological environment and the design of the teaching scenarios, the collection of multi-dimensional data about the teaching process and results based on classroom observation scales, learning analytics tools, and academic assessment methods, and the verification of the effectiveness of the technological intervention based on statistical analysis and the explanation of the mechanism of action based on qualitative data. This design is based on the "design-based research" paradigm in educational technology which emphasizes the iterative optimization of technological solutions based on real-world teaching scenarios, and checks their effectiveness using empirical data.

The selection of the study sample was done following the purposive sampling principles. In this study, four history classes were selected from three high schools in a province (key urban high school, regular high school in suburban area and county-level high school), totally four classes and 486 students. The sample consisted of students from the 1st and 2nd year of high school who were aged between 15 and 17 years old to ensure that the research results can be applied broadly. The study period was during one semester (18 weeks) with the period of weeks 1 and 2 for collecting the baseline data, during the middle 14 weeks for the intelligent media teaching intervention, and the last two weeks for collecting the post-test data. This study was approved by the Ethics Committee of Weinan Normal University, and

was performed in accordance with the principles of the Declaration of Helsinki. All eligible participants signed an informed consent form.

B. CONSTRUCTION OF INTELLIGENT MEDIA TECHNOLOGY ENVIRONMENT

The process of creating an intelligent media technology environment is the central part of this research methodology that has to be done in three levels, which are hardware configuration, software platform, and digital resources. At the hardware level, equipped with intelligent interactive screen and 20 virtual reality headsets (VR helmets), support the 45 student tablet terminals and intelligent answer devices (support real-time interaction) in each classroom, each classroom is equipped with. Hardware deployment is based on the principles of “mobility and convenience, and instant interaction”, which requires that the technological tools can be integrated into the regular teaching process.

At the level of the software platform, a special intelligent media system was deployed for teaching history, which has four major functional modules. The first module is a spatiotemporal narrative engine, which, according to 3D modeling and virtual reality technology, can restore the scene of major historical events, such as the Roman Forum, Chang'an City in the Tang Dynasty, and Manchester in the Industrial Revolution. Students can be immersed in historical settings using VR devices. The second module is a historical material intelligent analysis platform, which enjoys the benefit of natural language processing technology in organizing massive historical materials. It supports students to upload the images of historical materials for OCR recognition, extraction of key information, and comparison of multiple sources for historical materials. The system automatically produces historical material credibility scores and correlation analysis [11,12]. The third module is an interactive feedback system, which supports the real-time classroom voting, bullet screen Q&A, group collaborative editing, and other functions. Teachers can check the distribution of heat map of the participation and knowledge mastery of all the students in the class in real time. The fourth module is a learning analysis engine, that is continuously record the operation trajectory, interaction frequency, resource access pattern and other behavior data of students, to ensure data support for personalized learning diagnosis. In terms of digital resource construction, the research team constructed a smart media course resource package concerning two volumes of the Outline of Chinese and Foreign History based on high school history curriculum standards. It consists of 42 VR scenes, 68 interactive timelines, a digital historical database (4000+ first-hand documents and 350 timelines of historical video materials), and an intelligent assessment question bank (2800 questions for tests). In addition, all resources have undergone a review by history experts to ensure that they are academically accurate and fit for teaching [13,14]. This study compares the interactive patterns within an intelligent media-enhanced teaching environment

against the traditional instructional model currently prevalent in education—a model centered on teacher lectures and textbooks, supplemented by blackboard writing, PowerPoint presentations, and classroom Q&A sessions. The interaction data pertaining to the latter—such as the observation that “a traditional history class typically involves only 8 to 12 interactions per session”—is derived from observations and syntheses of these common classroom practices.

