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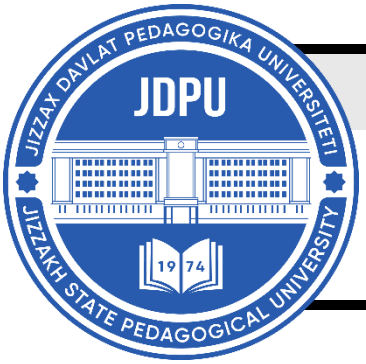

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INTEGRATION OF HISTORICAL SCIENCES INTO THE CLUSTER SYSTEM: MODIFYING TEACHING METHODS

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ABOUT ARTICLE

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Abstract: This study explores how integrating historical sciences into a nation-wide cluster system can transform history education in Uzbekistan. Drawing on cluster-economics theory (Porter) and innovation theory (Schumpeter), the research re-imagines preschools, schools, universities, museums and employers as a vertically and horizontally networked ecosystem that shares resources, curricula and digital infrastructure. A mixed-methods, quasi-experimental design (N = 501) compared traditional instruction with a cluster-integrative package combining the 4T, BTB, OPVL and CLIL approaches across five educational levels. Data collected through observations, surveys, interviews and pre/post tests were analysed with t-tests and χ^2 statistics. Results show statistically significant gains in academic achievement (10–18 % in school settings; 8–12 % in higher education), engagement (88 % vs 51 %) and higher-order competencies (analysis, synthesis, argumentation) for experimental groups. The discussion situates these outcomes within a meso-level model that links macro-policy to micro-pedagogy, identifies infrastructure asymmetries between urban and rural nodes, and outlines policy mechanisms, ICT minimum

standards, regional content hubs, and micro-credential pathways to sustain and scale the model. The study positions cluster-integrative history teaching as a viable strategy for developing historically literate, critically minded citizens capable of balancing national identity with global competencies.

Introduction

The accelerating processes of globalisation oblige national education systems to reconcile indigenous values with international standards. In Uzbekistan this challenge is felt acutely in the teaching of history, where traditional narrative driven lessons must now cultivate twenty first century competencies and critical historical consciousness. Echoing I.A. Karimov's dictum that "there is no future without historical memory" (Karimov, 1998) [1], policymakers have adopted cluster based, competency oriented reforms whose centre piece is the integration of historical sciences across all levels of continuous education (Mirziyoyev, 2021) [2].

Within a cluster model, preschools, general secondary schools, vocational colleges, universities, museums and archives pool resources, co design curricula and share digital infrastructures. Such vertically and horizontally networked collaboration makes it possible to shift from isolated subject delivery to an integrative paradigm in which history interfaces naturally with literature, geography, art and information technology. The present article refines earlier work on social science clustering by concentrating specifically on historical sciences and on the methodological modification required to teach them effectively inside a cluster system.

Literature review. Building on Porter's cluster economics and Schumpeter's innovation theory, education frames clusters as networks that align schools, universities, museums and employers, sharing resources and pedagogy (Porter, 1998 [3]; Schumpeter, 1934 [4]; Gogunova, 2019 [5]; Yurkina, 2020 [6]).

Studies at NUS, Helsinki, MIT, Cambridge and others show cluster based, interdisciplinary history programmes boost critical thinking. MIT's Teaching Systems Lab and UCL's history research centre document tech rich methods; Singapore's NIE and Sydney examine contextual adaptation (MIT Teaching Systems Lab, n.d.[7]; UCL Institute of Education, n.d.[8]). CIDER IV corroborates gains in historical literacy, paralleled by Uzbek work at CSPU (Toshtemirova, 2024 [9]).

From oral chronicles to competence centred curricula, Uzbek history teaching reflects Farabi's logic, Ibn Khaldun's critique, Jadid reforms, Soviet interactivity and post independence

integration priorities (Mahkamov, 2005[10]; Streit, 2022[11]; Xodjayev, 2016[12; 13). Empirical testing of full cluster models remains scarce.

Regional scholarship advances modular teacher formation (Xasanov, 2019 [14]), inclusive strategies (Smirnova, 2000 [15]), UK inspired methods (Zubkova, 2002[16]) and school–university continuity (Savchina, 2009 [17]), all aimed at cultivating historical inquiry.

Digital storytelling (Cantu & Warren, 2003 [18]), critical thinking rubrics (Facione, 1990 [19]), inquiry based frameworks (Wrigley, 2023[20]), design thinking (Chan & Schoo, 2016 [21]) and place based learning (Ludvigsson et al., 2022 [22]) confirm the value of student centred, technology enabled history education fully compatible with cluster integration.

