

An Examination of the Current State of Digital Educational Resource Management at Middle School A in City T

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Abstract

Current research on digital educational resources primarily centers on higher education, rural education, or macro-level policy analysis. Systematic investigations into the management of digital educational resources in urban secondary schools remain limited, particularly with regard to comprehensive theoretical frameworks and practical strategies that integrate technological infrastructure, human capacity, and organizational governance. To advance understanding in this area, this study first develops a 4D analytical framework-encompassing Devices, Data, Digital Literacy, and Departmental Governance-by drawing on the Digital Readiness Framework, the Technology Acceptance Model (TAM), Technological Pedagogical Content Knowledge (TPACK), and Collaborative Governance Theory. Guided by this framework, the study conducts a systematic diagnosis of the core challenges and underlying causes in digital educational resource management at Middle School A in City T, Shanxi Province. Subsequently, it proposes a comprehensive optimization pathway comprising equipment renewal planning and funding allocation, integrated data governance and regional sharing mechanisms, digital competency development through scenario-based training, and the establishment of organizational collaboration platforms with incentive support systems. Through the development and application of the 4D framework, this research not only contributes a contextually adaptable theoretical tool for managing digital educational resources in secondary schools but also provides actionable guidance for similar institutions seeking to address related challenges.

Keywords: digital educational resources, digital readiness, Technology Acceptance Model (TAM), Technology Pedagogical Content Knowledge (TPACK), Collaborative Governance Theory

1. Introduction

With the rapid advancement of emerging information technologies such as big data, 5G communications, and artificial intelligence, the education sector is experiencing an unprecedented digital transformation. In this context, digital educational resources-an essential component of educational informatization-have increasingly become a crucial enabler for promoting educational equity, enhancing teaching quality, and achieving modernization in education. In May 2024, the General Office of the Ministry of Education issued the "Management Specifications for the Inclusion and Removal of Digital Educational Resources in the National Smart Education Platform," which explicitly calls for establishing a scientific and standardized resource management mechanism. This initiative aims to improve resource quality, facilitate dynamic updates and optimized allocation of resources, and address the diverse needs of teachers, students, and the public for high-quality digital educational resources (General Office of the Ministry of Education, 2024). This policy signifies a new phase in China's management of digital educational resources characterized by institutionalization and standardization.

Research on digital educational resources in China commenced relatively late but has experienced rapid development in recent years. A review of the existing literature reveals that most studies concentrate on four primary areas: First, the construction and development of digital resources in education, with a significant emphasis on the technologies involved-such as cloud computing and artificial intelligence. Second, the application, co-construction, and sharing of digital resources within educational contexts, primarily addressing current application statuses across specific disciplines, guiding principles, influencing factors, and mechanisms for regional or inter-school resource sharing. Third, relevant policies are examined, including directions for policy formulation and analyses of their roles in promoting equitable

allocation of digital educational resources. Fourth, the management of digital educational resources is explored; key research subjects include libraries, communities, rural primary and secondary schools, as well as higher education institutions. Researchers predominantly hail from three disciplines: Library and Information Science, Educational Technology, and Educational Administration. The first two categories yield relatively abundant research outcomes; however, studies within Educational Administration remain fragmented and lack systematic coherence. Current publications are largely comprised of master's theses which indicate that authoritative theories and management techniques pertaining to digital educational resources have yet to be established. The advancement of digital learning resources should not solely focus on quantity; concurrently enhancing management practices is essential. Given that management encompasses multiple interconnected processes it becomes critically important to accurately define objectives at each phase while proposing targeted recommendations.

2. Research Method

The subject of this study is Middle School A located in City T, Shanxi Province. This institution is a public comprehensive secondary school recognized as a provincial key high school. The research benefited from a six-month internship at Middle School A, during which in-depth observations and interviews were conducted to gather firsthand data on the current state of digital educational resource management within the institution. This provided empirical evidence supporting the findings presented in this paper. Through an extensive analysis of relevant literature concerning digital educational resources and their conceptualization, it became evident that there remains no academic consensus regarding the management of these resources. Consequently, this paper proposes a framework informed by prior research and established international theories—specifically the Digital Readiness Framework, Technology Pedagogical Content Knowledge (TPACK) model, Technology Acceptance Model (TAM), and Collaborative Governance Theory. It posits that digital educational resource management encompasses four primary dimensions: equipment, data, digital literacy, and organizational governance—summarized under three categories: “people,” “affairs,” and “things.” These dimensions are further delineated into more specific secondary and tertiary aspects to enhance practicality, ultimately leading to the construction of a 4D framework for assessing the status of digital educational resource management. Subsequently, interview outlines addressing these dimensions were developed based on respondents' job roles. Utilizing the 4D framework allowed for identifying issues within the school's current approach to managing digital educational resources; this culminated in targeted optimization recommendations tailored for each dimension.

