Application of New Technologies in Post-Print Scientific Journals in the New Media Era

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

Abstract

With the advancement of network technologies, new media-related technologies have emerged and gained widespread application, precipitating profound transformations in work models, dissemination channels, and content service paradigms within the domain of scientific journal publishing. New media, big data, and artificial intelligence have permeated every operational facet of scientific journals, catalyzing a quiet transition from traditional manual work models to human-machine collaborative AI-driven editorial paradigms, thereby fundamentally altering the publishing industry' s workflow and promoting the rapid upgrading and transformation of the publishing profession. New media technologies primarily encompass databases, editorial management systems, computer typesetting software, all-media reading software, computer proofreading software, among others. Investigating the application of these new technologies to scientific journal work holds certain research significance and practical value.

Full Text

Preamble

Title: Application of New Technologies in Sci-tech Journals in the New Media Era

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Abstract: With the development of network technology, new media-related technologies have emerged and been widely applied across various industries. The publishing field of sci-tech journals has undergone tremendous changes in work modes, communication channels, and content service models. New media, big data, and artificial intelligence have penetrated every aspect of sci-tech journal work. The traditional human-centered work model has quietly shifted

to an AI-enabled editing model based on human-machine collaboration, fundamentally transforming publishing workflows and promoting rapid upgrading and transformation of the publishing profession. New media technologies mainly include databases, manuscript processing systems, computer typesetting software, all-media reading software, and computer proofreading software. How to apply these new technologies to sci-tech journal work has significant research value and practical importance.

Keywords: New media technology; Sci-tech journals; Media convergence; Work mode; Workflow
Classification Code: G230 **Document Code:** A
Citation Format: Tan XJ. Application of new technologies in sci-tech journals in the new media era [J]. *China Media Technology*, 2022(02): 94-96.

Introduction

With the rapid development of network technology, new media-related technologies have emerged and been increasingly applied across industries and fields. The publishing domain of sci-tech journals has experienced tremendous changes in work modes, communication channels, and content service models. Applying these new media technologies to sci-tech journal work, leveraging their advantages and functions, can effectively address work challenges, improve efficiency, and ensure journal quality.

From the current development trend of sci-tech journals, new media, big data, and artificial intelligence have permeated every workflow 环节, including initial review, peer review, topic selection, editing, typesetting, and proofreading. The traditional human-centered work model has quietly shifted to an AI-enabled editing model based on human-machine collaboration, fundamentally transforming publishing workflows and promoting rapid upgrading and transformation of the publishing profession. These new media technologies mainly include databases, manuscript processing systems, computer typesetting software, all-media reading software, and computer proofreading software. Currently, many sci-tech journal editors have conducted extensive research on these aspects [1-13]. Systematic thinking and analysis of the effective application of new technologies in sci-tech journal work are particularly necessary, as applying new technologies to sci-tech journals has significant research value and practical importance. Through reasonable and effective methods to leverage new media functions, we can ensure better management and operation of sci-tech journals with the assistance of new media technologies.

1. Application of Big Data

Big data, also known as massive data or large-scale data, refers to information data that cannot be processed or analyzed using traditional processes or tools,

along with the tools, platforms, and analysis systems used to collect them. Big data has the function of "discovering patterns and trends from massive data" [1].

1.1 In Topic Selection

Topic selection involves screening and planning reports on forward-looking, theoretical, and technical challenges in disciplinary fields. It represents the operational direction of a journal and is a key factor and primary task in determining journal influence. How to select disciplinary fields is very important and challenging. Currently, we can extract data on highly-cited and zero-cited papers from databases to summarize hot fields, or determine topic selection directions through bibliometric analysis [2]. The function of "discovering patterns and trends from massive data" helps editors with topic planning [1].

In 2017, the author retrieved source data for papers published in *Marine Sciences* from 1994-2013 in CNKI, compiled zero-citation papers, and conducted statistical analysis. The findings revealed that the citation rate of papers in *Marine Sciences* is directly related to topic selection. This demonstrates that through big data, we can discover patterns and disciplinary development trends, thereby identifying valuable topics and journal development directions. Journals should use this to judge disciplinary influence, formulate topic selection directions and journal policies, and ensure academic value.

1.2 In Peer Review

Peer review is a crucial part of editorial work. Regardless of manuscript sources, editorial departments must arrange for peer reviewers to examine manuscripts and provide review comments. Selecting appropriate peer reviewers is key to ensuring manuscript academic quality. A suitable reviewer possesses strong abilities to access relevant literature in their discipline and sensitivity to disciplinary information, understands disciplinary information thoroughly, can accurately grasp the frontiers of research areas involved in manuscripts, and can determine whether works are plagiarized or original. Therefore, selecting the right peer reviewer ensures the first quality checkpoint for manuscripts.

