

Path Exploration on the Synergistic Matching of Technology Platforms, Teacher Competence and Management Systems Driving the Quality and Efficiency Improvement of Educational Informatization

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Abstract: After completing large-scale infrastructure construction, the main challenge facing educational informatization has shifted from “how to build well” to “how to use well”. In some regions and schools, although various technology platforms have been introduced, teaching quality has not automatically improved as a result. The disconnection between technology platforms, teacher competence, and management systems is a noteworthy obstacle in this regard. This paper focuses on the operational logic and interrelationships among these three elements, examines the functions of technology platforms in resource aggregation, learning situation analysis, and process support, discusses the impact of teachers’ informatization teaching ability and information literacy on teaching effectiveness, and investigates the role of management systems from the perspectives of safeguard mechanisms and innovative strategies.

Keywords: Educational informatization; Technology platform; Teacher competence; Management system; Synergistic matching

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1. Introduction

After sustained investment and construction in the early stage, China’s educational informatization has entered a phase that deepening application and improving quality are the primary tasks. The “Educational Informatization 2.0 Action Plan” explicitly calls for a shift from emphasizing “building networks, building databases, and building teams” to a focus on “nurturing people as the foundation, integrated innovation, and systematic advancement”. However, from the actual situation in some localities, the problem of “emphasizing construction while neglecting application” still exists to varying degrees, and the stable correlation between informatization investment and teaching quality improvement that people expect has not yet been established. The causes of this situation are relatively complex, and one aspect that cannot be overlooked is the failure to form an effective synergy among technology platforms, teacher competence, and management systems.

Broadly speaking, technology platforms provide the basic environment for carrying resources and circulating data; teacher competence determines the extent to which technology can be effectively used in the teaching process; and management systems play a regulating role in the direction of interaction between the two from the perspectives of incentives, norms, and safeguards. If any one of these three links has a notable shortcoming, it becomes difficult for informatization construction to truly achieve the goals of improving classroom efficiency and talent cultivation quality. Therefore, clarifying the matching relationships among the three is helpful for understanding the internal mechanism of improving quality and efficiency in educational informatization. On the basis of discussing the respective roles of technology platforms, teacher competence, and management systems, this paper attempts to provide a rough sketch of the basic path through which they interconnect ^[1].

2. The role of technology platforms in the quality and efficiency improvement of educational informatization

2.1. Functional advantages of technology platforms

In terms of resource supply, platforms integrate various types of resources such as course content, experimental projects, and teaching research cases through a unified portal, and use technological means such as learner profiles to achieve personalized push to a certain extent. This approach helps lower the threshold for resource access and has practical significance for alleviating the uneven distribution of educational resources between regions. In terms of data analysis, platforms can automatically collect and visually present data generated from teaching activities such as previews, assignments, and assessments, providing informative references for teachers to grasp the learning status of the whole class and individual students, while also offering an observation window for teaching quality management at the regional level. In terms of process support, tools such as intelligent grading, automatic test paper generation, and voice assessment allow teachers to free themselves from some repetitive tasks, leaving more time for instructional design and individualized tutoring. Moreover, arrangements at the infrastructure level, such as unified authentication and data interoperability, make the connection between different educational applications more convenient and prepare the conditions for gradually forming a relatively coherent digital educational environment.

3. The impact of teacher competence on the quality and efficiency improvement of educational informatization

3.1. Enhancement of teachers' informatization teaching ability

From the perspective of competency formation, the shift in training philosophy is a noteworthy clue. Earlier technical training mostly emphasized explanations at the software operation level, but it was gradually realized that skill training detached from specific teaching contexts had quite limited actual transfer effects. Precisely for this reason, teacher training in recent years has begun to point more explicitly toward “using technology to solve teaching problems”, and the training format has gradually shifted from centralized lectures removed from the classroom to school-based research embedded in the daily teaching and research activities of schools. In this format, teachers have the opportunity to repeatedly try and adjust the combination of technology and subject content in real teaching scenarios, thereby gradually internalizing external operational skills as part of their teaching judgment. The improvement in classroom teaching efficiency is precisely the result of the accumulation of such subtle, unnoticed adjustments ^[2].

However, the sustained transformation of teachers' informatization teaching ability also depends on the support of external conditions. In the absence of usable learning situation data sources or when corresponding institutional incentives are unclear, it is difficult for teachers to steadily integrate their informatization teaching skills into daily teaching behavior, even if they possess certain such skills. From this perspective, the enhancement of informatization teaching ability is not merely a training issue but is also closely related to the degree of platform perfection and the coordination of management

systems.

3.2. Cultivation of teachers' informatization literacy

Teachers with a stronger digital awareness tend to engage in screening and selection when faced with massive resources, rather than simply piling them up. They are also more likely to be clearly aware of the scope and limitations of data feedback, avoiding mechanical reliance on quantitative indicators that might obscure those dimensions of teaching that are difficult to quantify. Information ethics literacy concerns whether teachers can appropriately grasp the boundaries of privacy and security when collecting and using student data, and maintain the necessary sensitivity to potential ethical risks. This point is of fundamental significance for the sustained and compliant use of educational data at the school level^[3].