3. Theoretical Framework for the Construction of a 4D Analytical Model

The primary dimension construction mechanism of the 4D framework is depicted in Figure 1. This framework is based on the basic education informatization index assessment framework developed and validated by the research team involved in the National Social Science Fund project titled “Research on the Construction and Application of China's Basic Education Informatization Development Index” (refer to Appendix D). The four primary dimensions of this framework seamlessly integrate strategic planning concepts from the Digital Readiness Framework, behavioral motivation perspectives from the Technology Acceptance Model (TAM), core teacher competency development principles from the Technology, Pedagogical Content Knowledge (TPACK) model, and collaborative governance theory's multi-stakeholder collaboration logic. Among these dimensions, the Equipment dimension serves as a material foundation; outdated equipment directly hinders effective utilization of data resources. The Data dimension acts as a central carrier that relies on institutional safeguards provided by organizational governance for efficient sharing. Meanwhile, the Digital Literacy dimension enhances effective application of both equipment and data through teacher competency development. These four dimensions collectively form a closed-loop system: upgrades in equipment facilitate data application; efficient data sharing fosters improvements in digital literacy; enhancements in literacy drive optimization within organizational governance; and refined governance subsequently informs decisions regarding equipment renewal.

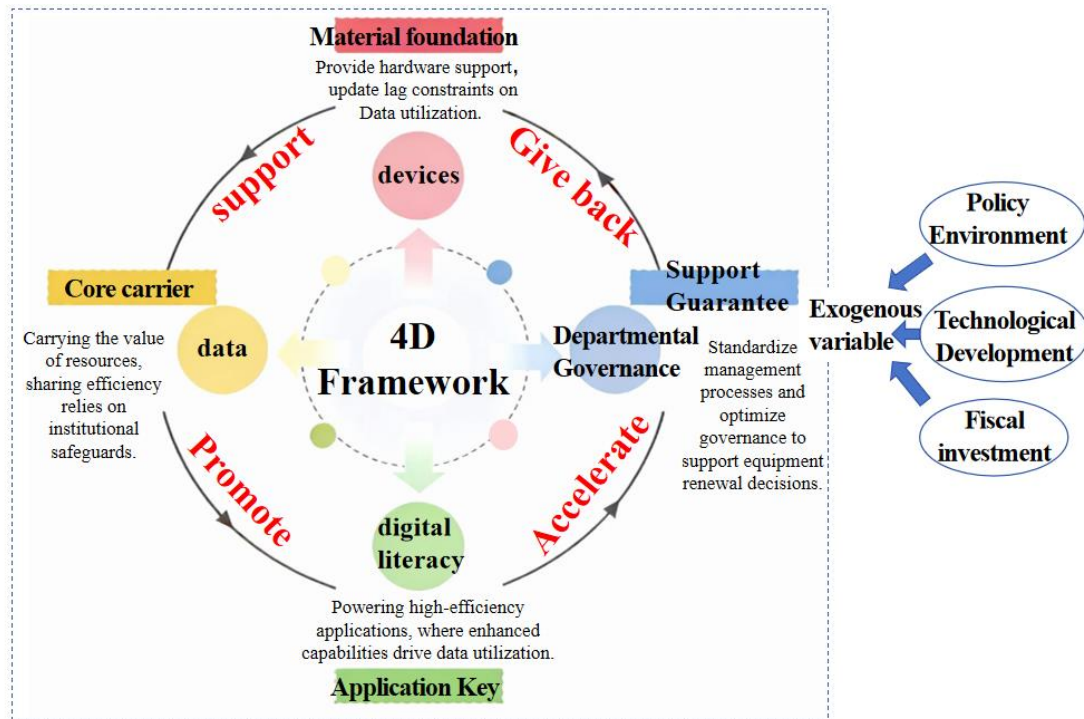


Figure 1. Mechanism for Constructing the 4D Analysis Framework

4. Indicator Selection for the 4D Analytical Framework

The selection of secondary and tertiary indicators represents a systematic process of operationalization and refinement, progressing from "management modules" to "specific observation points." Specific indicators are informed by the educational informatization evaluation framework (refer to Appendix E). The essence of constructing secondary dimensions lies in the principles of "functional decomposition" or "process-based disassembly" of primary strategic pillars (Selwyn, 2016). This entails breaking down each pillar into key management segments or core components based on its inherent logic. The construction of these three-tiered dimensions aims to 'measure' and critically analyze each secondary module. A key mechanism within this process involves designing multidimensional verifiable specific indicators that transform abstract functions into directly observable, interrogable, or assessable focal points (Venkatesh, 2003). Consequently, the secondary dimensions establish a meso-level framework encompassing essential functions across each strategic pillar while equipping it with micro-level indicators through tertiary dimensions-meticulously designed to collect data effectively diagnose issues and guide actions. Revised Text: "Collectively, they establish a coherent logical framework that bridges macro-level strategy with micro-level implementation. The final dimensional structure is illustrated in Table 1."

