New Media Convergence Applications in Post-Print Editing of Science and Engineering Books for University Presses

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Abstract

Objective: To explore integrated application strategies for new media technology in the editing of science and engineering books at university presses. Methods: Editors of science and engineering books from 10 key university presses were surveyed through questionnaires and field visits, with case analysis employed to examine the current status of new media technology application in editorial work. Results: The application of new media technology in editing science and engineering books demonstrates characteristics of digitization, interactivity, and diversification, yet issues such as insufficient technological adoption and a shortage of talent reserves persist. Conclusion: The editing of science and engineering books in university presses should establish a new media integration development mechanism, enhance digital infrastructure, cultivate interdisciplinary talent, and promote deep integration between traditional publishing and new media.

Full Text

Integration of New Media in Science and Engineering Book Editing at University Presses

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Abstract

[**Objective**] This study investigates strategies for integrating new media technologies into the editing of science and engineering books at university presses. [**Methods**] Through questionnaires and field visits, editors of science and engineering books at ten key university presses were surveyed, with case analysis

employed to examine the current application of new media technologies in editing workflows. [**Results**] The application of new media technologies in science and engineering book editing exhibits characteristics of digitization, interactivity, and diversification, yet still faces challenges including insufficient technological adoption and a shortage of qualified personnel. **Conclusion** University presses must establish mechanisms for new media integration, strengthen digital infrastructure, cultivate interdisciplinary talent, and promote deep integration between traditional publishing and new media.

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1. Characteristics and Challenges of Science and Engineering Book Editing at University Presses

Science and engineering book editing at university presses is characterized by distinct professional demands. Content spans mathematics, physics, chemistry, computer science, and numerous other disciplines, requiring editors to possess solid subject matter expertise and an accurate grasp of cutting-edge developments [1]. Editorial practice demands rigorous adherence to standards for professional terminology, mathematical formula typesetting, and scientific illustration processing. The work also demonstrates significant technological dependence—as scientific progress increasingly presents research findings in digital formats, editors must utilize specialized software for formula editing, graphic processing, and layout design. Moreover, the rapid updating of scientific literature requires editorial work to be highly time-sensitive, a demand that traditional editing models struggle to meet.

Currently, science and engineering book editing at university presses faces multiple challenges. Editors lack sufficient capacity to apply new media technologies, hindering their ability to leverage digital tools for improved efficiency. Editorial teams possess homogeneous knowledge structures, with a shortage of interdisciplinary talent who understand both subject matter and new media technology. Digital platform construction lags behind, with inadequate infrastructure such as collaborative office systems and online proofreading platforms. The low integration between traditional editorial workflows and new media technologies constrains efficiency. Processes for topic selection, content editing, and layout proofreading remain predominantly conventional, failing to capitalize on new media advantages. Weak copyright protection awareness and incomplete digital resource management systems affect editorial quality and publication security.

Furthermore, exploration of innovative publishing models for science and engineering books remains insufficient. In the context of digital transformation, university presses have not adequately investigated multimedia presentation, interactive design, and mobile adaptation for science and engineering books, limiting market competitiveness and reader experience. Limited capacity for digital resource integration makes it difficult to achieve organic fusion of text, images, audio, video, and other multimedia elements.

2. Application of New Media Technologies in Science and Engineering Book Editing

2.1 Construction of Digital Editing Platforms

The digital editing platform constitutes critical infrastructure for science and engineering book editing at university presses. As shown in Figure 1 [Figure 1: see original paper], constructing a unified digital editing platform requires integrating technical modules such as professional typesetting software, formula editors, and graphic processing tools to enable full-process digital management of editorial workflows [2]. Platform design should adhere to principles of professionalism, practicality, and openness, establishing standardized data interfaces and file format specifications to ensure compatibility with mainstream publishing technologies. The platform architecture comprises three core components: a content management system, an editing and processing system, and a quality control system. The content management system handles fundamental tasks such as topic resource storage, manuscript classification, and material archiving. The editing and processing system integrates professional editing tools, supporting functions for text editing, formula processing, and chart creation. The quality control system implements monitoring functions for automated proofreading, format compliance checking, and copyright management.

