THE INFLUENCE OF SCHOOL INFORMATIZATION MANAGEMENT ON CURRICULUM MANAGEMENT EFFICIENCY IN SELECTED PUBLIC PRIMARY AND SECONDARY SCHOOLS IN QINGDAO

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ABSTRACT
This study examines how school informatization management affects curriculum management efficiency in selected public primary and secondary schools in Qingdao. This research adopts a five-dimensional conceptual framework for school informatization management and curriculum management efficiency respectively. A total of 200 valid questionnaire responses were collected from school administrators, academic leaders and teachers in participating schools. Descriptive statistics, Pearson correlation analysis and multiple linear regression analysis were utilized for data processing. Results reveal respondents hold moderately-positive perceptions toward both school informatization management and curriculum management efficiency. The overall regression model indicates that school informatization management has a significant positive predictive effect on curriculum management efficiency. Among five dimensions, technical support services and teacher digital competence exert the strongest unique predictive influences; system application and digital infrastructure also make significant independent contributions. Although data management and decision-making is positively correlated with curriculum management efficiency, it shows no statistically significant unique predictive contribution after controlling other dimensions. This study argues that school digital transformation should be treated as holistic organizational capacity rather than simple hardware procurement. The research acknowledges limitations including convenience sampling, cross-sectional self-report measurement and potential common-method bias. Corresponding practical suggestions for school administrators, teacher professional development and data governance, as well as recommendations for future research are put forward.
Keywords: School Informatization Management, Curriculum Management Efficiency, Digital Infrastructure, Teacher Digital Competence, Public Primary and Secondary Schools, Qingdao

CITATION INFORMATION: Wang, P., & Krutkrongphan, S. (2026). The Influence of School Informatization Management on Curriculum Management Efficiency in Selected Public Primary and Secondary Schools in Qingdao. *Procedia of Multidisciplinary Research, 4*(11), 25.

INTRODUCTION

Digital transformation reshapes both school administration and instructional practice. Educational technology is not merely hardware devices, internet access or digital learning resources; it also covers organizational management, internal communication, resource allocation, information processing and evidence-based decision-making. Successful digital transformation relies not only on technological facilities, but also supporting organizational mechanisms, staff digital capabilities and institutional arrangements (Antonietti et al., 2023).

School informatization management, within educational administration context, refers to the systematic deployment of digital infrastructure, information systems, educational data, staff digital competencies and technical support services to improve school operation and educational activities. Prior school digitalization research indicates that technology can generate educational benefits only when embedded into organizational collaboration and sound school management routines (Reis-Andersson, 2024).

Educational informatization has become a core component of Chinese basic education. Chinese primary and secondary schools have widely deployed digital platforms, educational databases and online teaching-assisted management systems. Nevertheless, existing empirical evidence shows that many schools still fail to make full use of digital tools for communication, assessment, curriculum governance and instructional improvement (Che et al., 2023). Therefore, school informatization construction shall focus not only on equipment supply, but also on how schools integrate digital resources into daily educational practice.

In this study, School Informatization Management (SIM) is divided into five dimensions: (1) digital infrastructure; (2) system application; (3) data management and decision-making; (4) teacher digital competence; (5) technical support services. Digital infrastructure consists of hardware, network and technological foundation supporting school work. System application reflects the practical embedding of digital tools in administrative and teaching workflows. Data management and decision-making represents utilizing educational data for school planning, monitoring and managerial judgment. Studies in Chinese secondary schools confirm that effective data use is associated with data system access, individual data literacy, ICT competence and enabling organizational conditions (Luo et al., 2022).

Teacher digital competence constitutes critical human-based guarantee for informatization implementation, which supports teachers' curriculum-related work including teaching design, assessment and curriculum adjustment. Domestic K-12 research points out that teacher digital competence is shaped by ICT environment, targeted professional training and pedagogical support; sustained capacity building is required for effective educational technology implementation (Yang et al., 2023). Technical support services ensure stable and accessible digital working environment for teachers and administrative personnel.

Curriculum management efficiency describes organizational processes translating curriculum objectives into real teaching and learning outcomes. It represents core competency of school management, covering curriculum planning, implementation coordination, teaching resource allocation, monitoring & evaluation, as well as feedback & continuous improvement. Curriculum management is a collaborative practice among administrators, teachers and other educational stakeholders (Amelia et al., 2024).