Table 1. Framework for Evaluating Digital Educational Resources in Schools

Level 1 Dimension	Level 2 Dimension	Level 3 Dimension
Device	1. Device Configuration	Current configuration of digital hardware equipment in schools (e.g., multimedia classrooms, computers, internet access) Plans for introducing emerging technologies (e.g., AI, VR, smart classrooms)
	2. Device Maintenance & Update	Financial investment in hardware equipment Emergency response plans for hardware failures or cybersecurity incidents
	3. Needs Assessment & Feedback	Scientific mechanism for assessing hardware resource needs Collection of teacher needs and suggestions
Data	1. Data Platforms & Resources	Current digital education resource management platforms and tools Development status of school-based digital education resource repositories Sources and richness of digital education resources
	2. Data Update & Maintenance	Frequency of updating digital education resources Mechanisms for cleaning and maintaining outdated or invalid resources
	3. Data Resource Sharing	Mechanisms for sharing resources within the school Mechanisms for sharing digital education resources between schools
	4. Data Security & Privacy	Measures to ensure data security and privacy Awareness of data security and privacy protection
Digital Literacy	1. Digital Literacy Training	Participation of subject teachers in digital literacy training and its perceived usefulness Technical training and guidance received by educational technology departments
	2. Digital Competence	Response speed and problem-solving capability of technical support teams Ability of subject teachers to use digital tools
	3. Teacher User Experience	Improvement of teaching efficiency through the use of digital education resources Difficulties and suggestions encountered by teachers in using digital resources
Departmental Governance	1. Organizational Structure	Establishment of a specialized department for digital education resource management Rationality of the organizational structure of the digital resource management department
	2. Management System	Clear management policies for digital education resources Clear goals and pathways for digital transformation in education
	3. Incentives & Assessment	Incentive measures for teachers using digital education resources Assessment methods for the use of digital education resources

5. Interview Collection and Organization

5.1 Interview Collection

The respondents involved in this interview consisted of 12 teachers and administrators employed at Middle School A in City T, Shanxi Province, during the first semester of the 2024-2025 academic year. Their roles included vice principals, staff members from the Educational Technology Department, and subject teachers within the junior high division. Participants were selected through purposive sampling, a technique commonly utilized in qualitative research that involves choosing units (individuals or groups) pertinent to the research question based on specific objectives (Teddlie & Yu, 2007). Table 2 provides demographic information about the respondents, including their educational background, years of service, positions held, and professional titles.

Table 2. Respondent Information

Code	Education Level	Years of Service	Position	Professional Title
A01	Bachelor's Degree	29	Vice Principal	Senior Level
A02	Bachelor's Degree	24	Director of Educational Technology Office	None
A03	Bachelor's Degree	10	Educational Technology Officer	None
A04	Bachelor's Degree	1	Chinese Teacher	None
A05	Bachelor's Degree	1	English Teacher	None
A06	Bachelor's Degree	1	Physics Teacher	Secondary School Level 2
A07	Bachelor's Degree	6	Math Teacher	Secondary School Level 2
A08	Master's Degree	10	Biology Teacher	Secondary School Level 1
A09	Bachelor's Degree	2	History Teacher	Secondary School Level 2
A10	Master's Degree	36	Chemistry Teacher	Secondary School Level 1
A11	Master's Degree	9	Geography Teacher	Secondary School Level 2
A12	Master's Degree	25	Ethics and Rule of Law Teacher	Senior

5.2 Interview Organization

After in-depth processing of the interview content, the distribution table of interview data node codes generated by Nvivo software is shown in Table 3. The "number of reference points" in the table refers to the specific description times of the node in all interview texts, which directly reflects the attention and discussion intensity of each node in the interview. By combining node code distribution with text analysis, this study has achieved dual verification of quantitative statistics and qualitative interpretation of interview data, laying a solid empirical foundation for subsequent problem analysis and strategy proposal.

