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Research on the Development and Publishing Strategy of Intelligent Chinese Textbooks in the Era of Convergent Media

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Abstract: ***In the era of convergent media, technological innovations have provided new opportunities for the transformation, development, and publication of international Chinese textbooks. Currently, the development and publication of intelligent Chinese textbooks are in their infancy, facing challenges such as uneven digital textbook development levels across countries, insufficient interactivity, significant disparities in the number of country-specific intelligent textbooks, imprecise positioning in textbook development and publication, low levels of "intelligence" in textbooks, and poor compatibility with platform users. By leading with technology, accelerating the integration and innovation of various digital education resources, fostering collaborative construction, and creating a community for the development of Chinese textbooks integrating science and education, we can establish paradigms and improve the diversified system for the development and publication of intelligent textbooks. This will provide "material" support for the sustainable development of international Chinese education.***

Keywords: Intelligent Chinese Textbooks; Publishing strategy; Convergent Media.

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1. Introduction

1.1 Research Background and Significance

International Chinese education serves as a platform for China to tell its stories to the world and is an important channel for the export of Chinese culture. The Chinese language plays a vital role in the mutual learning of civilizations, economic exchanges, and political communication. The development and publication of international Chinese textbooks are integral to implementing international Chinese education. In the era of convergent media and rapid technological advancement, one of the crucial issues in the globalization of Chinese is how to leverage digital technologies to empower the compilation and publication of international Chinese textbooks.

Intelligent international Chinese textbooks represent the advanced stage of digital textbook development. Supported by an intelligent “textbook (content) – teaching management system – learning platform”, these textbooks create a multi-modal virtual learning environment, provide diverse resources, match personalized learning paths, conduct precise evaluations, and offer strong interactions among “people, resources, and environments.”(Du and Liu 2023)The development and publication of intelligent international Chinese textbooks can alleviate the current contradictions between delayed textbook development and the continuous evolution of international Chinese education in the convergent media era, fostering the collaborative development of language education and digital publishing.

2. Literature Review

2.1 Current Status of Intelligent Digital Textbooks Development

The advent of intelligent digital textbooks (IDTs) signifies a revolutionary leap in educational technology, integrating innovative digital solutions with advanced pedagogical practices. IDTs are poised to reshape the educational landscape by offering personalized learning experiences, fostering engagement, and enhancing accessibility. This review explores the technological foundations of IDTs, their adoption across different regions, and the numerous benefits they bring to educational contexts while highlighting persistent challenges and opportunities for future development.

2.2 Technological Foundations of Intelligent Digital Textbooks

IDTs are built on a foundation of cutting-edge technologies, including artificial intelligence (AI), augmented reality (AR), virtual reality (VR), and adaptive learning systems. These technologies enable IDTs to deliver highly personalized learning experiences, providing real-time feedback and interactive content tailored to individual needs. Adaptive learning algorithms are particularly significant in this regard. For instance, Pearson's Revel employs such algorithms to continuously analyze student performance and dynamically adjust the content and learning path to address knowledge gaps and strengthen understanding (Huang et al., 2020). This ensures that each learner receives content that aligns with their current abilities and progress.

Additionally, AR and VR technologies have transformed the way educational content is presented. By creating immersive learning environments, these technologies allow students to explore complex subjects, such as biology or geography, in ways that traditional textbooks cannot. For example, AR-enabled features in IDTs can overlay digital information onto real-world environments, offering interactive 3D models of anatomical structures or geographical terrains. Similarly, VR simulations provide a virtual laboratory setting where students can safely conduct experiments or practice language skills in realistic cultural contexts (Graham, 2006). These technological advancements make IDTs highly versatile tools for diverse educational applications.

2.3 Global Adoption Trends: Regional Disparities and Initiatives

The adoption of IDTs varies significantly across the globe, with regional disparities influenced by economic conditions, technological infrastructure, and policy initiatives.

Asia stands out as a leader in the adoption and integration of IDTs. South Korea, through its Smart Education Initiative, has incorporated digital textbooks into its K-12 education system, particularly in STEM subjects. These textbooks not only provide interactive content but are also supported by a robust technological infrastructure, including high-speed internet and widespread device accessibility (Wei & Wu, 2023). In China, the emphasis on educational informatization has resulted in the development of IDT platforms such as iFLYTEK and NetEase. These platforms integrate AI technologies to offer personalized learning tools for language acquisition, enabling students to engage with content that adapts to their individual progress and preferences.