Accordingly, curriculum management efficiency is operationalized into five dimensions: curriculum planning, implementation coordination, teaching resource allocation, monitoring & evaluation, feedback & improvement. Curriculum planning sets overall direction for instructional activities. Implementation coordination guarantees practical delivery of curriculum plans. Teaching resource allocation deals with rational deployment of manpower, instructional materials, digital resources and physical facilities. Monitoring and evaluation generates evidence reflecting curriculum implementation status. Feedback and improvement

enables iterative curriculum optimization based on implementation evidence and identified practical problems (Al-Eyd et al., 2018).

School informatization management can boost curriculum management efficiency through multiple paths: it delivers digital infrastructure and platforms for information sharing; system application facilitates cross-staff communication and coordination; data management supports evidence-driven curriculum planning and evaluation; enhanced teacher digital competence promotes application of digital curriculum resources; timely technical support safeguards technology-empowered curriculum activities. In this sense, school informatization functions as an organizational mechanism serving curriculum governance, instead of pure technical toolset.

However, positive influence from informatization upon curriculum management efficiency is not automatic. Even with similar digital conditions, schools may obtain divergent curriculum management outcomes due to gaps in curriculum planning quality, internal coordination, resource deployment and improvement mechanisms. Prior literature has separately investigated teacher digital competence, technology adoption or curriculum management, yet few empirical studies examine the comprehensive relationship between multi-dimension school informatization management and curriculum management efficiency among Chinese local public primary and secondary schools.

Against such research gap, this paper carries out the research entitled The Influence of School Informatization Management on Curriculum Management Efficiency in Selected Public Primary and Secondary Schools in Qingdao. This paper aims to explore the statistical association between school informatization management and perceived curriculum management efficiency in sample schools. Empirical findings of this study can provide local evidence for understanding how school-level digital management capacity shapes curriculum-related procedures and overall school administrative performance within Qingdao public primary-secondary context.

LITERATURE REVIEWS

Concepts and Perspectives on School Informatization Management

School informatization management means systematic integration of digital technologies, information resources, human capacities and organizational procedures in schools, which goes far beyond simply supplying computers, networks or digital platforms. Meaningful digitalization demands alignment between technological resources, leadership, organizational structures, professional practices and educational objectives (Pettersson, 2018). Pettersson (2018) pointed out that educational digital competence covers organizational infrastructure, policies and strategic leadership, so informatization should be treated as organizational capability instead of mere technical equipment.

Digital transformation brings organizational change that reshapes routines of teaching, administration, communication and decision-making. Håkansson Lindqvist and Pettersson (2019) stated that school digitalization is complex, involving technical, pedagogical and administrative difficulties at multiple school levels. Technology cannot bring organizational progress automatically. It relies on favourable conditions built by school leadership for staff to utilize digital resources, cooperate and embed digital systems into daily routines (Håkansson Lindqvist, 2019).

Therefore, this study defines school informatization management as a multi-faceted organizational capacity. It consists of five coordinated dimensions: digital infrastructure, system application, data management and decision-making, teacher digital competence, and technical support services. These technological, managerial, informational, human-related and supporting conditions jointly help digital tools merge into school administration and educational activities.

Digital infrastructure and system application

Digital infrastructure forms the technical foundation for school informatization, covering networks, devices and platforms; its value lies in accessibility and reliability rather than sheer quantity of equipment (Machusky & Herbert-Berger, 2022). Nevertheless, sufficient infrastructure cannot guarantee effective school operation. System application stresses continuous embedding of digital systems into teaching, administration and curriculum workflows, which is shaped by teachers' personal perceptions and beliefs (Ertmer et al., 2012). Data management and decision-making emphasizes transforming massive school digital data into actionable evidence for planning, monitoring and curriculum improvement, instead of merely storing information (Schildkamp, 2019). As the human dimension, teacher digital competence goes beyond basic operational skills. It integrates technical, pedagogical and ethical abilities for curriculum-related professional work, which is nurtured by institutional contexts (Falloon, 2020; Instefjord & Munthe, 2017).

Timely technical support services prevent technical failures from interrupting educational and administrative routines. Studies note that technology integration relies on ongoing institutional assistance instead of hardware access alone (Hew & Brush, 2007; Kopcha, 2012). To sum up, these five inter-related dimensions jointly constitute the multi-faceted construct of school informatization management in this study.