Table 3. Distribution Table of Node Coding for Interview Data

Primary Node	Secondary Node	Number of Reference Points
Device		25
	Device Configuration	14
	Device Maintenance & Update	5
	Needs Assessment & Feedback	6
Data		74
	Data Platforms & Resources	53
	Data Update & Maintenance	4
	Data Resource Sharing	14
	Data Security & Privacy	3
Digital Literacy		57
	Digital Literacy Training	23
	Digital Competence	19
	Teacher User Experience	15
Departmental Governance		22
	Organizational Structure	11
	Management System	8
	Incentives & Assessment	3

6. Challenges and Underlying Causes in the Management of Digital Educational Resources at Middle School A

6.1 Discrepancy Between Equipment Configuration and Educational Requirements

The school is currently grappling with significant equipment management challenges, which are characterized by both outdated hardware and misaligned resource allocation. Several terminals, projectors, and other devices have experienced a decline in performance due to funding limitations and usage issues. Meanwhile, emerging technologies such as artificial intelligence (AI) and virtual reality (VR) equipment remain excluded from the procurement process. Funding is constrained and often unplanned, addressing only immediate repairs while relying on ad-hoc resources for necessary upgrades. Additionally, feedback mechanisms lack reliability and validity; teachers tend to respond passively to surveys, resulting in a disconnect between planning efforts and actual needs.

The underlying issue stems from dual concerns regarding “budget constraints” and “unclear effectiveness,” which lead the school to exercise caution in investing in new technologies. This lack of strategic foresight, coupled with a reliance on “reactive” funding, contravenes the principle of “stable, forward-looking investment” outlined in the Digital Readiness Framework (Mercer, 2025). Furthermore, the absence of mechanisms for tracking equipment lifecycles and inadequate feedback channels contribute to the creation of “information silos,” thereby exacerbating the disconnect between equipment planning and teaching requirements.

6.2 Data Resource Silos and Barriers to Sharing

The school's data management issues center on four aspects: resources exist in “islands,” multiple platforms lack unified accounts, teachers face cumbersome operations, and humanities teachers' reliance on private storage leads to resource homogenization; updates depend on “manual intervention,” lacking standards and incentives, resulting in accumulated outdated resources; inter-school sharing interfaces are broken, with no agreements or interfaces after the alliance ended, causing cross-school data flow to stagnate; student data security awareness is weak, and the school's technical safeguards are disconnected from student training.

The root cause lies in departmental silos and the absence of unified integration systems, leading to “multiple databases operating in parallel with inefficient coordination.” School-based platforms remain underutilized, failing to provide collaborative support. Inter-school sharing conflicts with the “cross-boundary data flow” requirement of the Digital Readiness Framework (Mercer, 2025). While the pandemic and corporate closures served as triggers, the core issue is the lack of a sustainable sharing mechanism, ultimately limiting resource value realization.

6.3 Deficiencies in Teacher Digital Literacy and Ineffective Training Programs

The school demonstrates significant deficiencies in the development of digital literacy. The scope of digital training remains limited, with more than half of the teachers having never participated in any training programs. Younger educators represent a notable “blind spot” within these training initiatives. Furthermore, the focus of the training is predominantly theoretical, often neglecting practical application; as a result, even staff members from the teaching technology department find themselves ill-equipped to address real-world challenges following their training, perpetuating a cycle of resistance.

There are significant disparities in teacher competencies: some educators rely on fragmented self-study methods, while others recognize the value of various tools but lack proficiency in their application—both factors hinder effective instruction. Furthermore, there is a critical shortage of “dual experts” who possess both pedagogical and technical skills, resulting in inadequate leadership and direction for teacher development. Theoretical analysis indicates that training gaps and inefficiencies prevent teachers from recognizing the usefulness and ease of use of technology, fostering resistance (Zhao & Zhao & Hou, 2015). The TPACK model suggests that competency gaps arise from insufficient integration of technology, pedagogy, and subject knowledge (Mishra P & Koehler M.J., 2006). Both fragmented self-study approaches and training deficiencies undermine integration capabilities. The absence of dual-expertise professionals renders teacher development directionless, obstructing the establishment of a virtuous cycle where individual growth propels collective advancement; this exacerbates the challenge of enhancing competencies.

6.4 Ineffective Interdepartmental Collaboration and Absence of Governance Mechanisms

The school demonstrates significant core issues in organizational governance, characterized by inadequate interdepartmental coordination. There exists an information asymmetry between the Teaching and Technology Office and other departments; for example, communication delays impede the efficient utilization of recording classrooms, leaving teachers uninformed about enhancements to the school-based platform. Digital development is hindered by a lack of micro- and meso-level planning. Decision-makers erroneously delegate the entire responsibility for process digitization to the technical department, which obstructs progress. Furthermore, there are no assessments of resource utilization; teacher accountability relies solely on open-class observations, resulting in some educators engaging in merely

perfunctory compliance. Awareness regarding student data security remains insufficient, and the school does not have systematic training programs in place.