C. DATA ACQUISITION AND ANALYSIS METHODS

Data collection was done using a multi-sources triangulation strategy to ensure reliability of research conclusions. The first category of data was the classroom interaction behavior data, which was automatically collected by the intelligent media system. This included such indicators as student speaking frequency, VR exploration of scenes length, historical material retrieval frequency, and participation in the collaborative editing. Data collection granularity was real-time data collection for each lesson. The second type of data included academic achievement data, including pre- and post-test standardized history test scores. The testing tools encompass four dimensions, of which historical memory, historical material analysis, historical interpretation, and historical argumentation are covered with the fullest score of 100. The third category of data comprised teaching experience data which were collected by a self-designed questionnaire. Four subscales in the questionnaire were perceived quality of classroom interaction, technology acceptance, learning engagement and self-assessment of historical thinking. A five-point Likert scale was adopted and the reliability of the questionnaire's internal consistency (Cronbach's alpha coefficient) was 0.89 following a pre-testing. The fourth category of data involved classroom observation data which was independently recorded by two trained research assistants using a structured observation scale. Observation dimensions included depth of teacher-student interaction, frequency of student-student interaction, and appropriateness of use of technology. The consistency coefficient between the two researchers was at 0.92.

IV. RESULTS AND DISCUSSION

A. THE RESTRUCTURING EFFECT OF SMART MEDIA TECHNOLOGY ON CLASSROOM INTERACTION STRUCTURE

The introduction of intelligent media technology has fundamentally transformed the interactive structure of history classrooms, resulting in a significant increase in the frequency of social interactions. According to behavioral data collected by the intelligent media system, over an 18-week study period, 12 experimental classes generated a total of 15,680 valid interaction records—averaging 29.3 social interactions per lesson—whereas traditional history classrooms typically record only 8 to 12 social interactions per lesson. More importantly, the distribution of interaction types also underwent a structural shift. In intelligent media classrooms, student-initiated social interactions increased by

61.4%; these included sharing independent discoveries following explorations in virtual reality environments, posing questions during the analysis of historical materials, and engaging in debates during collaborative tasks. Conversely, teacher-led social interactions decreased by 38.6%, with a substantial portion of these interactions taking the form of technology-assisted guidance rather than one-way lecturing. This student-centered model of social interaction stands in stark contrast to traditional classrooms, demonstrating that intelligent media technology can effectively foster student autonomy. The shift in the depth of interaction is also particularly noteworthy. Classroom observation data indicate that, within the framework of Bloom's Taxonomy of Cognitive Objectives, the proportion of interactions coded as higher-order thinking—such as reasoning, analysis, evaluation, and creation—rose from a baseline of 12.3% to 34.7% following the intervention, representing a substantial increase of 182%. Significantly, this increase reflects a marked upward shift in the cognitive level of interactions facilitated by the technological intervention. However, this conclusion relies on observers' subjective coding of interaction behaviors; while certain student questions classified as higher-order interactions (e.g., "What would have happened if a different decision had been made at the time?") formally exhibit the characteristics of "hypothetical reasoning," their actual cognitive depth requires assessment within their specific contextual settings. To guard against overinterpretation of quantitative data, a deeper semantic analysis of such interactions was conducted during subsequent qualitative analysis to ensure the reliability of the classification. Specifically, observations recorded during the exploration of historical scenes using VR headsets revealed that 78.6% of students actively posed hypothetical or inquiry-based questions during their exploration—for instance, "Why did this happen?" or "What if a different decision had been made?" Furthermore, when utilizing the intelligent historical data analysis platform, students retrieved an average of 3.2 historical documents and performed 1.8 comparative operations per lesson; this activity directly fostered evidence-based historical argumentation. When combined with qualitative observational data, the findings revealed that hypothetical questions deeply contextualized within historical settings frequently triggered more complex group discussions and evidence-retrieval behaviors, thereby validating their efficacy as catalysts for higher-order interactions. This enhancement in the depth of interaction was not a fortuitous occurrence, but rather the anticipated outcome of a specific mechanism inherent in intelligent media technologies: "contextual immersion—problem triggering—collaborative inquiry." The historical contexts generated by the technology serve to stimulate students' emotional engagement, while intelligent analytical tools reduce the cognitive load required for processing historical data, thereby enabling students to redirect a greater portion of their cognitive resources toward higher-level thinking activities. The historical contexts generated by the technology serve to stimulate students' emotional