Concepts and Perspectives on Curriculum Management Efficiency

Curriculum management is an ongoing organizational process translating formal curriculum requirements into real-world school practices, shaped by leadership, teacher collaboration and contextual conditions (Wang, 2023). Teacher involvement is critical: engaging teachers as co-designers strengthens their sense of ownership and supports implementation fidelity, yet participation alone cannot eliminate practical obstacles (Chimbunde & Moreeng, 2024). Curriculum implementation is not mechanical execution of documents; it relies on collective interpretation among educators and leaders (Lowell et al., 2024). Instructional leadership plays a core role by mobilizing resources and fostering collaboration (Chen et al., 2025).

In this study, curriculum management efficiency denotes staff-perceived operational quality rather than financial-based economic efficiency. It consists of five interrelated dimensions. Curriculum planning sets clear priorities with teacher participation, while implementation coordination guarantees consistent practice through communication and teamwork. Teaching resource allocation focuses on reasonable deployment of human, material and digital resources to match curriculum demands (Miles & Darling-Hammond, 1998). Monitoring and evaluation collects evidence to identify gaps between plans and actual delivery (Shand et al., 2026). Feedback and improvement closes the management loop by turning evaluation data into iterative curriculum adjustments.

Taken together, these five dimensions form a complete cyclic system. They define a school's perceived capacity to conduct curriculum-related work systematically, coherently and responsively for subsequent empirical testing in Qingdao public schools.

Related Research

Prior international studies provide empirical foundations for this research. Håkansson Lindqvist and Pettersson (2019) pointed out that school digital transformation is a complex multi-faceted organizational challenge instead of simple equipment investment; supportive leadership practices help embed digital tools into daily teaching and administration (Håkansson Lindqvist, 2019). Quantitative studies by AlAjmi (2022) and A'mar and Eleyan (2022) further confirmed that principals' digital leadership and institutional support promote teachers' technology integration, proving informatization goes far beyond hardware construction.

Regarding data-driven school management, Schildkamp et al. (2017) and Van Geel et al. (2017) highlighted that usable data-based decision-making relies on leadership, staff capacity and standardized workflows, rather than information systems alone.

For curriculum management, Lai and Cheung (2013) regarded instructional leadership as a collective community-based process. Wang et al. (2023) stressed ongoing dialogue and distributed leadership for sustainable curriculum innovation. Lowell et al. (2024) found identical curriculum materials may generate divergent implementation outcomes due to teacher agency, collaboration and leadership. Chen et al. (2025) added that administrative support mobilizes resources and boosts teacher collaboration for curriculum reform.

Collectively, existing literature has explored digitalization and curriculum management separately. However, few empirical works jointly examine the five-dimension school informatization management and its influence on curriculum management efficiency within the local Qingdao context, which creates the research gap addressed by this study.

From the literature review, the conceptual framework can be drawn as shown in Figure 1.

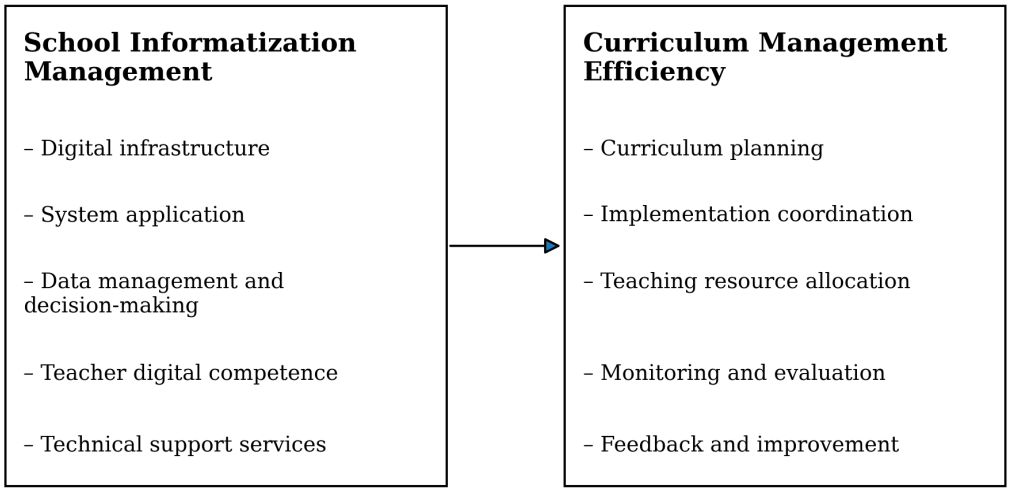

Figure 1 Conceptual Framework adapted from Redecker and Punie(2017).