Western nations, particularly the United States, have seen widespread adoption of IDTs in secondary and higher education. Companies like McGraw-Hill and Cengage have pioneered the development of adaptive digital textbooks, which are often integrated with Learning Management Systems (LMS) such as Canvas and Blackboard. These integrations streamline the learning experience by providing a centralized platform for accessing textbooks, tracking progress, and completing assessments (Hrastinski, 2019). Moreover, U.S. institutions frequently utilize IDTs in online and hybrid courses, highlighting their potential for flexible and scalable learning environments.

In developing regions, however, the adoption of IDTs faces significant challenges. Limited access to reliable internet connectivity, insufficient technological infrastructure, and financial constraints hinder the widespread use of these resources. Initiatives such as UNESCO’s Global Education Coalition aim to address these disparities by promoting equitable access to digital learning tools. While progress has been made in some areas, such as the introduction of affordable devices and localized content, the gap between developing and developed regions remains a pressing concern.

2.4 Benefits of Intelligent Digital Textbooks

The growing adoption of IDTs is driven by their ability to address several key needs in modern education.

Personalization: AI and machine learning technologies enable IDTs to deliver content tailored to individual learners. By analyzing user behavior, such as time spent on tasks and accuracy in assessments, IDTs adapt the

difficulty and focus of the material to align with the learner's needs. This personalized approach supports self-paced learning and fosters a deeper understanding of the content (Dziuban et al., 2018).

Engagement: IDTs incorporate interactive features such as gamification, multimedia content, and real-time quizzes to enhance learner engagement. Gamified elements, including leaderboards and rewards, motivate students to complete tasks and actively participate in learning activities. Multimedia content, such as videos, animations, and simulations, appeals to diverse learning styles, making the material more accessible and enjoyable (Hrastinski, 2019).

Accessibility: One of the most impactful benefits of IDTs is their potential to create inclusive learning environments. Tools like text-to-speech functionality, adjustable font sizes, multi-language support, and visual aids make these textbooks accessible to differently-abled learners. Additionally, their digital format allows students to access content on a variety of devices, ensuring learning continuity regardless of geographical location or socio-economic status (Kintu et al., 2017).

3. New Development Trends for International Chinese Textbooks in the Era of Convergent Media

3.1 Technological Transformation: Empowering Innovation and Upgrading International Chinese Textbooks Through Digital Technology

The rapid advancement of intelligent technologies, particularly in big data, cloud computing, and artificial intelligence, has revolutionized the development and publication of international Chinese textbooks. Traditional printed textbooks, with their static and singular format, struggle to meet the diverse and personalized learning needs of modern learners. In contrast, the application of media convergence technology has driven a comprehensive transformation in both the physical form and content delivery of textbooks, transitioning from static print media to dynamic digital media. This shift not only enriches the presentation of educational materials through multimedia elements such as animations, videos, and audio but also ensures that textbook content remains timely and accurate by enabling real-time updates.

In the context of media convergence, intelligent textbooks have emerged as a focal point in international Chinese education. These textbooks represent the integration of traditional educational materials with modern information technologies, creating an open, intelligent, and personalized learning environment. By leveraging advanced technologies like big data analytics, AI algorithms, and cloud computing services, intelligent textbooks can recommend learning resources tailored to students' habits, abilities, and progress. They also offer customized learning paths, achieving precise resource matching and personalized content delivery. Additionally, these textbooks enhance learning efficiency through accurate assessment features, providing real-time feedback on learning outcomes to help both teachers and students adjust their strategies and plans effectively.

Advancements in technology not only redefine the form of textbooks but also lead to profound changes in learning methods. The proliferation of mobile learning, online learning, and blended learning has made education more flexible and accessible, unbound by time or location. International Chinese textbooks must capitalize on these technological advantages by designing resources tailored to diverse learning scenarios and needs, such as mobile applications, online courses, and virtual laboratories, to cater to the varied demands of Chinese learners worldwide.

