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A Study on the Three-Dimensional Optimization Paths to Improve Primary and Secondary School Teachers' Acceptance of Digital Textbooks

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Abstract: ***This study, grounded in the Technology Acceptance Model and structured interviews, reveals that primary and secondary school teachers' acceptance of digital textbooks is influenced by the intricate interplay of individual psychological capital, technology-teaching fit, and the organizational support system. To boost teachers' acceptance, a three - dimensional optimization framework is proposed. This framework encompasses cognitive reconstruction, scenario adaptation, and ecological construction. Cognitive reconstruction enhances teachers' internal motivation for technology adoption through dynamic adjustment of their cognitive structures. Scenario adaptation optimizes the functional compatibility of digital textbooks based on the unique features of teaching contexts. Ecological construction, via the organizational support system, establishes an institutional guarantee for sustainable development. Additionally, strategies such as hierarchical teacher training, school - level technical emergency mechanisms, subject - specific tool module development, teaching process scaffolding, interdisciplinary mentorship, and dynamic demand feedback loops are elaborated to implement this optimization path, aiming to facilitate the effective integration of digital textbooks in teaching.***

Keywords: Digital Textbooks, Teacher Acceptance, Technology - Teaching Fit, Organizational Support**.**

1. Introduction

Based on an empirical study using the Technology Acceptance Model and structured interviews, it has been found that primary and secondary school teachers' acceptance of digital textbooks is driven by the multi-dimensional interaction of individual psychological capital, technology - teaching fit, and the organizational support system. To systematically enhance teachers' acceptance of digital textbooks, this study constructs a three-dimensional optimization path, which includes cognitive reconstruction, scenario adaptation, and ecological construction. Specifically, the dynamic adjustment mechanism of teachers' cognitive structure is utilized to enhance the internal motivation for technology acceptance; the functional adaptability of digital textbooks is optimized according to the contextual characteristics of teaching scenarios; and the ecological construction of the organizational support system is carried out to establish an institutional guarantee system for sustainable development.

2. Coordinated Intervention of Cognitive Reconstruction and Anxiety Alleviation

Empirical data show that teachers' computer self-efficacy and technological anxiety have significantly different impacts on technology acceptance. Based on this, the study proposes a dual approach of optimizing teachers' technological cognitive patterns and reducing external risks to enhance the sustainability of digital textbook application.

2.1 Implementing a Hierarchical Teacher Training Plan Step by Step

Given the heterogeneous characteristics of teachers' technological ability baselines, a hierarchical training mechanism of "pre-test diagnosis - hierarchical training - dynamic assessment" is established. In the diagnostic stage, standardized assessment tools (such as the "Digital Literacy Assessment Questionnaire for Primary and Secondary School Teachers" based on the industry standard "Digital Literacy of Teachers" [1] are used to comprehensively evaluate teachers' digital awareness, digital technology knowledge and skills, digital applications, digital social responsibility, and professional development. According to the assessment results, teachers are divided into three levels: beginner, intermediate, and advanced. The beginner group focuses on cultivating basic operation skills of digital textbooks (such as resource retrieval, content editing, and classroom presentation), and the foundation of technology application through modular curriculum design. The intermediate group emphasizes strengthening the ability of data-driven teaching analysis, and designs a blended learning project of "case study + peer assessment" to guide teachers to complete advanced tasks such as learning situation analysis and cross-platform resource integration. The advanced group promotes the development of technology integration ability through technology innovation workshops, requiring teachers to develop school-based digital resources according to the characteristics of their disciplines. During the training process, a task decomposition + immediate feedback mechanism is embedded. For example, in the training of resource retrieval skills, the operation process is broken down into subtasks such as platform navigation identification, keyword strategy optimization, and retrieval result screening. After each task is completed, a diagnostic report is generated by the intelligent system to ensure the continuity and visibility of ability improvement. The training content at each level is progressive and closely connected, providing teachers with a systematic path to enhance their abilities and helping teachers gradually deepen their understanding and application of digital textbooks in teaching practice.

2.2 Taking Precautions to Establish a School-Level Technical Emergency Mechanism

To alleviate teachers' technological anxiety, an intervention

model combining cognitive reconstruction and behavioral support is established. First, a cognitive reconstruction workshop is constructed from the perspective of technology philosophy. According to Shan Meixian's view of technology as a tool [2], technology is essentially a tool developed to solve practical problems. Therefore, attribution training is used to help teachers establish the cognitive connection between technical failures and learning opportunities. Second, a school-level technical response team is established. By integrating on-campus technical personnel and remote expert resources, a service standard of 5-minute on-site response + 8-hour remote support is established, and the technical failure handling time is controlled within an acceptable range for teaching activities.