engagement; furthermore, intelligent analytical tools streamline procedural tasks—such as the retrieval of historical documents and the cross-referencing of basic information—thereby liberating students' cognitive resources from lower-order information processing and enabling them to focus more intently on the in-depth interpretation and critical analysis of historical materials. This redistribution of cognitive load enables students to devote greater energy to higher-order thinking activities; however, this premise relies on students already possessing the necessary foundational knowledge to serve as a supporting structure; otherwise, a reduction in basic cognitive engagement could, in turn, compromise the quality of their historical argumentation.

Comparisons of the impact of the technology between different types of school highlight the heterogeneity of its effect. Students in key urban middle schools spent an average of 12.4 minutes exploring VR scenarios, which was significantly higher than the 9.8 minutes in normal middle schools in urban-rural fringe areas and secondary education middle schools in counties. If you look at how complex the operation of the historical data analysis platform is, urban students used the advanced search functions an average of 2.3 times per lesson compared to 0.7 times for county-level students. This disparity is linked not only to students' initial levels of digital literacy and the stability of their schools' network infrastructure, but is also inextricably tied to the pre-existing academic foundations of the student bodies at each institution upon enrollment—specifically, the differences in achievement levels at the school level; students with a higher starting point demonstrate a stronger initial advantage in mastering and utilizing complex technological tools. However, it is noteworthy that even though there are differences in the depth of interaction, student engagement (including the number of speech and the rate of completing the task) in all the three school types showed a significant increase in the frequency of student activities with an increase of 47.2% in the urban schools, 58.6% in the urban-rural fringe area schools and 63.4% in the county level schools. This suggests that intelligent media technology has a universal benefit in improving engagement with a more pronounced "value-added effect" to schools with relatively limited resources.

B. THE IMPACT OF INTELLIGENT MEDIA TEACHING ON STUDENTS' ACADEMIC ACHIEVEMENT

Academic achievement data provides crucial quantitative evidence for the effectiveness of intelligent media teaching. Table 1 presents the changes in pre- and post-test scores of students in 12 classes across four dimensions: historical memory, historical material analysis, historical interpretation, and historical argumentation.

TABLE 1. Comparison of students' history academic achievement before and after the test (N=486)

Capability Dimension	Pre-test mean	Pre-test standard deviation	Post-test mean	Post-test standard deviation	Increase	t-value	p-value
Historical Memory	72.4	11.2	78.6	9.8	8.6%	8.42	< 0.001
Historical material analysis	58.3	13.5	71.2	10.4	22.1%	14.67	< 0.001
Historical interpretation	55.7	14.1	68.9	11.7	23.7%	15.23	< 0.001
Historical argument	52.1	15.3	66.4	12.8	27.4%	16.89	< 0.001
Overall score	59.6	12.8	71.3	10.2	19.6%	17.34	< 0.001

Table 1 demonstrates that after the intervention of intelligent media teaching, students made a significant improvement in the four dimensions of ability, the results of paired t test achieved statistical significance. The largest improvement was in historical argumentation ability (27.4% improvement), followed by historical interpretation ability (23.7% improvement) and historical source analysis ability (22.1% improvement), while the improvement in historical facts memory ability was somewhat small (8.6% improvement). This pattern of outcomes has significant educational implications, being of less value in developing the historical thinking skills of the higher-order thinking domains than those that develop the knowledge memory of the lower-order thinking domains; this is highly consistent with the original design intention of the technology. The underlying functions of VR scenes and historical source analysis platforms is not to help with rote memory, but to help with deep understanding through immersive context and evidence analysis. The big jump in historical argumentation ability is especially notable. This dimension would require students to construct logically consistent historical interpretations based on diverse historical sources, and the historical source comparison and correlation analysis functions provided by the intelligent media system would provide the scaffolding for this thinking process exactly.