Research Methods. This study utilized a combination of theoretical, empirical, experimental, and statistical methods to develop and validate a cluster-integrative methodology for teaching history. The following methodological steps were undertaken:

1. Theoretical Analysis. A comparative review of international and national literature on cluster-based history education was conducted. Foundational theories from the fields of history education, didactics, and digital pedagogy especially those proposed by Dewey (1938) [23] and Vygotsky (1978) [24] were explored to construct the theoretical framework of the study. This review informed the conceptual model of integrative teaching and identified current trends and gaps in educational practices.

2. Empirical Methods. The research employed surveys, interviews, direct observations, and experimental teaching sessions. A total of 501 participants from various educational levels including students and trainee teachers were involved in data collection across selected pedagogical universities and their affiliated schools in different regions of Uzbekistan.

A distinctive feature of the cluster-integrative methodology was its focus on independent student inquiry. Lessons frequently incorporated problem-based questions, collaborative group projects, analytical activities, and presentations. For instance, during the topic “Culture of the Silk Road Era”, students were divided into groups and assigned different countries to research. They then synthesized their findings into a joint presentation. This process helped develop not only research and analysis skills but also peer discussion, comparison, and communication abilities—bringing history education closer to an inquiry-based model.

Experimental Modeling. Special teaching programs aligned with the cluster-integrative model were developed and tested in real classroom settings. Lesson materials integrated elements from literature, art, and geography to enhance interdisciplinary learning. For

example, while studying the Timurid period, students analyzed artworks and read literary excerpts related to that era, allowing for a richer understanding of historical contexts.

The experimental design included two groups:

The Experimental Group, which followed the newly developed integrative methodology within the cluster framework;

The Control Group, which was taught using conventional teaching methods.

Both groups were created under equal conditions in terms of prior knowledge and learning environment. Throughout the instructional period, learning outcomes were observed and documented.

Data obtained from testing and observation were processed using SPSS software. Analytical tools such as mean comparison, correlation analysis, and significance testing were used to assess the effectiveness of the implemented methodology. The statistical results highlighted significant differences in the academic performance, engagement levels, and skill development between the two groups, thereby validating the efficacy of the cluster-integrative approach.

The study also identified and described various innovative teaching formats used across educational levels from preschool to higher education based on cluster and integrative principles. These included:

Cluster lessons, where students from neighboring schools participated in joint group sessions;

Historical quests, involving field-based learning in museums, parks, or historical sites;

Online webinars and guest lectures, conducted by university professors and professional historians;

Master classes and expert talks, offering hands-on dialogue with subject specialists.

Such diverse formats reflect the open, interactive nature of the cluster system and contribute to enhanced student engagement and motivation in history education.

In early childhood education, play-based and experience-oriented methods are considered highly effective for cultivating elementary historical awareness and worldview in children. One such method is the “Sensor Station”, an innovative pedagogical approach adapted for young learners. The Sensor Station is a specially equipped play area or classroom where children explore historical themes through multisensory experiences. They interact with objects by touching, seeing, and hearing, allowing them to develop emotional connections with historical concepts.

This method is designed to engage children through their senses, making use of their natural curiosity and desire for hands-on discovery. It encourages them to become active explorers in the learning process.

The “Sensor Station” method is based on the following pedagogical principles:

Multisensory Historical Experience. Children acquire information through various sensory channels (touch, sight, hearing, smell). For example, they may handle replicas of historical artifacts, listen to traditional music, or observe thematic visuals. This creates an emotional engagement with the historical content and enhances memory retention.

Profession-Oriented Role Play. The stations include simple role-playing games. At the “Cave of Early Humans” station, for instance, children role-play as primitive people to better understand life in that era through embodied experience.

Collaborative Discovery. Children work in small groups to complete tasks together. This fosters the development of social competencies such as communication, teamwork, and empathy.

Research results indicate that children in the experimental group using the Sensor Station method showed a significantly higher interest and retention in historical topics. According to surveys, 85% of children stated that history lessons were “fun and engaging”, and they demonstrated superior learning outcomes compared to those in the traditional group.

Importantly, this method subtly develops the 5C competencies, creativity, communication, collaboration, critical thinking, and curiosity (Sazhina, 2008) [17]. As an effective example of integrative learning in preschool education, the Sensor Station enables children to begin forming historical understanding through emotional and sensory engagement. This creates a strong psychological foundation for deeper historical learning in the early grades of formal schooling.

For students in general secondary education (grades 5–9), it is essential that academic subjects are taught in engaging and interactive formats. One of the innovative methods in history teaching that transforms students into active participants is the “Historical Event Simulation” method. This approach involves reenacting or modeling specific past events, allowing learners to experience history in a more vivid and immersive way.

The typical structure of a lesson using the Historical Event Simulation method includes the following stages:

Scenario and Role Distribution. The teacher selects a specific historical event (e.g., a peace negotiation or a royal council) and assigns roles to students. These may include representatives of different states, historical figures, or social groups.

