Digital Production Practices and Reflections on Post-Print in Electric Power Book Publishing

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Date: 2023-10-08T00:00:00+00:00

Abstract

The book production methods in the publishing industry have remained largely unchanged for decades. With breakthroughs in computer technology, artificial intelligence has developed rapidly. In book production, applying artificial intelligence technology to technically transform publishing workflows can increase production efficiency and reduce costs while maintaining, or even improving, quality, thereby injecting new vitality into traditional book publishing.

Full Text

Preamble

Digital Production Practice and Reflection on Electric Power Book Publishing

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Abstract: For decades, book production methods in the publishing industry have remained largely unchanged. However, with breakthroughs in computer technology, artificial intelligence has developed rapidly. Applying AI technology to transform publishing workflows can improve production efficiency and reduce costs while maintaining or even enhancing quality, thereby injecting new vitality into traditional book publishing.

Keywords: editorial processing; manuscript review; digital production; artificial intelligence
CLC Number: G122
Document Code: A
Article ID: 1671-0134(2021)11-103-03
DOI: 10.19483/j.cnki.11-4653/n.2021.11.031
Citation Format: Zang Yanjiao, Gu Chenlan, Li Jia. Digital Production

Practice and Reflection on Electric Power Book Publishing [J]. China Media Technology, 2021(11): 103-105.

1. Current State of Book Publishing Production at the Press

China Electric Power Press (hereinafter referred to as "the Press") was established in 1951 and serves as the "national team" for electric power book publishing in China. As one of the earliest central science and technology publishers in the country, the Press has published numerous professional books over the past 70 years and enjoys an excellent reputation in the field of electrical technology publishing. In the last decade, the Press has implemented multiple information technology projects covering publishing information management, print quality review, finished product management, and content distribution, achieving some technological innovations and optimizations across various publishing stages. However, in the core content production segment of book publishing, the Press still employs relatively traditional working methods due to constraints from established workflows, technical limitations, and work habits.

The prevalent book production method at the Press follows this pattern: after receiving a manuscript, even if the author has submitted an electronic file (Word document), editors prefer to conduct content review on printed paper copies. The so-called "editorial processing" primarily involves editors identifying and marking issues on paper without making direct changes—a practice maintained throughout the initial review, secondary review, and final review stages. Throughout the three-review process, a single paper manuscript is used from beginning to end, with handwritten corrections filling every margin. To distinguish contributions from different reviewers, each person typically uses a different colored pen. Content modifications and adjustments are then performed manually by typesetters, who transcribe the editors' handwritten marks into typesetting software. After typesetting, the manuscript is printed again and returned to the Press for proofreading and verification. Any issues discovered during verification are again marked by hand on paper and returned to the typesetters for revision. This cycle repeats for several rounds until no new problems are found, after which the manuscript is submitted to the reading and quality inspection departments for final checking.

2. Critical Issues in the Existing Production Process

Under this paper-based, handwritten production model for editors and proofreaders, several urgent problems persist.

First, handwritten text is not always standardized. Influenced by individual writing habits and constrained by limited space on paper already filled with text, editors inevitably produce cursive or abbreviated notes, creating risks for

typesetters who must decipher these marks visually.

Second, the process involves excessive repetitive labor. Content is repeatedly transcribed from paper into typesetting software, and despite being digitally processed, must be printed again for subsequent review and proofreading, reverting to offline paper-based operations. This constant conversion between paper and digital formats increases the likelihood of errors.

Third, manuscript review remains primarily manual, placing excessive dependence on editors' personal expertise and sense of responsibility. Although reference books and databases are available, consulting multiple physical volumes is inconvenient. With increasingly stringent quality requirements, editors, proofreaders, and quality inspectors must invest more effort in repeated checks, leading to fatigue-induced oversights and inadvertently prolonging the review cycle.

Fourth, communication is inconvenient. Many typesetting companies are no longer located in downtown Beijing or even its suburbs; to reduce costs, large-scale operations have relocated to Hebei or further away. To transmit paper-based review comments to typesetters and receive newly printed versions, editorial and production departments must coordinate logistics daily. Setting aside the fact that at least five printouts are required during review and proofreading —consuming substantial paper—the financial and time costs of logistics alone represent a significant burden. Since the pandemic, occasional regional lockdowns have delayed deliveries, severely impacting already tight publishing schedules.

Fifth, typesetting feedback is slow. Typesetting companies rarely serve only one publisher; tasks from multiple publishers must be queued. Since they primarily rely on manual typesetting, even urgent requests require temporary staffing, and a 2–3 day turnaround remains necessary.

3. Practice of Digital Production Workflow

After analyzing these problems, the Press implemented the following improvements in its production process.

3.1 Manuscript Processing and Review in Word

The Press selected Word as the tool for manuscript processing and review based on several considerations. First, the vast majority of author submissions are already Word files; using Word for subsequent editorial processing allows direct content modification without file conversion or data loss. Second, Word offers powerful editing capabilities, enjoys high market penetration, and is familiar to most editorial staff, resulting in low learning costs. Third, Word has robust plugin mechanisms that support secondary development and can describe content through XML (Extensible Markup Language) structured files, offering strong openness.

Editors work in Word using track changes mode, enabling the extraction and storage of all modifications through technical means. This makes content

changes transparent across the three-review stages. With computer technology intervention, the manually completed review record forms previously required are no longer necessary—the system automatically generates relevant records, saving editors' time.