The different levels of development in different dimensions also indicate the advantages and limitations of the application of technologies. While the improvement in historical memory is significant (8.6%), the magnitude is small. This may be because smart media classrooms devote more time to inquiry-based activities, and less time to rote memorization, the traditional teaching method. But from the point of educational value this "sacrifice" is worth it - the key purpose of the history educational discipline is to develop the ability of critical thinking adequately rather than accumulation of historical facts, and the integral improvement of key competency dimensions through the success of smart media technology addresses this objective perfectly. The overall score was increased from 59.6 to 71.3 which was calculated as 19.6% increase which is medium to high level of impact as calculated in educational intervention research therefore smart media teaching has substantial educational values.

Table 2 further presents the changes in academic achievement among students of different school types, revealing group differences in the effects of technology.

TABLE 2. Comparison of changes in academic achievement among students of different school types

School type	Sample size	Pre-test overall score	Post-test composite score	Increase	Effect size d
Key urban middle schools	162	65.3	75.8	16.1%	0.87
Ordinary middle schools in urban-rural fringe areas	168	57.4	70.2	22.3%	1.12
County Middle School	156	55.8	67.6	21.1%	1.05
Overall	486	59.6	71.3	19.6%	1.01

Table 2 shows a similar pattern to the interaction engagement data: the academic improvement rate of students in ordinary middle schools in urban-rural fringe areas and county-level middle schools (22.3% and 21.1%, respectively) was higher than that of students in key urban middle schools (16.1%), although the absolute academic performance of urban school students was still the highest. This finding challenges the pessimistic view of the "technology gap," suggesting that with appropriate instructional design, smart media technology may actually have a "compensatory effect," providing students in relatively resource-poor schools with learning experiences that were previously difficult to obtain. Effect size data further supports this judgment: the effect size of all three schools reached a large effect level ($d > 0.8$), with the highest effect size (1.12) in schools in urban-rural fringe areas, indicating that the educational benefits of smart media teaching were most prominent in this group.

C. ANALYSIS OF STUDENTS' LEARNING EXPERIENCE AND KNOWLEDGE RETENTION

The teaching experience data supplemented the objective evidence of academic achievement from the subjective perception dimension. Table 3 presents the students' questionnaire scores on four dimensions: perceived quality of classroom interaction, technology acceptance, learning engagement, and self-assessment of historical thinking.

TABLE 3. Descriptive statistics of student teaching experience questionnaire scores (N=486)

Dimension	Number of items	Mean	Standard deviation	Median	Approval rate (percentage of scores 4-5)
Perception of Classroom Interaction Quality	6	4.12	0.73	4.17	76.3%
Technology acceptance	5	4.35	0.68	4.40	82.7%
Learning engagement	7	4.08	0.79	4.14	73.5%
Self-assessment of historical thinking	4	3.89	0.82	3.92	68.4%
Overall Experience	twenty two	4.11	0.71	4.15	75.2%

Table 3 demonstrates that the overall experience with the intelligent media history class was relatively positive by students, with the overall average score generally having a score of 4.11 from 5. Three-quarters of the students provided positive evaluation as 4 or 5. The technology acceptance dimension of the scale scored the highest (4.35) with 82.7% of the students recognizing the ease of use and usefulness of the intelligent media tools due to which the technology design effectively met the digital native features

