

Digital technology-enabled collaborative innovation in ideological and political education in higher vocational colleges

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Abstract: This study examines how digital technologies can facilitate collaborative innovation in ideological and political education at higher vocational colleges. The benefits are articulated in four dimensions: greater precision in implementation, greater synergy among dispersed resources, richer multi-actor interactions and the ability to expand beyond fixed time and space. However, these benefits are limited by several interconnected challenges, including limited teacher competence, resource deficiencies, weak institutional safeguards and ethical issues such as algorithmic filtering and privacy erosion. The study therefore proposes three strategies: differentiated capacity building; cross-departmental collaboration to share resources; and ethically informed data governance.

Keywords: digital technology; higher vocational colleges; ideological and political education; collaborative innovation

1 Introduction

Although digital technologies are transforming higher education, institutions are struggling to convert these advances into educational outcomes. In particular, ideological and political education is at a crossroads. Traditional approaches have long been hindered by monotonous teaching methods, low levels of student engagement and disjointed collaboration between theory courses, daily activities, thematic education and practical training. Higher vocational colleges, with their focus on employment and close industry links, face unique challenges. Despite the potential of digital technologies, there has been little systematic examination of their intersection with collaborative innovation. While macro-level research focuses on policy [1], collaborative studies rarely address vocational contexts [2-4], and recent scholarship predominantly examines single applications [5-7]. What is underexplored is an integrated perspective. This study addresses this gap by examining the value logic of digital enablement, identifying constraints and developing strategies.

2 The value logic of digital technology-enabled collaborative innovation

2.1 Realizing precision-oriented educational supply

The core value that digital technologies bring is precision. Traditional approaches follow a standardized model that cannot be tailored to individual cognitive levels. Digital technologies enable precision. Digital footprints, including learning behaviors and preferences, keep profiles up to date. This allows educators to match resources effectively, shifting from a group-oriented approach to an individual-oriented one. One deep learning-based system achieved prediction accuracy of 89.7%, surpassing traditional methods by 23.5%.

2.2 Unlocking synergy effects of diverse educational resources

Ideological and political education has been hindered by fragmented resources and data silos, preventing meaningful collaboration. Digital connectivity breaks down these barriers. A unified platform that standardizes and shares data eliminates blind spots. When teaching accesses real-time data and management can track progress, collaboration becomes data-driven. Research confirms that digital infrastructure and collaborative R&D are critical enablers.

2.3 Reconstructing multi-subject interactive relationships

Ideological and political education is, at its heart, about collaborative interaction. Traditional models rely on one-way transmission. However, digital technologies rework this relationship by moving away from the subject-object dichotomy towards intersubjectivity. This loosens the monopoly of teachers and raises the awareness of students. Digital platforms weave instructors, counselors and mentors into unified networks. Students shift from being passive recipients to becoming active co-creators of value.

2.4 Breaking temporal-spatial boundaries

Traditional ideological and political education depends on fixed time and space, which limits its reach. Digital technologies open doors to ubiquitous learning. Students can access resources at any time. Physical spaces enriched with QR codes and AR can become part of the curriculum. Virtual reality bridges distance. Seamless integration of online and offline elements connects scenarios, moving education from the classroom to life.

3 Practical challenges

3.1 Gaps in teachers' digital literacy

There is still a significant discrepancy between teachers' digital literacy and the demands of the role. Many instructors demonstrate limited digital awareness, with their understanding of technology often confined to basic multimedia. A background in the humanities makes advanced comprehension challenging. Mastery of AI, VR and big data analytics is limited. Some educators overemphasize technology at the expense of substance, while others resist meaningful integration.

3.2 Structural shortcomings in resource supply

Developing digital resources is essential, yet supply falls short of practical demand. Funding constraints leave some colleges with insufficient resources. Immature infrastructure and a lack of unified standards create information silos. Theory, activity and student affairs resources are often managed separately, with little integration. Without dynamic updating mechanisms, social hotspots cannot be transformed into educational resources quickly enough, which reduces the appeal of ideological and political education.

3.3 Deficiencies in the digital environment and institutional safeguards

The digital educational environment remains unstable. Many colleges lack forward-looking strategic planning and sustained investment, and mismatched architectures and data standards hinder integration. Promoted platforms end up as data warehouses rather than educational tools. Educational scenario development lags and off-campus digitization is slow. Institutional safeguards and incentives are inadequate, dampening educators' enthusiasm.

3.4 Ethical dilemmas

Digital technologies pose three ethical risks. Firstly, technological immersion erodes humanistic value guidance, reducing education to a spectacle. Secondly, algorithm-based systems create information cocoons that narrow cognitive scope. Thirdly, the capture of digital footprints blurs privacy boundaries, while overreliance on digital tools weakens independent judgement [8]. These issues cannot be solved in isolation; they require integrated solutions.

4 Practical pathways

4.1 Discipline capacity building and institutional guarantee

Deficiencies in digital literacy stem from institutional design, so training alone is not enough. What is needed is differentiated, scenario-oriented capacity development informed by TPACK [9]. Basic training focuses on smart classrooms and digital platforms, while advanced training covers behavioral data, AI-assisted activities and ethical risks. Top-level planning must include incentive and fault-tolerance mechanisms. Collaborative digital education should be embedded in institutional blueprints with clearly defined responsibilities.

4.2 Co-construction of shared resources and immersive scenarios

Inadequate resource supply and weak scenario support reinforce each other. Simply adding resources without embedding them in scenarios and unified governance yields little benefit. Under unified data standards, cross-departmental platforms should integrate curriculum materials, activity archives and case studies. Priority should be given to vocational context resources that combine ideological guidance, professional ethics and post requirements. Static repositories should be transformed into scenario-embedded practices by incorporating lightweight content such as QR codes and AR materials in dormitories and community spaces, and offering virtual visits to off-campus bases.

4.3 Digital governance and data-driven closed-loop operation

Big data-driven education carries the risk of information cocoons, privacy breaches and reduced subjectivity. Data norms and algorithm correction mechanisms must be defined to determine the scope of data collection, access permissions and retention cycles, so as to prevent overreach while allowing for manual, value-oriented intervention. An ethically constrained, collaborative evaluation loop should be developed based on multi-source student growth archives that integrate grades, activities and performance, and are complemented by qualitative assessments. Feeding evaluation outputs back to teachers and administrators closes the loop, with data informing pedagogical judgements.

5 Conclusion

This study examined how digital technologies could facilitate collaborative innovation in ideological and political education at higher vocational colleges. While digital enablement holds genuine potential across four interconnected dimensions, this potential is constrained by barriers relating to teacher capacity, resource infrastructure, institutional design and ethical governance. These interconnected challenges resist piecemeal solutions. The study therefore advocates an integrated approach combining differentiated teacher development, cross-departmental resource co-construction and ethically bounded data governance.

Conflicts of interest

The author declares no conflicts of interest regarding the publication of this paper.

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