Analyzing these issues through the lens of collaborative governance theory reveals that the fundamental problem lies in the absence of a multi-stakeholder coordination mechanism. This deficiency has led to a fragmented “information sharing-collaborative decision-making” process. There is a lack of strategic coordination, with non-technical departments exhibiting low levels of participation, while the technical department cannot shoulder this burden alone. Furthermore, supervision and incentive mechanisms are insufficient, making it challenging to motivate educators effectively. Data security governance does not encompass all stakeholders; there exists a disconnect between technical safeguards and awareness education. This situation underscores the urgent need for establishing a comprehensive collaborative governance system (Zhang & Zhou, 2016).

7. Optimization Strategies for the Management of Digital Educational Resources at Middle School A

The optimization pathways delineated in this section are designed to establish a coherent closed-loop process that spans from problem identification to systemic enhancement. The Digital Readiness Framework underscores the importance of strategic resource allocation to navigate the practical challenges posed by unstable investments; the Technology Acceptance Model aims to elevate educators' perceived value of technological tools and their readiness to embrace them; the TPACK model identifies avenues for profound integration among technology, pedagogy, and subject content; while collaborative governance theory further highlights the significance of goal alignment and institutional coordination among diverse stakeholders. These theoretical perspectives collectively contribute to a four-dimensional optimization system that advances concurrently: Planning-Technology-Capacity-Institution. This system addresses entrenched issues such as aging facilities, data silos, varying literacy levels, and fragmented governance, thereby creating an optimization pathway where theory and practice mutually reinforce one another.

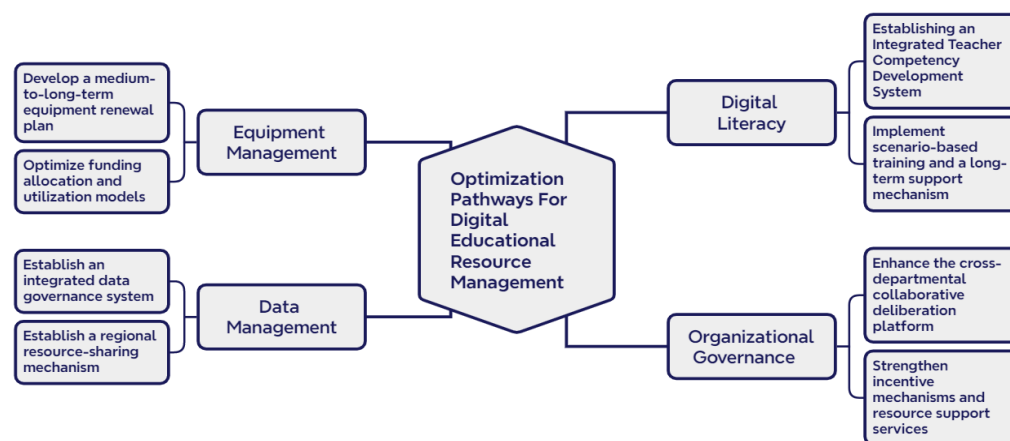


Figure 2. Optimization Strategies for the Management of Digital Educational Resources

7.1 Equipment Renewal Planning and Funding Allocation

Schools must enhance equipment management through strategic planning and adequate funding. In alignment with the Digital Readiness Framework, it is essential to establish a three-year rolling equipment renewal plan that integrates emerging facilities such as AI labs into budget considerations. Investment priorities and phased objectives should be clearly defined to develop a comprehensive equipment lifecycle management system. A unified digital platform for equipment management should be established to dynamically collect usage and failure data, thereby creating a closed-loop process of “demand-assessment-allocation-feedback.” Additionally, it is crucial to create a dedicated fund for technological upgrades and validate the suitability of new equipment through scenario-based pilot testing, shifting from reactive repairs to proactive prevention. To support these initiatives, implement a dual-track funding mechanism comprising “basic support + innovation incentives”: the basic portion will cover routine maintenance while the innovation portion will facilitate trials of new technologies and faculty integration projects. Concurrently, diversifying funding sources through models such as school-enterprise collaboration can help alleviate cost pressures. Finally, it is important to implement a dynamic evaluation mechanism for funding effectiveness that incorporates assessments of teaching impact. This approach ensures that resource allocation enhances educational quality while establishing a sustainable pathway for ongoing equipment iteration.