RESEARCH METHODOLOGY

This part illustrates research design for investigating how school informatization management predicts curriculum management efficiency in selected Qingdao public primary and secondary schools. Target population covers administrators, academic leaders and teachers of sampled local public schools. Slovin's formula with 0.05 sampling error yields required sample size of 200 valid respondents. Convenience sampling was adopted to recruit participants who have completed at least one-semester service in current school.

Research instrument is self-administered structured questionnaire developed based on conceptual framework and prior literature. It contains three sections: demographic information, school informatization management scale and curriculum management efficiency scale. Each latent variable consists of five dimensions; every dimension contains four items measured by five-point Likert scale. Subject experts conducted IOC assessment to guarantee content validity. Pilot test was performed among 30 respondents sharing similar background with formal sample. Cronbach's alpha was used to examine internal reliability, with 0.70 as acceptable threshold.

Primary data were gathered through paper-based or electronic questionnaires. Academic approval and school entry permissions were acquired before distribution. Participants were informed of voluntary participation and data confidentiality; no personal identifying information was collected. Data collection terminated once 200 valid responses were obtained. Secondary data source includes peer-reviewed journal articles, official educational documents and statistical reports.

Statistical software processed collected dataset. Descriptive statistics (frequency, percentage, mean, standard deviation) depict respondent profiles and variable level. Inferential statistics

applies multiple linear regression under significance level of 0.05 to test hypotheses and compare unique predictive effect of each informatization dimension upon curriculum management efficiency. Regression indicators such as R, R^2, regression coefficients and p-values are reported for hypothesis judgement.

RESEARCH RESULTS

Data Screening and Respondent Profile

Total 200 valid questionnaire records were retained for further analysis without substantial item-level deletion. Sample is dominated by female respondents (78.0%), covering primary, lower-secondary and upper-secondary practitioners; upper-secondary staff accounts for 58.5%. Respondents include teachers and administrators across diverse age brackets, educational attainment and working tenure, including both novice and experienced educators.

Table 1 Profile of respondents (N = 200)

Variable	Category	n	%
Gender	Male	43	21.5%
	Female	156	78.0%
	Prefer not to say	1	0.5%
Age	20-29 years	34	17.0%
	30-39 years	45	22.5%
	40-49 years	62	31.0%
	50-59 years	38	19.0%
	60 years or above	21	10.5%
Highest educational qualification	Bachelor degree	71	35.5%
	Master degree	65	32.5%
	Other/doctoral or above	64	32.0%
School level	Primary	54	27.0%
	Lower secondary	29	14.5%
	Upper secondary	117	58.5%
Total teaching experience	Less than 10 years	88	44.0%
	10 years or above	112	56.0%
Years of service in the current school	Less than 1 year	34	17.0%
	1-5 years	45	22.5%
	6-10 years	62	31.0%
	11-20 years	36	18.0%
	More than 20 years	23	11.5%

Note: This table displays demographic characteristics of 200 valid participants. The sample is dominated by female respondents. Participants cover different age brackets, educational backgrounds and school levels. Both junior and senior staff with varied teaching and in-school working years are included. Upper-secondary school participants constitute the largest group in this sample.

Descriptive Statistics of Core Variables

Descriptive outputs show moderately-positive attitude towards both two latent constructs. The overall mean of school informatization management reaches 3.325 (SD = 0.676). Among five dimensions, system application gains highest average score, while data management and decision-making obtains lowest mean value together with maximum standard deviation, reflecting inconsistent staff perception on school-level data-related practice.

For curriculum management efficiency, overall mean equals 3.279 (SD = 0.696). Curriculum planning achieves highest rating; feedback and improvement scores the lowest. This indicates

sample schools perform relatively well in formal curriculum planning documents formulation, whereas evidence-based cyclic revision mechanism remains insufficient. Cronbach's alpha for all dimensions exceeds 0.70, proving satisfactory internal consistency of questionnaire scales.

Table 2 Descriptive statistics and reliability for school informatization management

Dimension	M	SD	Min	Max	Cronbach α
Digital Infrastructure	3.329	0.605	2.000	4.000	0.884
System Application	3.369	0.631	2.000	4.000	0.910
Data Management and Decision-Making	3.265	0.788	1.500	4.000	0.950
Teacher Digital Competence	3.357	0.687	2.000	4.000	0.939
Technical Support Services	3.306	0.721	2.000	4.000	0.941
Overall School Informatization Management	3.325	0.676	1.900	4.000	0.986

Note: M = Mean score; SD = Standard Deviation; Min = Minimum value; Max = Maximum value.