3.2 Ecological Transformation: The Evolution of International Chinese Textbooks in a Fragmented and Diversified Ecosystem

The rapid development of digital technology is driving a profound transformation of the educational ecosystem. Keywords such as disintermediation, user-centric approaches, remote collaboration, self-driven learning, and virtual environments define the new era of education. This shift demands that international Chinese textbooks adapt to the evolving educational ecosystem by undergoing comprehensive innovations in content design, teaching methods, and evaluation systems to support more flexible, efficient, and personalized learning processes. Textbooks are no longer merely repositories of knowledge but serve as hubs connecting online and offline, domestic and international educational resources, thereby fostering global Chinese learning communities and facilitating intercultural exchanges.

In an era of information overload, learners' attention and time are increasingly fragmented, making microlearning a prevailing trend. International Chinese textbooks should embrace this trend by developing concise and focused learning modules that enable learners to study effectively during fragmented time intervals. These modules, in the form of vocabulary flashcards, grammar micro-lessons, or cultural tips, allow learners to study anytime, anywhere, and select content based on their individual needs, thereby constructing personalized learning paths.

The era of media convergence provides broader learning spaces for international Chinese education. Beyond traditional classrooms, platforms such as social media, virtual reality environments, and collaborative online tools have become new arenas for learning. International Chinese textbooks should harness these diversified platforms to create engaging and varied learning experiences. For example, online collaboration tools can facilitate cross-border language exchanges, while virtual reality technology can simulate authentic Chinese language environments, enabling students to improve their language skills through immersive experiences.

With the maturation of AI technologies, intelligent learning tools such as voice assistants, adaptive learning systems, and online assessment platforms are increasingly integrated into international Chinese education. These tools not only support autonomous learning and enhance learning efficiency for students but also provide teachers with precise teaching diagnostics and data-driven insights, promoting innovation and optimization in teaching methods. International Chinese textbooks should actively integrate these intelligent tools to form comprehensive "textbook + platform + tool" learning solutions, offering teachers and students more convenient, efficient, and holistic educational resources and services.

The era of media convergence brings unprecedented opportunities and challenges to the development of international Chinese textbooks. Technological transformation necessitates the incorporation of digital technologies to achieve comprehensive upgrades in content and format, delivering intelligent and personalized learning experiences. Meanwhile, ecological transformation urges textbooks to adapt to fragmented and diversified learning environments, fostering an open, interactive, and shared educational ecosystem. To address these changes, the development and publication of international Chinese textbooks should embrace innovative concepts and continuously explore the application of new technologies and models to meet the diverse needs of global Chinese learners, propelling international Chinese education to new heights.

4. Analysis of the Current Status of Intelligent International Chinese Textbooks

4.1 Low Level of "Intelligence" in Textbooks and Poor Compatibility with Platforms and Users

Unlike traditional print textbooks, digital international Chinese textbooks are typically presented through various digital media such as websites, mobile apps, DVDs, and computer applications. However, the current level of "intelligence" in digital textbooks is relatively low. When teachers and students use these textbooks for teaching and learning, it is difficult to replicate the full offline teaching experience. For example, the 51KID platform requires additional PowerPoint presentations and audio files for teaching when using Chinese digital textbooks, as it cannot offer a one-stop teaching experience through the content and features of the digital textbooks alone. Additionally, while both "Global Confucius Institute MOOCs" and "Chinese University MOOC" platforms have developed a considerable number of international Chinese digital textbooks, these textbooks are not fully compatible with the platform's functions due to limitations in platform capabilities. As a result, students' interaction with the digital textbooks remains relatively limited, lacking real-time feedback mechanisms for questions and difficulties encountered during learning.

4.2 Uneven Development of Textbooks, with Few Interactive-Friendly Textbooks

As of now, there are 3,679 international Chinese digital textbooks worldwide. Among them, China has developed 1,744 textbooks, accounting for 47.40%, while overseas Chinese digital textbooks total 1,935, accounting for 52.60%. (Wu et al.2021) Despite some progress, the development of intelligent Chinese textbooks across different countries remains unbalanced, with significant disparities in education philosophies, policies, technologies, and funding. As a result, the current level of international Chinese intelligent textbook development is uneven, with high-quality textbooks being scarce.

From the perspective of publishing formats, digital textbooks can be categorized into static media, multimedia, and rich media. Static media textbooks are essentially PDF versions of print textbooks, while multimedia textbooks incorporate various media such as audio, animations, and videos, making the content more dynamic and engaging.