7.2 Comprehensive Data Governance and Regional Collaboration

Schools must tackle data challenges through both internal governance and regional collaboration. Drawing on theories of digital readiness and collaborative governance, it is essential to establish an integrated data governance system that consolidates various resource platforms. This involves developing standardized interfaces for school-based platforms to facilitate mutual identity recognition and data synchronization with higher-level systems, thereby alleviating operational burdens on faculty. Furthermore, a mechanism for resource quality assessment and dynamic cleanup should be implemented, utilizing differentiated indexing based on disciplinary characteristics. This entails strengthening template-based management for the sciences while promoting diverse annotations in the humanities, supported by intelligent retrieval systems designed to eliminate “data silos.” At the regional level, it is crucial to establish inter-school resource sharing mechanisms and form resource alliances aimed at unifying formats, metadata standards, and copyright protocols. From a technological perspective, leveraging blockchain technology can help build robust resource traceability systems that create discipline-specific sharing channels: establishing standardized repositories for scientific resources to support collaborative development while fostering open material pools and co-creation communities in the humanities to stimulate innovation in resources and enhance utilization efficiency.

7.3 Digital Competency Development and Scenario-Based Training

Enhancing teachers' digital literacy necessitates the establishment of competency frameworks and the refinement of training mechanisms. Grounded in the TPACK model, it is essential to develop tiered, subject-specific training courses focused on “technology-enabled instructional innovation.” This approach should aim to strengthen data modeling skills among science teachers while simultaneously fostering digital storytelling and resource integration capabilities for humanities educators. To facilitate this process, a “dual-mentor” system should be implemented, wherein instructional technology experts collaborate with subject leaders to jointly design and evaluate training programs. Through innovation workshops and lesson development projects, educators will be guided in enhancing their technology integration skills and transforming exemplary practices through practical application. In alignment with the TAM model, a blended training approach that combines “case analysis + hands-on practice + school-based implementation” should be adopted. This strategy aims to embed content within teaching scenarios effectively and improve transfer effectiveness. Furthermore, establishing a post-training tracking system will provide ongoing support through comprehensive teaching data analysis. Additionally, exploring digital competency certification and incentive mechanisms is crucial. Incorporating recognition methods such as micro-credentials can help create a closed-loop competency development cycle characterized by: “learnable → applicable → effective → rewarding.”

7.4 Organizational Collaboration Platform and Incentive Support

Optimizing organizational governance necessitates the enhancement of collaborative mechanisms and the reinforcement of incentive support. Grounded in collaborative governance theory, it is essential to establish a Digital Resource Development and Management Committee at the school level. This committee should integrate teaching affairs, technology, and other stakeholders to create a regular joint deliberation mechanism aimed at coordinating core issues such as resource development. It is crucial to delineate departmental responsibilities throughout the resource lifecycle, establish processes for information sharing and joint decision-making, and implement a unified online scheduling system for high-demand teaching facilities. These measures will enhance transparency and efficiency in resource allocation while dismantling administrative barriers to ensure comprehensive management. Within this framework of collaborative governance, it is important to strengthen incentive guidance and service support. The establishment of a Digital Teaching Innovation Incentive Program will recognize and allocate resources to teachers or teams that demonstrate significant achievements in technology integration. Concurrently, there should be the creation of a rapid response closed-loop mechanism for addressing technical issues along with the development of a mobile version of the university's platform for operational maintenance. By lowering usage barriers, fostering a supportive organizational environment, we can facilitate a cultural shift among faculty from “being told to use” towards “wanting to use.”

8. Conclusion and Reflection

Centered on the core theme of “digital educational resource management in secondary schools,” this study systematically reviews relevant theoretical and policy contexts. It addresses a significant research gap, wherein most existing studies predominantly focus on macro-level and higher education settings, while lacking a systematic analytical framework specifically tailored to secondary school environments. To fill this void, the study innovatively constructs a 4D analytical framework that encompasses four dimensions: “devices, data, digital literacy, and organizational governance.” Through empirical investigation conducted at a middle school in T City, Shanxi Province, this study systematically elucidates the current status, prominent issues, and underlying causes associated with digital educational resource management across various dimensions. These issues are not isolated but rather interconnected and mutually reinforcing. Collectively they form systemic bottlenecks that impede the transformation of digital educational resources from mere “basic availability”

to “efficient utilization.”Based on a comprehensive diagnosis and theoretical analysis of the identified issues, this study proposes a systematic optimization pathway that encompasses four levels: strategic planning, technological empowerment, capacity building, and institutional coordination. These recommendations aim to establish a closed-loop optimization system that spans from top-level design to implementation, as well as from resource integration to human development. They provide clear actionable guidance for Middle School A and similar institutions in addressing challenges related to digital educational resource management and improving the efficiency of resource application.