This table presents descriptive statistics and Cronbach's alpha for each dimension of school informatization management. All alpha values exceed 0.70, showing good internal consistency. System application obtains the highest mean score, while data management and decision-making has the lowest mean and largest standard deviation, indicating greater divergence among respondents' perceptions of school data-related practices.

Table 3 Descriptive statistics and reliability for curriculum management efficiency

Dimension	M	SD	Min	Max	Cronbach α
Curriculum Planning	3.364	0.667	2.000	4.000	0.928
Implementation Coordination	3.326	0.706	2.000	4.000	0.930
Teaching Resource Allocation	3.280	0.723	2.000	4.000	0.946
Monitoring and Evaluation	3.229	0.713	2.000	4.000	0.939
Feedback and Improvement	3.196	0.710	2.000	4.000	0.941
Overall Curriculum Management Efficiency	3.279	0.696	2.000	4.000	0.989

Note: M = Mean score; SD = Standard Deviation; Min = Minimum value; Max = Maximum value.

This table reports descriptive results and reliability for curriculum management efficiency. All dimensions show satisfactory internal consistency. Curriculum planning receives the highest mean score, whereas feedback and improvement scores lowest. It reveals that participants hold more positive views on curriculum planning, yet perceive obvious weaknesses in the feedback-improvement link of curriculum management.

Correlation Analysis

Pearson correlation analysis demonstrates strong, positive and statistically significant correlations between each dimension of school informatization management and overall curriculum management efficiency ($p < 0.001$). Technical support services generates the highest bivariate correlation coefficient. Nevertheless, severe inter-correlation among predictor variables suggests correlation outputs cannot represent independent predictive effect for each single dimension. Multiple regression analysis is therefore required.

Table 4 Pearson correlations with curriculum management efficiency

Predictor	r	95% CI low	95% CI high	p
Digital Infrastructure	0.974	0.966	0.980	< .001
System Application	0.981	0.975	0.986	< .001
Data Management and Decision-Making	0.974	0.965	0.980	< .001
Teacher Digital Competence	0.975	0.966	0.981	< .001
Technical Support Services	0.992	0.989	0.994	< .001

Table 4 r = Pearson correlation coefficient; CI = Confidence Interval; p = significance value. This table shows bivariate correlations between five predictors and curriculum management efficiency. All dimensions have large, positive and statistically significant correlations with the dependent variable at $p < .001$. Strong inter-correlations among predictors signal shared variance; correlation results cannot represent unique predictive effects, so multiple regression analysis is required.

Multiple Regression and Hypothesis Testing

The overall regression model achieves statistical significance, $F(5, 194) = 4114.057$, $p < 0.001$, adjusted $R^2 = 0.990$. Four dimensions namely technical support services, teacher digital competence, system application and digital infrastructure produce significant unique positive predictive effects. Technical support services owns largest standardized beta value. By contrast, data management and decision-making displays positive but non-significant unique contribution ($p = 0.547$) when other predictors are statistically controlled.

Table 5 Multiple regression predicting curriculum management efficiency

Predictor	B	β	SE	t	p
Digital Infrastructure	0.138	0.120	0.036	3.851	< .001
System Application	0.138	0.125	0.042	3.270	0.001
Data Management and Decision-Making	0.018	0.021	0.030	0.603	0.547
Teacher Digital Competence	0.230	0.227	0.027	8.471	< .001
Technical Support Services	0.496	0.514	0.048	10.428	< .001

Note: B = Unstandardized regression coefficient; β = Standardized regression coefficient; SE = Standard Error; t = t-statistic; p = significance value.

The regression model: $F(5,194)=4114.057$, $p<.001$, Adjusted $R^2=0.990$. This table presents multiple-regression outputs. Four predictors show statistically significant unique positive effects. Technical support services has the largest standardized coefficient. Data management and decision-making shows positive but non-significant unique contribution ($p=0.547$) after controlling other variables.

Table 6 Summary of hypothesis testing

Hypothesis	Statement	Decision	Evidence
H1	School informatization management influences curriculum management efficiency.	Supported	The overall model was significant, $F(5,194) = 4114.057$, $p < .001$; $R^2 = .991$.
H2	The five components of school informatization management influence curriculum management efficiency.	Partially supported	Four components had significant positive unique coefficients; data management and decision-making was not significant in the simultaneous model ($p = .547$).