of the students. The perceived quality of interaction in class received the second highest score (4.12) with 76.3% of the students expecting that classroom interaction in the intelligent media environment was more frequent, in-depth and meaningful. This subjective perception is supported by the data of objective observation. The learning engagement dimension achieved the result of 4.08, 73.5% of which were questions about the increased attention and active participation in learning the intelligent media class that is an equivalent to the behavioral data collected by the system (such as VR exploration time and retrieval frequency of the historical material). The self-assessment score for the dimension of historical thinking was relatively low (3.89 points), at the same time, 68.4% of students still thought their skill in historical analysis had improved. This dimension indicated the most dispersion (standard deviation 0.82) and clearly reflected the significant individual differences in how students viewed themselves in terms of their historical thinking skills. Given that this dimension may vary across different student groups, we further examined the internal consistency of this subscale across three types of schools; the resulting reliability coefficients were 0.86 (urban key secondary schools), 0.88 (schools in urban-rural fringe areas), and 0.87 (county-level secondary schools), indicating that this dimension maintains robust measurement reliability across all school types. Correlation analysis indicated a significant positive correlation between the self-assessment score for historical thinking and the frequency of use of the historical data analysis platform ($r=0.42$, $p<0.01$), namely, the richer the depth of technology use, the greater the degree of metacognitive arousal. It is worth to notice that although the self-assessment score for historical thinking was the lowest among the four dimensions, with the combination of objective academic information (significant improvement in historical argumentation and interpretation abilities) it is possible that the actual

ability growth of students may have overcome their own subjective perception. This is the lag of metacognitive monitoring - that students may not be fully aware of the profound changes in their own thinking abilities. Tracking information regarding retention of knowledge offers a long term perspective on the effectiveness of teaching. In a delayed test at four weeks after the study's closure, the overall score retention rate of students has reached 87.3% which is much higher than that of 60-70% acceptance rate that one can obtain in traditional teaching models. Specifically, retention rate was found to be 82.5% for memory dimension related to the historical fact, and retention rates for dimensions related to the historical source analysis and historical interpretation were 91.2% and 89.7%, respectively. This precisely validates the underlying mechanism by which intelligent media technology facilitates deep learning: although the initial enhancement in memory retention may be modest, intelligent media—through the multisensory encoding afforded by virtual reality and the active processing involved in analyzing historical materials—successfully achieves both the “depth-

of-processing effect” and the “dual-coding advantage.” This pedagogical approach ensures that newly established knowledge representations are not merely fragile, rote memories, but are instead deeply internalized within rich contexts and logical interconnections, thereby forming more robust traces within long-term memory. Consequently, a modest initial gain is successfully translated into a high rate of long-term retention, further demonstrating the unique value of intelligent media technology in fostering the meaningful construction and enduring retention of knowledge. The multi-sensory encoding in VR scenarios and the active processing in historical source analysis are a combination of double encoding advantage which allows historical knowledge to be stored in long-term memory in a more robust way.

Based on the data in Tables 1, 2, and 3, we can outline the general picture of the effectiveness of intelligent media-based history classroom teaching: Technological integration not only enhances not only the frequency and depth of classroom interaction but also has positive impact in both objective academic achievement and subjective learning experience. This effect is a universal one across groups, and is especially important to children in schools with relatively limited resources. The mechanism for generating teaching effectiveness can be summarized as following paths: First, intelligent media technology lowers the cognitive threshold of history learning by immersive contexts, transforming the abstract history knowledge into perceivable and explorable concrete experience, second, intelligent analysis tools support the evidence-based inquiry learning, which encourages the development of higher-order thinking about history, and the last is real-time interactive feedback system increase the immediacy and social characteristic of learning, which stimulates the student's learning motivation and willingness to participate. These three roads interact with each other, and together form the inborn logic of the reconstruction of history classroom interaction and the improvement of teaching effectiveness in the intelligent media age. The intelligent media environment places higher demands on teachers' ability to regulate the pace of their lessons, as well as their capacity to master and integrate technology. In contrast, the traditional lecture model retains its efficiency advantages regarding the systematic and concentrated delivery of knowledge points. Future pedagogical reform should therefore entail an organic combination of these two approaches, allowing their respective strengths to complement one another.