It should be noted that the 4D analysis framework proposed in this study and its optimized path at Middle School A , although constructed and verified based on specific empirical data, are essentially a contextual exploration for a single case. Different middle schools have significant differences in infrastructure, funding investment, teacher structure, and institutional culture. Therefore, when applying the conclusions of this study to other schools, one can adjust the secondary and tertiary indicators under the framework according to one's own actual situation, so as to combine the common analysis tools with individual school conditions, and reasonably utilize the transfer value of the 4D framework for school-based adaptation. The optimization path of digital educational resource management is a continuous iterative and learning process. This study is only a preliminary exploration in this long journey. Future research can deepen and expand from the following three aspects: First, conduct empirical verification research on the optimization path. Select several schools that have implemented similar optimization measures and conduct medium- and long-term tracking evaluations. Through comparing the digital educational resource management indicators before and after implementation, scientifically test the actual effectiveness of the path proposed in this study. Second, promote multi-case comparative research. Select middle schools in different regions and of different types for multi-case investigations. Compare the commonalities and differences in digital resource management under the 4D framework, and then refine more universal management models or differentiated implementation strategies. Third, pay attention to the dynamic adaptation of technology iteration and educational transformation. As new technologies such as artificial intelligence and virtual reality continue to integrate into the educational scene, future research needs to continuously pay attention to the extensibility of the 4D framework, and explore how to organically incorporate the emerging technology dimensions into the existing equipment, data, literacy, and governance systems to ensure the time-sensitive nature and practical guidance of the analysis framework.

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Data sharing statement

No additional data are available.

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Appendix A

Interview Outline for “Digital Educational Resource Management in Secondary Schools”

Department: Educational Technology

Office Position _____ Years of Service _____

1. Could you describe the current configuration of the school's digital hardware equipment?
2. What digital educational resource management platforms are currently in use at the school? What are their functions and features?
2. What is the update frequency for the school's digital educational resources? How is the timeliness and accuracy of these resources ensured?
3. How does the school manage the cleanup and maintenance of outdated or ineffective digital educational resources?
4. How does the Educational Technology Office provide technical support for teachers using digital educational resources?
5. Do you believe the school adequately addresses technical training and guidance? What areas could be improved?
6. How do you collect and address teachers' needs and suggestions regarding digital educational resources?
9. What challenges do you perceive in the school's management of digital educational resources? What solutions would you recommend?
10. Has the school implemented effective measures to safeguard data security and privacy?
11. In which areas do you believe the school's digital educational resources perform well? Where is there room for improvement?

Appendix B

Interview Outline for “Digital Educational Resource Management in Secondary Schools”

Position: Vice Principal

Years of Service _____ Education Level _____

1. Does the school have clear goals and implementation pathways for educational digital transformation?
2. Do you believe current funding adequately supports the school's digital education needs? Where is it primarily allocated?
3. Does the school regularly organize teacher training on digital educational resource applications? What are the main training contents?
4. What incentive measures does the school have for teachers' professional growth in digital teaching?
5. How does the school evaluate the effectiveness of digital educational resource usage? Are there corresponding assessment methods or evaluation systems?
6. What are the primary sources of the school's digital educational resources? Does the school share digital educational resources with other schools?
7. Is there a sharing mechanism for digital educational resources among different departments or offices within the school?
8. Does the school have plans to introduce emerging technologies (e.g., AI, VR, smart classrooms, virtual labs) to enrich digital educational resources?
9. Has the school established a dedicated department for managing digital educational resources? Is its organizational structure appropriate?
10. Does the school have a set of regulations governing the management and use of digital educational resources?
11. What additional measures do you believe the school could implement to manage digital educational resources more effectively?

Appendix C

Interview Outline for “Digital Educational Resource Management in Secondary Schools”

Department: Junior High School

Basic Information: Subject Taught _____ Educational Background _____ Years of Teaching Experience _____
Professional Title _____

1. How would you assess the school's development of digital hardware resources? (Including but not limited to multimedia classrooms, computers, internet access, and other teaching support facilities)
2. What channels do you use to access digital educational resources? Which digital educational resources do you frequently utilize in your daily teaching?
3. Does the school maintain a school-based digital educational resource repository or platform?
4. Do you believe the school provides sufficient digital educational resources aligned with teaching content?
5. Do teachers share and exchange digital educational resources among themselves? How frequently does this occur?
6. What digital educational tools do you primarily use in your daily work?
7. Does the school have a dedicated team of digital professionals? What is their level of expertise?
8. Have you encountered technical issues during teaching? Did the school's technical support team respond promptly and resolve these issues?
9. Have you participated in training related to teacher digital literacy? How effective was it for your work?
10. Does using digital educational resources enhance your teaching efficiency or create additional burdens? Why?
11. What support or improvements would you like the school to provide regarding digital educational resources in the future?