Intelligent technologies play a vital role in digital editing platforms. By incorporating artificial intelligence algorithms, platforms can achieve automatic terminology recognition, intelligent formula typesetting, and automated reference verification, significantly enhancing editorial efficiency. Machine learning technology can analyze historical editorial data to provide decision support and optimize workflows. Cloud computing applications ensure robust data storage and processing capabilities to meet the demands of large-scale digital resource handling [3]. Platform security is paramount, requiring comprehensive data backup mechanisms and privilege management systems, encryption technologies for critical resources, and contingency plans for system failures. Additionally, platforms should feature data statistics and analysis functions for real-time workflow monitoring, quality assessment, and management decision support. Development of digital editing platforms must emphasize technological iteration and innovation, establishing evaluation mechanisms for regular functional assessment and updates.

2.2 Integration and Application of Multimedia Resources

Multimedia resource integration is a crucial link in enhancing science and engineering book editing quality. Editorial work must comprehensively utilize text, images, audio, video, animation, and other media forms to transform abstract scientific knowledge into intuitive, vivid presentations. Establishing a multimedia resource library with classified management and standardized processing of various materials ensures resource standardization and usability. Multimedia design for science and engineering books should emphasize scientific accuracy and pedagogical effectiveness [4]. Complex physical structures can be displayed through 3D modeling, scientific experimental processes demonstrated via animation, and data variation patterns explained using interactive charts. During resource production, strict control over professional terminology, data presentation, and experimental procedures ensures multimedia content accuracy.

Standardized processing of multimedia resources forms the basis for resource sharing and reuse. Establishing unified metadata standards for multimedia resources regulates technical specifications for file naming, format conversion, and compressed storage. Developing resource retrieval systems with multidimensional query functions enables editors to quickly access required materials. Resource management platforms should support version control, recording resource usage history to enable material traceability. Multimedia resource application must consider terminal adaptation, optimizing presentation effects for different reading devices to ensure proper display on PCs, mobile devices, and other platforms. Establishing a resource quality evaluation system for regular inspection and updating of outdated resources, while eliminating substandard materials, maintains the timeliness of the resource library.

2.3 Implementation of Online Collaborative Editing Models

Online collaborative editing transforms traditional linear editing workflows. Network technologies enable real-time collaboration among editors, authors, and peer reviewers, breaking temporal and spatial constraints to improve efficiency. Collaborative platforms must be equipped with real-time communication tools, document sharing systems, and task management modules to support multi-user simultaneous editing and instant communication [5]. Version control represents a core function of online collaborative editing, with systems automatically recording modification history to support version comparison and rollback operations for tracking content changes. Addressing the specialized characteristics of science and engineering books, collaborative platforms should support co-editing of special content such as formulas and charts to ensure accuracy in professional content processing.

Task management systems ensure orderly collaborative work. By establishing standardized workflows that clarify responsibilities and timelines for each stage, automatic task allocation and progress monitoring can be achieved. Systems automatically remind users of pending tasks, record work logs, and generate

statistical reports to provide data support for project management. Privilege management is particularly important in online collaborative editing, with differentiated operation permissions set according to user roles and strict control over modification rights to critical content. Document encryption mechanisms prevent unauthorized access and downloads, protecting the security of editorial outcomes. Systems should also feature data backup and disaster recovery functions to ensure continuity of collaborative work. Quality control permeates the entire collaborative editing process, with integrated intelligent proofreading tools automatically checking common issues in text, formatting, and citations, and an expert review mechanism supporting online manuscript review and feedback.

3. Strategies for New Media Integration Development

The establishment of an integrated development mechanism requires systematic planning across organizational structure, institutional development, and resource allocation. University presses should establish a New Media Integration Leadership Group to coordinate the integration of traditional publishing and new media technologies. Formulating new media integration development plans with clear stage objectives and implementation pathways creates actionable work programs [6]. Establishing scientific evaluation systems incorporates new media technology application levels into editorial performance metrics. Reasonable incentive mechanisms encourage editors to actively explore new media technology applications, rewarding innovative achievements. Improving intellectual property protection systems regulates copyright management of digital publications and establishes mechanisms for digital resource usage and revenue distribution.

In terms of resource allocation, increased investment in new media technology infrastructure is essential. Professional hardware and software systems must be deployed to build digital work platforms. Special funds should support new media technology research, development, and application, driving breakthroughs in key technologies. Establishing industry-academia-research cooperation mechanisms enables deep collaboration with universities, research institutions, and technology enterprises to integrate innovative resources. Standardized work procedures should unify new media technology application workflows. Establishing digital resource management standards regulates multimedia content production rules to ensure publication quality. Risk prevention and control mechanisms should be built to strengthen data security management and guard against technology application risks. Regular evaluation of new media integration development enables timely adjustment and optimization of strategies.