Rich media textbooks, which are closer to the function of intelligent textbooks, provide interactive learning, expanded exercises, cultural extensions, and multi-modal functions. However, the number of these rich media intelligent Chinese textbooks remains relatively low and is not yet widely applied in teaching.

Table 1: Statistics of Domestic Digital Textbook Publications (Xiao 2022)

Publishing Format	*Beijing Language University Press*	*Chinese Teaching Press*	*Foreign Language Teaching and Research Press*	*People's Education Press*	*Total*
Static Media	5	2	1	0	8
Multimedia	103	25	17	3	148
Rich Media	8	2	5	0	15
Total	116	29	23	3	171

4.3 Significant Disparities in Country-Specific Regional Intelligent Textbook Quantities and Lack of Accurate Positioning

Globally, there are significant differences in the number of Chinese digital textbooks developed by various countries. For example, aside from China, South Korea (489), Thailand (106), and Japan (73) have the highest numbers in Asia. In Europe, Russia, Ireland, Italy, and the UK are the top developers. Countries like Cameroon in Africa have very few, with just one textbook (Wu et al.2021). These discrepancies are largely due to differences in educational informatization, international Chinese education levels, and economic development.

5. Strategies for Improving the Compilation and Publication of Intelligent International Chinese Textbooks

With the continuous innovation of global informatization and educational technology, international Chinese education is encountering unprecedented opportunities and challenges. As a culmination of contemporary educational technology, intelligent textbooks not only enhance teaching efficiency and quality but also serve as a crucial medium for spreading Chinese culture worldwide and promoting international exchange. This paper explores strategies for improving the compilation and publication of intelligent international Chinese textbooks from three dimensions: technological leadership, paradigm establishment, and collaborative development. These strategies aim to provide theoretical support and practical guidance for modernizing and advancing international Chinese education.

5.1 Technological Leadership: Accelerating the Integration and Innovation of Digital Educational Resources

5.1.1 The Necessity and Current Status of Technological Integration

Technological integration, as a critical strategy for driving industrial innovation and upgrading, focuses on the organic combination of diverse technological elements to create complementary advantages and solve complex domain-specific problems. In the context of compiling and publishing intelligent international Chinese textbooks, technological integration is particularly vital. Cutting-edge technologies such as cognitive intelligence, blockchain, virtual reality (VR), augmented reality (AR), 5G communication, and AI-driven dialogue systems have introduced unprecedented possibilities for presenting and interacting with educational content. However, the application of these technologies in international Chinese digital textbooks remains at an early stage, with most resources limited to basic digitalization rather than true intelligence or personalization. Thus, effectively integrating these technologies to enhance interactivity, adaptability, and intelligent management in textbooks is an urgent challenge.

5.1.2 Multi-Modal Teaching Function Innovation

In applying technological integration to international Chinese intelligent textbooks, the development and fusion of multi-modal teaching functions should be prioritized. For instance, by leveraging the coherence and systematic nature of course content from international Chinese MOOCs, high-quality resources can be incorporated into intelligent textbooks, ensuring logical and comprehensive knowledge structures. Similarly, features like audiovisual training and real-time assessment from Chinese learning apps can enhance textbook interactivity and feedback mechanisms, allowing learners to consolidate knowledge and improve skills through practice.

Furthermore, integrating AI-driven dialogue technologies like ChatGPT can simulate real-life conversational scenarios, addressing the issue of limited interaction in intelligent textbooks. This technology can also dynamically adjust dialogue content and difficulty based on learner responses, thereby constructing personalized learning pathways.

5.1.3 Content Innovation Driven by Technology

Technological leadership is not only reflected in functional integration but also in the innovation and activation of content. Through big data analytics of learner behaviors, preferences, and performance, intelligent textbooks can recommend relevant content with precision, achieving a personalized match of learning resources. Additionally, VR/AR technologies can create immersive language learning environments, such as simulating traditional Chinese festivals or daily life scenes, deepening learners' understanding and appreciation of Chinese culture. The application of 5G technology provides robust support for high-definition videos and real-time interactions, further diversifying teaching methods and formats.