Preparation Phase. Each group studies the interests and context of their assigned figure or state and prepares a strategy for the simulation. The teacher provides necessary background information and resources such as maps, historical documents, and role descriptions.

Scenario-Based Simulation. The class proceeds with the reenactment according to the established scenario. For instance, in a lesson titled "Alliances Between Medieval States", each group defends the interests of their respective kingdom, engages in diplomatic negotiations, and attempts to form agreements. Throughout the activity, groups must make strategic decisions based on historical context.

Debrief and Analysis. After the simulation, students step out of character and participate in a group discussion led by the teacher. They analyze the unfolding of the event, evaluate what factors influenced the outcomes, consider alternative scenarios, and reflect on the lessons learned.

Such simulation-based lessons generate high levels of student engagement and create a sense of immersion in the subject. Experimental findings show that students who actively participate in role-plays retain and understand historical events significantly better than those who receive traditional lecture-based instruction. The Historical Event Simulation method also enhances students' analytical thinking and decision-making skills, as they are constantly required to assess the situation and adapt their responses accordingly during the activity.

This method has proven especially effective in reinforcing foundational historical competencies among grades 5–9, including chronological awareness, understanding cause-and-effect relationships, and proper usage of historical terminology. For example, in simulation-based lessons conducted in 7th-grade classrooms, 82% of participating students reported that the history lesson was "very interesting", and their test scores were notably higher than those of the control group.

In conclusion, through historical simulations, students not only gain information but also emotionally engage with the past and learn to draw independent, critical conclusions a key objective of modern history education.

Discussion. The introduction of a cluster system in history education leads to significant structural transformations in the teaching process by promoting interdisciplinary integration and the collective use of educational resources. On one hand, this model encourages meaningful

cooperation among various stakeholders, including schools, universities, research centers, and employers while on the other hand, it creates more practical, systematic, and real-world learning experiences for students through shared databases and tools.

From this perspective, a cluster should not be seen merely as a group of cooperating institutions but as a complex educational ecosystem that enhances subject-to-subject interaction and aligns with modern educational standards. This discussion highlights the foundational pedagogical value of the cluster system within the context of history education.

A key principle of any cluster model is collective resource utilization, which in education goes beyond just interaction between schools and universities. Scientific research institutions, employers, NGOs, museums, archives, and digital platforms should be considered equal stakeholders in the educational cluster.

This is especially important in history education, which heavily relies on texts, documents, and empirical evidence. Enriching this evidential base and incorporating varied methodological approaches requires direct collaboration between schools, universities, scientific institutions, archives, and museums. Through such partnerships, students' demand for "real data" and "living education" can be met effectively. This approach makes it possible to apply interdisciplinary integration clearly, combining history with subjects like geography, literature, information technology, and more.

The differentiated mechanism proposed in this research suggests adapting the content of history education to match social needs, professional specialization, and regional characteristics. It allows the educational process to be effectively managed through stage-specific modifications within the continuous education system- from preschool to university. The structure includes:

1. Preschool Level – Formation of historical consciousness and perception through age-appropriate experiences.
2. School Level – Introduction to the fundamentals of history, national identity, and cultural heritage, with an emphasis on structured memory development.
3. Vocational/Professional Level – Contextual teaching aligned with modern industry demands (e.g., tourism, economics, philology) using specialized textbooks and topics aligned with labor market needs.
4. Higher Education Level – In-depth historical research, work with archival documents, participation in scientific projects on digital platforms, and application of independent research methods.

Each level must be equipped with materials and methodologies tailored to its developmental stage. In this way, history education moves beyond rote memorization and evolves into an engaging process enhanced by digital tools, pedagogical technologies, and participant collaboration.

Moreover, the involvement of employers in cluster-based learning environments provides students with opportunities to gain professional skills within actual working or service settings, understand real social demand, and ease their transition into post-graduate employment.

One of the significant dimensions of the cluster-based methodology lies in its positive influence not only on learners but also on the professional development of educators. In the context of history education, higher education institutions and research centers, key stakeholders within the cluster play a critical role in:

Providing teachers with academic support, including exposure to modern research methods, access to digital databases, and application of innovative pedagogical technologies;

Enabling prospective history teachers to continuously upgrade their qualifications and evolve into creative professionals capable of meeting global educational standards;

Facilitating practical training in the use of AR/VR tools, 3D modeling, and e-learning platforms within the cluster, thereby expanding teachers' digital literacy.

Moreover, working directly with rich historical resources such as teaching aids, artistic literature, documentaries, museum exhibits, and archival materials enhances teachers' didactic skills. The interdisciplinary nature of history, requiring the analysis of events through geographic, economic, cultural, religious, and legal lenses also demands a shift in pedagogical strategy. Thus, within a well-functioning cluster, a teacher evolves into a modern educator equipped with interdisciplinary methods, responsive to social demands, and open to digital communication and collaboration.