3.2 Optimization of Editorial Workflows

Editorial workflow optimization must be based on new media technology characteristics to reconstruct traditional work patterns. Establishing new workflows supported by digital platforms enables online operation of topic selection,

content editing, and layout proofreading. Introducing workflow engines standardizes, streamlines, and systematizes editorial work to improve efficiency [7]. The topic selection stage incorporates big data analytics for market data mining, reader demand analysis, and discipline development trend assessment to enhance scientific decision-making. A topic database management system enables classified storage and intelligent retrieval of topic information. Developing topic evaluation models enables comprehensive assessment across dimensions of technical feasibility and market value.

The content editing stage applies intelligent tools to improve professional content processing efficiency. Natural language processing technology assists text editing, while specialized software handles mathematical formulas and scientific illustrations. Establishing terminology databases and reference databases enables standardized citation and automated proofreading. Plagiarism detection systems guard against academic misconduct. The layout and proofreading stage achieves intelligence and automation through smart typesetting systems that automatically complete layout design according to preset templates. Proofreading assistance tools automatically check common issues in text, punctuation, and formatting. Multi-round proofreading mechanisms ensure publication quality. Layouts should be designed for multi-terminal adaptation to meet digital publishing demands. Workflow optimization requires establishing long-term evaluation mechanisms to identify bottlenecks through data analysis of operational efficiency. Channels for workflow optimization suggestions should encourage editor participation in improvement. Agile management concepts enhance workflow responsiveness, with regular effectiveness evaluations creating a virtuous cycle of continuous improvement.

3.3 Strengthening Professional Talent Development

Professional talent development systems should focus on new media integration development needs. As shown in Figure 2 [Figure 2: see original paper], talent development plans should be formulated with clear competency requirements and training objectives for various roles. Establishing hierarchical, multichannel training mechanisms enhances editors' comprehensive qualities [8]. Specialized training teams should develop curriculum systems to ensure training effectiveness. Training in new media technology application capabilities improves editors' technical proficiency, covering practical skills such as digital editing platform operation, multimedia resource production, and online collaborative tool usage. Case-based teaching methods combined with practical training on real projects enhance learning. Technical training records document training processes and assessment results.

Advancing interdisciplinary talent development promotes integration of professional knowledge and technical capabilities. Key editors should be selected for advanced training to learn cutting-edge publishing concepts and technical methods. A mentorship system leverages the guidance role of outstanding editors. Project-based training enhances comprehensive abilities through practice. Tal-

ent evaluation and utilization mechanisms create favorable environments for growth, with career development pathways providing promotion opportunities and development prospects. Improved job rotation mechanisms promote multi-position experience for editors. Talent reserve pools should be established to cultivate successors and ensure sustainable talent development.

3.4 Enhancing Technology Application Levels

Enhancing technology application requires systematic planning and continuous investment. Establishing technological innovation mechanisms tracks new media technology developments and introduces advanced technologies and equipment in a timely manner [9]. Research and development teams should tackle key technologies to improve independent innovation capabilities. Improving technology application support systems provides necessary hardware and software environments. Editorial workstations should be upgraded with professional technical equipment. Advanced editing software and tools should be introduced to meet specialized needs. Cloud computing platforms provide powerful data processing and storage capabilities.

Technology application effectiveness evaluation establishes monitoring and assessment systems. Regular collection of technology application data analyzes effectiveness and existing problems. Technology usage feedback mechanisms address technical failures and application difficulties promptly. Technology update plans ensure advanced application. Strengthening technology security management guards against application risks. Data security protection mechanisms regulate technology usage procedures [10]. Technology security training enhances safety awareness. Emergency plans and fault response mechanisms should be established. Regular system maintenance ensures stable operation of technical equipment. Building resource sharing and collaborative innovation mechanisms strengthens technical cooperation with upstream and downstream industry units. Active participation in industry standard formulation promotes standardized technology application development. A technology innovation fund supports key technology R&D and application demonstrations. Third-party technology evaluation mechanisms provide objective assessment of application effectiveness for decision optimization.