5.2 Paradigm Establishment: Enhancing the Standardization System for Intelligent Textbook Development and Publishing

5.2.1 Importance of Standardization Systems

Standards are essential benchmarks for measuring quality and ensuring consistency. In the development and publication of intelligent international Chinese textbooks, establishing a comprehensive standardization system is crucial for ensuring quality, promoting resource sharing, and fostering industry growth. Currently, disparities in technological levels, educational philosophies, and market demands among countries result in uneven quality of international Chinese digital textbooks, with a lack of unified standards and regulations significantly limiting their adoption and dissemination.

5.2.2 Constructing a Standardization System

The construction of a standardization system for intelligent international Chinese textbooks should encompass multiple aspects, including compilation, publishing, review, software platform, and mobile terminal standards. Firstly, clear definitions and characteristics of intelligent textbooks must be established, specifying technical requirements and educational values. Secondly, standards for content compilation and review should be developed, ensuring the scientific, accurate, timely, and culturally appropriate nature of the materials. A rigorous review mechanism should be implemented to ensure quality compliance through multiple evaluation rounds. Additionally, software platform and mobile terminal standards should be designed to ensure compatibility and user experience across various devices.

5.2.3 Model Creation and Gradual Promotion

Based on the constructed standardization system, exemplary projects should be identified to create model cases of intelligent textbooks. These cases should fully consider the needs and cultural backgrounds of learners from different countries and regions, integrating the latest educational concepts and technological advancements to showcase the unique features and benefits of intelligent textbooks. By leveraging the demonstrative effect of these examples, the adoption of intelligent textbooks can gradually expand to broader regions and user groups, fostering the standardized and large-scale development of international Chinese intelligent textbooks.

5.3 Collaborative Development: Building a Diversified Community for Textbook Development and Publishing

5.3.1 Necessity of Collaborative Development

The development and publication of intelligent international Chinese textbooks is a complex project involving multiple disciplines, domains, and stakeholders. Given the diverse learning needs and cultural backgrounds of learners worldwide, it is challenging for any single institution or team to accomplish this task independently. Thus, establishing a diversified community comprising governments, universities, research institutions, publishing companies, technology providers, and users is critical for advancing intelligent textbook development.

5.3.2 Roles of Diverse Stakeholders

In the collaborative development process, each stakeholder should have a clear role and leverage their strengths. Governments should provide policy support and funding to create a favorable external environment for textbook development and dissemination. Universities and research institutions should focus on educational theory research and teaching method innovation, ensuring the scientific and practical value of textbook content. Publishing companies should enhance cooperation with technology providers to utilize advanced technologies for improving digital and intelligent textbook features. Technology providers should continuously monitor advancements in educational technologies and offer technical support and solutions for intelligent textbook development. Users, as the ultimate beneficiaries, play a crucial role in providing feedback and suggestions, contributing to the continuous optimization and refinement of textbooks.

5.3.3 Building Mechanisms and Platforms

To ensure effective collaborative development, robust mechanisms and platforms must be established. Regular communication and exchange mechanisms, such as seminars and forums, can facilitate information sharing and idea generation among stakeholders. A collaborative platform for textbook development and publishing should be created to integrate resources and enable efficient project management and teamwork. Additionally, international collaboration and exchange should be encouraged to draw on global best practices and promote the internationalization of intelligent international Chinese textbooks.

5.3.4 Emphasizing Individual Differences and Cultural Diversity

In the process of collaborative development, individual differences and multicultural backgrounds of learners should be fully considered. The content design of intelligent textbooks should reflect the unique characteristics of Chinese characters and teaching methods, align closely with contemporary Chinese life and culture, incorporate universal human emotions and values, and selectively adapt to the lifestyles and cultures of overseas learners. Through cultural exchange and integration, learners' understanding and recognition of Chinese culture can be enhanced, promoting the sustainable development of international Chinese education.

6. Conclusion

In conclusion, improving the compilation and publication of intelligent international Chinese textbooks requires addressing three critical dimensions: technological leadership, paradigm establishment, and collaborative development. By integrating innovative technologies, establishing robust standardization systems, and fostering diversified collaboration, international Chinese education can advance towards modernization, intelligence, and internationalization. As technology continues to evolve and educational philosophies progress, intelligent textbooks will serve as vital bridges for global connections, cultural dissemination, and intercultural exchange, providing enriched, efficient, and personalized learning experiences for learners worldwide.

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