Note: This table summarizes hypothesis testing outcomes based on multiple-regression results. H1 is fully supported. H2 obtains partial support because data management and decision-making fails to demonstrate statistically significant independent predictive effect in this regression model.

DISCUSSION & CONCLUSION

Discussion

Drawing upon 200 valid survey responses from Qingdao public primary-secondary school staff, this paper investigates the relationship between school informatization management and curriculum management efficiency. Consistent with organizational-capability-oriented literature (Pettersson, 2018), significant overall regression result for Hypothesis 1 confirms positive statistical association between school informatization management and curriculum management efficiency. Digital transformation is far more than hardware procurement; it integrates infrastructure, system application, human resource and institutional support to improve curriculum-related work. Nevertheless, considering cross-sectional self-report research design, high correlation coefficients may be partly affected by common-method variance. Statistical association cannot be completely interpreted as strict causal relationship.

Within five informatization dimensions, technical support services delivers strongest unique predictive effect. This result echoes classic technology-integration research (Hew & Brush, 2007). Even well-equipped digital systems cannot serve curriculum management if technical failures remain unresolved. Timely troubleshooting and accessible assistance guarantee continuity for information communication, resource sharing and curriculum monitoring. Teacher digital competence ranks as second-strongest predictor, supporting the standpoint that digital value originates from human agent rather than equipment hardware (Falloon, 2020). Teachers equipped with solid digital competence can better participate in collaborative curriculum planning, evidence-based assessment and curriculum adjustment practice.

System application and digital infrastructure also generate meaningful independent predictive contribution. Hardware facilities and digital platforms constitute necessary preconditions, yet their practical value hinges on embedding into daily organizational routines (Ertmer et al., 2012). Notably, data management and decision-making yields strong bivariate correlation, but loses statistical significance in simultaneous regression model. It does not indicate data practice is trivial. Instead, data-related functions in sampled schools largely depend on infrastructure condition, system operation status and teacher digital competence. Without independent organizational routines for interpreting educational data, its separate statistical contribution cannot be observed in current sample.

Descriptive statistics reveal obvious implementation gap inside curriculum management system. Participants assign relatively high scores to curriculum planning dimension, while feedback and improvement receives lowest mean value. Local schools are comparatively adept at drafting formal curriculum documents, but lack stable institutional mechanisms transforming monitoring evidence and staff feedback into tangible curriculum revision (Lowell et al., 2024).

Conclusions

First, school informatization management shows positive association with curriculum management efficiency among investigated Qingdao public primary and secondary schools. Second, technical support services and teacher digital competence act as two most influential dimensions, followed by system application and digital infrastructure. Third, data management and decision-making correlates positively with curriculum management efficiency, yet presents no significant unique predictive power when other dimensions are statistically controlled; hence Hypothesis 2 gains partial support. Fourth, sampled local schools exhibit comparative strength in curriculum planning phase, whereas feedback-improvement segment of curriculum cycle deserves further strengthening. Generally speaking, digital transformation

ought to be regarded as holistic whole-school organizational capacity integrating technology, personnel and management routines.

Practical Implications and Recommendations

For school administrators, informatization construction shall balance hardware investment and technical-support institutional mechanism. Clear response criteria for technical faults and regular staff feedback collection can mitigate interruptions against curriculum-related work. Schools need to construct complete feedback-improvement closed-loop: curriculum evaluation outcomes should be discussed in formal meetings and converted into documented curriculum adjustment actions.

Teacher professional development should transcend basic digital-skill training. Schools can organize situated training activities oriented towards authentic curriculum tasks, together with peer-mentoring learning communities, helping teachers apply digital tools in curriculum planning, monitoring and continuous improvement. For school data governance, schools need to define clear inquiry questions, shared interpretation rules and follow-up decision-making workflows, making collected educational data produce tangible curriculum optimization outcomes.

Limitations and Future Research

This study applies convenience sampling strategy, so empirical findings cannot be generalized to all schools within Qingdao municipal region. Cross-sectional self-report design cannot determine causal sequence and bears potential common-method bias. Extremely high model R^2 value implies heavy shared variance existing among predictor variables. Future research may adopt stratified random sampling and mixed-method design combining semi-structured interviews and objective school administrative records. Longitudinal investigation is recommended to track how shifts in informatization conditions bring about changes of curriculum management efficiency.

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Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Conflicts of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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