As for the development path, the cultivation of teachers' information literacy can hardly be accomplished through short-term intensive training alone; it grows slowly through day-to-day professional practice and peer exchange. Informal learning forms such as teaching and research communities and online master teacher studios provide spaces for teachers to continuously encounter and discuss issues in informatization teaching, which is beneficial to the daily cultivation of literacy. When the institutional level consciously incorporates information literacy into the reference framework for teacher professional development, this cultivation process can often be further consolidated. Overall, information literacy is akin to the soil on which informatization teaching ability depends for growth, and together they determine the depth to which technology platforms are used in teaching. The condition of this "soil" is, in turn, inseparable from the continuous nurturing provided by the institutional level.

4. The relationship between management systems and the quality and efficiency improvement of educational informatization

4.1. The guarantee role of management systems

The funding system is related to the sustainability of informatization construction. If platform construction and equipment configuration rely mainly on one-off project investment without normalized arrangements for operation and maintenance funds, problems such as delayed equipment updates and platform service degradation are likely to occur after the project cycle ends. The standards and norms system primarily addresses the problem of "information silos", making data circulation between different systems possible through relatively unified data formats and interoperability rules; this is the technical prerequisite for data-driven teaching and management. The security system delineates the boundaries for the collection and use of educational data; it greatly influences the acceptance of informatization applications by teachers, students, and parents, and forms the trust basis for the implementation of large-scale data applications. The evaluation and supervision system incorporates informatization application into the assessment framework for schools and teachers, changing the situation that "it makes no difference whether one uses it or not" at the institutional level, and making it more likely that scattered teaching innovation behaviors will be transformed into stable organizational behaviors^[4].

These safeguard arrangements provide basic rigid constraints for the combination of technology platforms and teacher competence. However, safeguard mechanisms mainly address the questions of "whether it can be used" and "whether it should be used". If one wants to further address the question of "whether it is being used well", it is likely that more efforts are needed at the level of innovative strategies.

4.2. Innovative strategies of management systems

As educational informatization moves from initial application to deep integration, management systems themselves need to shift from a relatively single control orientation to a more flexible governance approach. Some explorations that have emerged in recent years can be broadly understood from the aspects of cross-departmental collaboration, data-driven decision-making, precise incentives, and adjustments to supply methods.

The main intention of cross-departmental collaboration is to break down the barriers between technology departments,

teaching research departments, and teacher training departments. Under the traditional structure, these departments often have their respective emphases and act separately, making it easy for platform selection, teacher training, and classroom application to become disconnected from one another. Establishing some kind of cross-departmental coordination mechanism helps to consider the configuration of technological conditions, the cultivation of teacher competence, and the improvement of teaching practice in a connected manner.

The adjustment to the decision-making model points toward moving from judgment based on experience to data assistance. With the help of data platforms at the regional level, administrators can continuously monitor the frequency of resource use, teacher participation, and changes in academic quality, thereby dynamically allocating teaching and research support resources. This evidence-based decision-making approach has the potential to improve the efficiency of management resource allocation and make support measures more aligned with grassroots needs ^[5].

Innovation in the incentive mechanism focuses on establishing a more accurate relationship between evaluation and teachers' actual informatization teaching behaviors. Impressionistic evaluations or one-off competitions are less able to reflect teachers' sustained investment in daily teaching. Practices such as micro-capability certification require teachers to submit materials such as instructional designs and classroom records that demonstrate technology integration as the basis for judgment, providing evaluation with more concrete and traceable support, and achieving improvement in the precision of incentives.

Adjustments to the supply system involve reforms in the operation and maintenance model of educational informatization. Faced with increasingly complex operation and maintenance requirements, relying solely on school IT personnel is often insufficient. Models such as government procurement of services and school-enterprise collaborative operation and maintenance alleviate the technical maintenance pressure on grassroots schools to a certain extent, allowing teachers and administrators to devote more energy to teaching and management proper.

Looking at these practices together, one can roughly summarize an idea: let the management system play the role of a "regulator" more often, driving the functional advantages of technology platforms and the competency reserves of teachers to converge in the direction of improving teaching quality. When institutional design can effectively respond to the needs of technological development and teacher growth, the overall benefits of educational informatization are more likely to become apparent.

5. Conclusion

Technology platforms, teacher competence, and management systems are not singular elements that function independently; rather, they constitute a mutually interlocking system in the process of improving quality and efficiency in educational informatization. Technology platforms provide the basic conditions of resources and data; teacher competence serves as the intermediary link that transforms technology into tangible teaching effectiveness; and management systems influence the exact form of the combination of the former two through guarantees and incentives. The state of continuous adjustment among the three may well be an important issue that must be faced over the long term when educational informatization crosses the "last mile".

During the platform construction phase, it may be appropriate to simultaneously plan for the development of teacher competence and the space for institutional support, maintaining a certain degree of coordination among the technical framework, personnel preparation, and rule design. In terms of teacher professional development, the dimensions of data interpretation and institutional response can be further integrated into training content, helping teachers understand the pedagogical significance of technology application and the organizational environment in which they operate while mastering operational skills. At the level of institutional design, it is necessary to maintain an open attitude and flexibility to adapt to technological iteration and teaching innovation, avoiding overly rigid rules that suppress bottom-up exploration.

As new technologies such as artificial intelligence are gradually embedded, the form of platforms and the operational modes of teaching may undergo new changes, which is likely to set new requirements for the matching relationship among

platforms, teachers, and institutions. Through such continuous adjustment and mutual accommodation, the diverse efforts in educational informatization may gradually converge into a relatively smooth channel, providing reliable support for the steady improvement of educational quality.

Disclosure statement

The author declares no conflict of interest.

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