Reviewers can utilize both Word' s native features and specially developed intelligent proofreading and editing tools. The intelligent proofreading tool employs natural language understanding, deep machine learning, and artificial intelligence to assist in manuscript review, providing multi-dimensional checks including character/symbol verification, logical consistency, content duplication, knowledge accuracy, formatting, and grammar. This improves book content quality and efficiency, freeing editors from low-value, repetitive tasks so they can focus on more valuable checks of knowledge and academic substance. Computer-assisted review significantly enhances proofreading efficiency and prevents errors caused by eye fatigue and mental exhaustion. Through big data technology, intelligent proofreading rapidly accumulates professional knowledge, compensating for editors' knowledge gaps and effectively improving manuscript quality.

For non-standard content, the intelligent editor enables batch processing of full-width/half-width symbols, Arabic numerals, punctuation in headings, image and table positioning, line breaks, hyperlinks, automatic numbering, and more. Traditionally, typesetters handled these tasks, but this approach suffered from frequent errors and omissions, and required subsequent verification by editors and proofreaders—three people ensuring quality for one modification, resulting in very low efficiency. With the new technology, editors can typically process these elements with a single click, with modifications carried directly and losslessly into the typesetting software, reducing or even eliminating subsequent proofreading work while ensuring both timeliness and quality.

3.2 Managing Editorial Tasks Through the Platform

The digital production management platform provides workflow management functions for the book production process, supporting full lifecycle management. All personnel involved in book production, regardless of location, can query, edit, and drive tasks related to their roles through the platform, achieving remote work and communication.

Unlike the ERP systems currently common in publishing houses, the digital production management platform does not merely fill in information after the fact; it records the editorial process, automatically collecting data and information on manuscript changes, version development, and workflow steps. Based on this collection, it performs data analysis and aggregation, enabling management departments to monitor editorial progress and identify issues in real time.

The platform supports book compilation tasks managed along the main line of "topic selection." Responsible editors can track and control topic progress and assign tasks for each workflow stage. Different topic statuses can run in parallel or serially, encompassing manuscript review tasks, proofreading tasks,

and content creation, thereby achieving multi-person collaboration.

The platform supports digital management of users, organizations, permissions, workflows, topics, and manuscript tasks; unified storage and management of production data resources during the compilation process; and seamless integration between modules. It supports an open data and technology interface exchange system and integration with ERP and resource management systems.

3.3 Intelligent Typesetting Replacing Manual Typesetting

Intelligent typesetting technology addresses the problems of poor timeliness and potential introduction of new errors in manual typesetting. Finalized Word manuscripts undergo intelligent analysis and processing by an automatic typesetting engine, which combines the parsed structured content with pre-configured template files to automatically generate typeset files. The intelligent typesetting service comprises three components: a book template design tool, an automatic typesetting engine, and a fine-tuning tool.

The Press selected books with distinct layout features, regular image-text relationships, clear chapter structures, and reusable layout patterns. After analysis, relevant characteristics were extracted and XML-format template files were created using the template design tool. This tool provides style editing and layout design functions for multi-format digital products, supporting matching between structured tags and styles, layout rule design, and interactive operation for template creation.

The automatic typesetting engine automatically combines designed layout templates with structured document content to produce initial typeset results. The engine can simultaneously output multiple format types from a single production run, achieving "create once, publish many." Output formats include:

1. **PDF format**: High- and low-resolution PDF documents for print and electronic devices.
2. **Word format**: Word documents with identical content and similar layout to PDFs, facilitating author revisions for reprints.
3. **XML format**: Structured content extracted from typeset documents according to predefined definitions for metadata extraction, web publishing, or other applications.
4. **Epub format**: Epub e-book documents for digital reading services.

After automatic typesetting, some elements such as image placement and blank page management still require manual adjustment to meet final publishing requirements. The fine-tuning tool supports task management, allowing typesetters to receive tasks, complete work, and submit results directly through the tool, making operations highly convenient.

4. Future Vision

The most critical work in book publishing is content processing and review. Previously entirely manual, this work is now gradually leveraging computer technology to handle tasks with strong regularity, repetitive operations, and clear descriptive features. Through the Press' s technological transformation practice, publishing cycles have been shortened by at least 30%, with some standardized books achieving reductions of up to 50%. Meanwhile, intelligent tools enable more granular content review, identifying more issues and improving quality.

Currently, due to challenges in Chinese semantic analysis, complex scientific formulas, and difficulty recognizing units of measurement, only partial intelligent and automated processing has been achieved in manuscript processing and review, with some content still requiring manual checking and judgment. However, technological development will not cease, nor will the pace of technological transformation and upgrading in the publishing industry. Future advances in AI technology, natural language processing, and deep learning—guided by industry standards, international and domestic norms, and business knowledge—will enable book digital production systems to identify and automatically process various error types more quickly and accurately. This will free editorial staff to devote more time and energy to the professionalism, intellectual substance, and impact of content.

Through the development of book digital production systems, more offline work will move to computers and networks. Data collection in these systems features strong timeliness, accuracy, tamper resistance, and convenient querying and retrieval. Editors will be liberated from traditional tasks like filling out forms and writing summaries; by working within the system and using its tools, required data will be automatically collected intelligently. The system parses manuscript content and attributes to generate various reports and multi-dimensional statistical analyses, providing a basis for management decision-making and editorial work.

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Note: Figure translations are in progress. See original paper for figures.