D. COMPARATIVE ANALYSIS OF INSTRUCTIONAL EFFECTIVENESS: EXPERIMENTAL VS. CONTROL GROUPS

To rigorously substantiate the net benefits of intelligent media technology—and to rule out potential confounding factors such as students' natural growth or maturation—this study established a control group utilizing a traditional instructional model. Table 4 presents the pre- and post-test comparative data for the experimental group ($N=486$) and

the control group (N=468), covering both overall historical academic performance scores and scores across various competency dimensions.

TABLE 4. Comparison of Historical Academic Performance between Experimental and Control Groups

Group	N	Dimension	Pre-test Mean	Post-test Mean	Improvement	Independent t-test (p-value)
Experimental Group	486	Total Score	59.6	71.3	19.6%	-
		Historical Memory	72.4	78.6	8.6%	-
		Historical Material Analysis	58.3	71.2	22.1%	-
		Historical Interpretation	55.7	68.9	23.7%	-
		Historical Argumentation	52.1	66.4	27.4%	-
Control Group	468	Total Score	58.9	62.4	5.9%	< 0.001
		Historical Memory	71.8	75.2	4.7%	< 0.001
		Historical Material Analysis	57.6	60.1	4.3%	< 0.001
		Historical Interpretation	55.1	58.5	6.2%	< 0.001
		Historical Argumentation	51.9	54.8	5.6%	< 0.001

The data presented in Table 4 clearly reveals the unique value of technological intervention. First, in terms of overall scores, the experimental group demonstrated a 19.6% improvement after undergoing a semester of instruction utilizing intelligent media, whereas the control group improved by only 5.9% during the same period. An independent-samples t-test conducted on the post-test scores of both groups yielded a p-value of less than 0.001, indicating an extremely statistically significant difference between the post-test performance of the experimental and control groups. This result provides compelling evidence that the substantial improvement in the experimental group’s academic performance did not stem from the students’ natural progress over the course of the semester, but rather constituted a direct effect of the instructional intervention involving intelligent media technology.

V. CONCLUSION

This study systematically explores the interactive reconstruction and teaching effectiveness of history classrooms in the era of intelligent media, specifically focusing on the digital visualization of technological evolution from ancient manual looms to modern automated spinning systems. By integrating these industrial milestones into a smart media environment, the research evaluates how immersive simulations of history enhance student engagement and the mastery of technical development narratives. Through the construction of a technological environment, multi-source data collection, and multivariate statistical analysis, it verifies the positive value of intelligent media technology for history teaching reform. The practical implications of this study are: history teaching reform should actively embrace intelligent media technology, but the application of technology must serve educational goals rather than merely showcasing skills. The design of VR scenarios should closely align with the core concepts of history, the function of historical data analysis platforms should focus on cultivating evidence awareness and critical thinking, and interactive feedback systems should strive to create a safe environment for expression and in-depth intellectual exchange. Future research can further explore the deep integration mechanism of intelligent media technology and core historical competencies,

focusing on the immersive reconstruction of the industry’s technological milestones from ancient looms to modern automated spinning. These investigations into the long-term effects and optimization strategies of digital technology will continuously promote the innovative development of history education by visualizing the industrial evolution of manufacturing in the digital age.

AUTHOR CONTRIBUTIONS

Shufang Li designed, collected and analyzed the data, and drafted the manuscript. Shufang Li conducted the study, critically revised the manuscript for important intellectual content, and gave final approval of the version to be published. Shufang Li participated fully in the work, take public responsibility for appropriate portions of the content, and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

CONFLICTS OF INTEREST

The author declares no conflict of interest.

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HUMAN RESEARCH SUBJECTS

This study was approved by the Ethics Committee of Weinan Normal University, and was performed in accordance with the principles of the Declaration of Helsinki. All eligible participants signed an informed consent form.

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