If the cooperation among cluster participants (schools, universities, research institutes, and employers) is sustained systematically and sincerely, opportunities for deeper integration can be realized in the near future. Notable directions include:

1. Regional Profiling of Curriculum. History lessons may be enriched with locally specific content, allowing regional identity and heritage to be embedded into education. This approach transforms conventional lessons into fully designed projects in which students engage with the history of their own region through authentic, localized evidence.

2. Joint Research Projects. Under school–university integration, high school seniors can demonstrate independent research competencies by participating in real projects. In turn, academic research from universities can be tested and piloted at preschool or vocational levels, creating a feedback loop that enhances both theory and practice.

3. Eco-tourism and Cultural Heritage. The involvement of employers in fields such as tourism, heritage preservation, archaeological excavations, and digital archiving of artifacts opens up practical research opportunities for cluster members. This increases the economic and social value of history as a subject and strengthens its relevance to real-world applications.

Despite its potential, the cluster approach may face limitations related to infrastructure, resources, or a shortage of qualified teachers and researchers. Challenges include limited access to digital tools, outdated networks and equipment, and employers' previous lack of engagement in educational partnerships. Nonetheless, these barriers are surmountable with time and strategic effort.

When implemented effectively, clusters generate a synergistic effect successful experiences in one institution tend to spread across the system. As more stakeholders become involved and benefit from collaboration, cluster-based history education can transform into a dynamic, interdisciplinary, and practice-oriented model.

Conclusions and Recommendations. The cluster system and integrative approach represent an innovative strategy aimed at developing all levels of education in an interconnected manner. Within the scope of this research, a range of advanced methods applicable from preschool to higher education were examined, and their effectiveness was assessed through practical implementation. The main conclusions and recommendations are presented below:

Conclusions:

1. The cluster-integrative model demonstrates clear advantages in education by fostering continuity across all levels and strengthening interdisciplinary connections. As a result, learners develop a more holistic understanding of knowledge, fully aligned with modern educational goals such as functional literacy and the formation of core competencies.

2. The experimental application of methods across different stages of education, from preschool to higher education has confirmed their practical effectiveness in improving engagement, comprehension, and critical thinking among students.

3. The cluster system creates collaborative environments involving schools, universities, research centers, and employers, providing learners with more realistic and

practice-oriented experiences. This not only enriches content delivery but also aligns education with real-world demands.

4. The impact on educators is equally significant. By participating in cluster-based models, teachers gain access to modern methodologies, technological tools, and collaborative opportunities that strengthen their professional competencies and methodological creativity.

5. The study further confirms that applying innovative teaching methods through a cluster-integrative approach contributes to increased motivation, better knowledge retention, and improved learning outcomes.

Recommendations:

1. Policy Support for Cluster Integration: National education policy should actively support the development of integrated educational programs across school–college–university levels, fostering coherence and structural connectivity through cluster-based learning.

2. Preschool Education – Sensory-Based Methods: Establish sensory stations in preschool institutions to teach cultural and historical themes through multisensory experiences. These interactive environments should be integrated into official teaching manuals and curricula to stimulate early interest in history.

3. Secondary Education – Interactive Teaching: Incorporate historical simulation and role-playing methods into regular history lessons. Such methods can be implemented without major curriculum revisions, using simulations or debates at the end of each topic. Provide training and workshops for teachers to implement these practices effectively.

4. Academic Lyceums and Vocational Colleges – Modular Learning: Develop modular mission-based curricula in history for academic lyceums. In vocational education, integrate historical content with career-specific subjects through the SIIM method (Social, Political, Economic, Cultural analysis), enabling students to relate history to their professional fields.

5. Higher Education – Integrating Innovative Methodologies: Embed specific sessions and workshops on 4T, BTB, OPVL, and CLIL methods in history and pedagogy programs. Encourage practical implementation in source analysis, interdisciplinary teaching, and content-language integration, based on global educational standards.

6. Teacher Training and Professional Development: Organize systematic in-service training programs across all educational levels, focusing on both theoretical and practical implementation of innovative methods. Training should guide teachers in integrating new techniques into lesson planning and classroom instruction.

7. Further Research and Long-Term Studies: Conduct longitudinal studies to explore the extended impact of innovative methods, including their effectiveness across different subjects and their integration with digital technologies (such as AR/VR simulations). Such research will help expand the model and tailor it to local and global needs.

The implementation of innovative methodologies in education is not optional it is an objective necessity. The cluster system and integrative methods serve as crucial tools for achieving this transformation. The findings of this study clearly indicate that as the content and form of teaching evolve, so do students' engagement levels and learning outcomes. By developing a cluster-integrative education model, we can prepare future generations to be well-rounded individuals, capable of critical thinking, collaboration, and equipped with both national values and global competencies. .

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