3. Optimization of Functional Adaptation to Teaching Scenarios

To improve the technology-teaching fit, it is necessary to base on the laws of subject teaching and the characteristics of classroom timings, and achieve a qualitative transformation of digital textbooks from instrumental intervention to teaching integration through customized function development and coupled design of teaching processes.

3.1 Developing Subject-Specific Tool Modules Targeted at Problems

In response to the differences in subject knowledge systems and cognitive logics, a subject-oriented function development model is constructed. In the field of Chinese, the design logic of Professor Zhang Qiuling's team's "Literacy Rooted" intelligent learning platform can be referred to, and a three-dimensional tool matrix of "Reading and Appreciation", "Expression and Communication", and "Sorting and Exploration" can be constructed [3]. This system deeply embeds technical functions into the process of achieving the core literacy goals of the unified textbooks by anchoring core subject concepts such as literary text analysis and visualization of writing thinking. In mathematics, the focus is on developing functional modules such as dynamic geometric modeling and data visualization analysis, presenting intuitive representations of abstract mathematical principles through technical tools to promote students' in-depth understanding of complex concepts.

The key to the subject-oriented development model lies in establishing an iterative mechanism of subject needs analysis → function prototype design → teaching scenario verification to ensure the dynamic fit between technical functions and teaching objectives and avoid the development mistake of "technical idling".

3.2 Building Full Teaching Process Scaffolds Step by Step

Based on the stage characteristics of the classroom teaching process (introduction → exploration → summary), a timing adaptation scheme for technical intervention is designed. In the classroom introduction stage, the system automatically pushes contextualized resources according to the teaching content (such as restoring historical sites through AR technology in history courses), activating students' prior knowledge through multi-modal information input. In the exploration stage, interactive analysis tools [4] (such as dynamic cell structure maps in biology courses) are enabled to support students in collaborative exploration and hypothesis verification. In the summary stage, intelligent mind mapping tools [5] are used to assist teachers and students in structured knowledge sorting and visual presentation of learning achievements. When the operation logic of technical tools is consistent with the timing rules of teaching behaviors, the resistance of teachers in the process of technology adoption will be significantly reduced, thus more effectively promoting the application of technology in teaching.

4. Construction of a Flexible Organizational Support System

The in-depth application of digital textbooks depends on the structural reform of the organizational support system. A sustainable technology application ecosystem is constructed through institutional optimization and resource integration.

4.1 Forming an Interdisciplinary Collaborative Mentorship Team

The obstacles in teachers' technology adaptation process often stem from isolated technological exploration, so it is necessary to establish an interdisciplinary technical mentorship team. The team consists of information technology experts, key teachers from various disciplines, and educational technology researchers, providing teachers with comprehensive and systematic guidance from technical principles to practical applications. Information technology experts are responsible for explaining the application skills of digital textbook development and multimedia teaching tools; key subject teachers share practical experience on how to skillfully integrate technology into daily teaching; educational technology researchers analyze the development trends and theoretical basis of technology-teaching integration from a theoretical perspective. Through regularly holding "technology-teaching integration" case study activities, for problems such as the disconnection between technology application and teaching objectives and the complexity of technology operation affecting teaching fluency that occur in practice, mentors and teachers conduct in-depth discussions together. They analyze the root causes of problems from multiple dimensions such as teaching concepts, teaching design, and tool selection, and propose practical improvement strategies, thus promoting the improvement of teachers' practical ability in technology-teaching integration.

4.2 Establishing a Dynamic Demand Feedback Loop

Relying on the existing teaching and research system, a multi-level dynamic demand feedback mechanism is constructed. The district-level teaching and research center, as the top-level hub, regularly organizes cross-school joint teaching and research activities. Through channels such as teaching case discussions and common demand questionnaire surveys, it systematically combs the general demands of teachers in the region for digital textbooks (such as function optimization, resource integration, etc.), forms a standardized demand list, and feedbacks it to the technology developers to promote the large-scale solution of common problems. The school-level teaching and research group, as the main body

for subject in-depth exploration, based on the characteristics of subject teaching, organizes teachers to conduct in-depth discussions on the integration path of digital textbooks and subject core literacy. For example, the Chinese subject can focus on how digital textbooks support text close reading and critical thinking cultivation, while the mathematics subject can explore the application of dynamic modeling tools in the visualization of abstract concepts. Through the experience sharing within and outside the subject, functional requirements with subject characteristics are refined to provide professional guidance for technology iteration. The grade-level lesson preparation group, as the front-line execution unit, promptly captures the operation pain points encountered by individual teachers in specific teaching scenarios during daily teaching and research activities such as collective lesson preparation and teaching observation. Problems are quickly summarized through immediate feedback forms or online collaboration platforms, forming a short-cycle loop of problem - suggestion - optimization. Through a hierarchical and collaborative feedback network, the transformation from fragmented perception to systematic response of teachers' demands is realized, ensuring that technology optimization always targets the evolving needs of real teaching scenarios.

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Author Profile

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