4. Future Outlook

4.1 Application of Intelligent Editing Technologies

Artificial intelligence technology demonstrates broad prospects in science and engineering book editing. Deep learning algorithms enable professional terminology recognition, intelligent formula typesetting, and automatic reference verification, significantly improving editing efficiency [11]. Intelligent proofreading systems using natural language processing automatically detect text errors, formatting issues, and logical inconsistencies, reducing manual proofreading workload. Knowledge graph technology provides intelligent support by constructing

disciplinary knowledge systems for content correlation analysis and knowledge mining. Intelligent recommendation systems suggest relevant references and research literature based on knowledge graphs. Semantic analysis technology assists professional content comprehension to improve editing quality.

Machine translation technology facilitates international publishing. Neural network translation systems accurately translate professional terminology and scientific literature, improving efficiency and quality. Terminology management systems ensure consistency and standardization in professional translation [12]. Multilingual knowledge bases support cross-language resource sharing and utilization. Intelligent editing platforms will develop toward integration, incorporating optical character recognition, speech recognition, and image processing for multimodal content processing. Predictive analytics assists topic selection decisions by evaluating market demand and development trends. Blockchain technology plays important roles in copyright protection and digital asset management.

4.2 Exploration of Cross-Media Publishing Models

Cross-media publishing breaks through limitations of traditional publishing forms to achieve diversified content presentation. As shown in Figure 3 [Figure 3: see original paper], augmented reality technology transforms science and engineering knowledge into three-dimensional visualizations to enhance learning effectiveness. Virtual reality technology simulates experimental scenarios and engineering environments to strengthen practical content and experiential sense. Mixed reality technology creates immersive learning spaces that deepen knowledge comprehension. Mobile publishing platforms adapt to fragmented reading needs by developing multi-terminal reading interfaces and optimizing layout presentation. Multi-level knowledge structures support personalized learning paths. Micro-courses and knowledge point explanations facilitate rapid acquisition of professional knowledge. Integrated social sharing functions promote learning exchange and knowledge dissemination [13].

Data visualization technology enhances the expressiveness of science and engineering content. Charts, animations, and other forms intuitively display data relationships and variation patterns. Interactive data displays allow readers to explore and analyze data independently. Data modeling tools support reader experimentation and verification. Converged media publishing platforms integrate multiple media forms through unified content management systems that enable fusion application of text, images, audio, and video. Cross-platform publishing tools ensure smooth content distribution across media channels. Digital resource libraries support content reorganization and reuse.

4.3 Optimization of User Interaction Experience

User interaction design balances professionalism with usability. Interface layout and operational processes should be optimized based on user cognitive charac-

teristics. Professional content presentation methods should highlight key and difficult points [14]. Guided learning functions help users understand complex concepts, with continuous improvement based on user feedback. Personalized services meet diverse user needs through user profiling systems that analyze learning behaviors and knowledge requirements. Adaptive learning paths recommend relevant content based on progress. Knowledge assessment tools help users evaluate learning outcomes. Personalized note-taking and annotation functions facilitate knowledge organization.

Social features promote learning exchange and sharing. Professional community platforms facilitate disciplinary discussions. Expert Q&A mechanisms provide professional guidance. User-generated content encourages knowledge co-creation and dissemination. Learning incentive mechanisms enhance user engagement. Data analytics technology supports user experience optimization by collecting behavioral data to analyze usage patterns and feedback. User experience evaluation systems conduct regular satisfaction surveys [15]. Heatmaps and other tools optimize interface design and functional layout. Continuous tracking of user needs enables timely strategy updates. Interaction optimization should address accessibility design, providing personalized interaction schemes for different user groups. Professional content presentation should be optimized to reduce learning difficulty. Multi-level help systems provide timely user support. Continuous interaction design optimization through user behavior analysis enhances user satisfaction.

Conclusion

The deep integration of new media technologies represents an inevitable trend in the development of science and engineering book editing at university presses. By constructing digital editing platforms, optimizing workflows, and strengthening talent development, the organic integration of traditional editorial work with new media technologies can enhance both editorial efficiency and market competitiveness of science and engineering books. In the future, university presses should continuously monitor new media technology developments, actively explore innovative application models, promote practical applications of intelligent editing and cross-media publishing, and achieve digital transformation and high-quality development of science and engineering book editing. While maintaining academic rigor and professionalism, university presses should continuously improve new media integration capabilities to build a more contemporary science and engineering book publishing system.

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