Appendix D

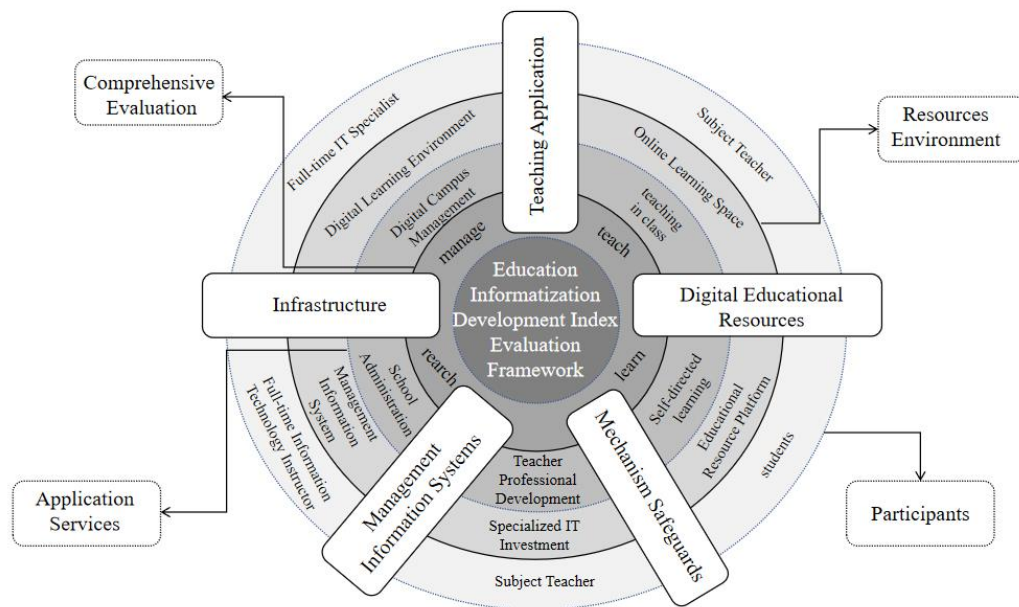


Figure 3 Evaluation Framework for the Education Informatization Index

Appendix E

First-level Indicator	Weight	Second-level Indicator	Weight
Infrastructure	0.16	1. Proportion of multimedia-equipped classrooms	0.15
		2. Proportion of schools with dedicated laboratories (per lab type)	0.13
		3. Average number of terminals per 100 students	0.18
		4. Number of informatization terminals per teacher (for teaching use)	0.14
		5. Proportion of schools connected to the Internet	0.23
		6. Proportion of schools with full-campus wireless network coverage	0.17
Digital Educational Resources	0.13	7. Proportion of schools with subject-aligned digital resources	0.21
		8. Proportion of schools with school-based resource libraries	0.16
		9. Proportion of schools with activated school online spaces	0.17
		10. Proportion of students with activated personal online learning spaces	0.15
		11. Proportion of teachers with activated personal online learning spaces	0.14
		12. Proportion of schools connected to provincial public educational resource service platforms	0.17
Teaching Application	0.21	13. Proportion of schools with regular usage of school network rooms	0.14
		14. Proportion of schools using digital resources in all classes	0.19
		15. Proportion of schools with regular IT-assisted classroom teaching	0.15
		16. Proportion of teachers frequently using multimedia resources (e.g., PPT, videos, animations) for teaching	0.12
		17. Average utilization rate of multimedia classrooms	0.22
		18. Average number of lessons uploaded by each teacher (prefecture-level or above) in the past year	0.18
Management Informatization	0.29	19. Proportion of schools with regular usage of management information systems	0.19
		20. Proportion of schools applying basic management information data	0.22
		21. Proportion of schools with school-level public information release platforms	0.14
		22. Proportion of schools with school network security systems	0.17
		23. Proportion of schools with full-campus security monitoring coverage	0.15
		24. Proportion of schools with all-in-one campus cards	0.13
Mechanism Guarantee	0.21	25. Share of informatization funding in the school's total educational expenditure (same period)	0.20
		26. Proportion of schools with school leaders in charge of informatization construction	0.12
		27. Proportion of teachers who attended school-based informatization training in the past year	0.16
		28. Proportion of schools whose leaders attended provincial (or higher) informatization training	0.13
		29. Proportion of full-time teachers for IT courses	0.12
		30. Proportion of schools with full-time informatization staff	0.16
		31. Proportion of schools with measures to enhance teachers' IT application capabilities	0.11