The rapid development of science and technology has led to increasingly fine disciplinary divisions, increasing the difficulty for editors to select peer reviewers. The author' s journal, *Marine Sciences*, is a comprehensive academic journal covering dozens of marine disciplines. Due to position constraints, *Marine Sciences* cannot assign an editor for each discipline. In the past, manuscript decisions relied on editors' accumulated knowledge and experience over many years. However, knowledge is infinite while editors' knowledge systems are incomplete. Editors fundamentally cannot grasp the hot spots and difficulties in each disciplinary field and must rely on frontline experts such as doctoral and master supervisors working in these fields. Finding frontline peer reviewers is the key to ensuring journal academic quality. How to select a suitable peer reviewer

from dozens of disciplines across global and national research institutions relies solely on human knowledge systems and cannot be accomplished. Nowadays, we can use big data retrieval from major databases such as CNKI and journal manuscript processing systems to identify researchers at home and abroad and select peer reviewers, finding experts currently working in the manuscript' s academic field to grasp research frontiers and hot spots, enabling targeted and precise review assignments, thereby ensuring journal academic quality [1].

2. Applications in Editorial Workflow

2.1 In Initial Review

The initial review conducts a preliminary examination of manuscripts, screening for originality or plagiarism, publication value, and whether they should be sent for in-depth expert review. Proper initial review avoids wasting human and financial resources. In traditional initial review processes, sci-tech journal editors relied on their knowledge and experience to preliminarily identify plagiarism and academic value. In the big data era, AI software has replaced manual identification, weakening human roles to some extent and shifting from "experience-based judgment" to "data analysis" [3], ensuring academic ethics and automatically checking new manuscripts for duplication and preliminary assessment of innovation and value before deciding whether to send them for external review.

Editorial departments can use databases and manuscript processing systems for automatic duplication checks, obtaining data on manuscript content repetition rates and duplicate locations, thereby quickly and conveniently completing initial review work. Therefore, the AI functions of databases and manuscript processing systems can prevent plagiarism in research papers, encourage researchers to improve academic ethics, and ensure journal academic quality [1].

2.2 In Typesetting

Since the advent of humanity, requirements for text carriers have emerged, and demands for information dissemination and text recording gave birth to printing technology. Typesetting technology has continuously advanced with printing technology development. Ancient Chinese movable type printing made indelible contributions to human historical progress and social development. Cai Lun' s papermaking laid the material foundation for printing development, woodblock printing simplified book replication processes, Bi Sheng' s movable type printing improved printing efficiency, and Wang Zhen' s rotating typesetting printing method in the Yuan Dynasty represented a major innovation in China' s typesetting and printing history. In the late Ming Dynasty, modern Western printing technology was introduced to China, machines began to be applied in China' s printing industry, lead movable type replaced wood and clay movable type, and the printing industry developed toward mechanization.

Before the 1980s, China used relatively primitive lead typesetting technology. After the 1980s, China adopted laser phototypesetting technology, abandoning lead typesetting and entering the era of "light and electricity." Subsequently, China launched various computer typesetting software. With the arrival of the network information era, digital technology became widespread [4].

Since the 1990s, computer typesetting has replaced lead typesetting in China. Main domestic computer typesetting software includes Founder (北大方正) and LaTeX. These software require adding many commands during typesetting, which is not easily accepted by editorial staff and can only be completed by typesetting companies. Therefore, the traditional publishing model separated editorial work from typesetting work, with editorial work completed by editorial departments and typesetting work completed by typesetting companies.

With the rapid development of new technologies, Word software has entered millions of households. Currently, in the publishing industry, almost all authors submit manuscripts in Word format, which is closer to the final printing process. Word software' s typesetting functions have become increasingly powerful, and its ability to achieve typesetting effects has narrowed the gap with professional typesetting software, with increasingly higher typesetting efficiency and greater advantages for integration with later digital publishing [6]. Word software is simple to operate, and through extensive use, editorial staff have discovered it can complete sci-tech journal typesetting work, with editors being more likely to be competent for this work. Therefore, editors using Word software for typesetting is certainly more feasible than using professional typesetting software. The key is to connect with digital editing, which professional typesetting obviously cannot do. Therefore, editors using Word for typesetting can form a new editorial workflow and work model—integration of editing, typesetting, and proofreading—where editors complete editing work and layout formatting simultaneously while processing author manuscripts, with authors completing proofreading during the process, thereby achieving the unification of editing, typesetting, and proofreading work (Figure 1 [Figure 1: see original paper]) [7], changing the traditional editorial work model.

2.3 In Proofreading

Proofreading is a very important part of the publishing process. In a sense, proofreading quality directly determines publication quality. Sci-tech journal proofreading work is very tedious, especially the references section. The emergence of computer proofreading software has provided great convenience for rapid proofreading.

Since the 1990s, research on Chinese text proofreading in China has developed rapidly. Currently, good results have been achieved, with some results already commercialized. Among them, Heima Proofreading System, Yuanjing Editing System, and Gongzhi Proofreading Tool are relatively successful proofreading software, each with distinctive features. The Heima Proofreading System from

Beijing Heima Feiteng Technology Co., Ltd. is the most market-dominant and practical professional proofreading software in China, used by over 95% of publishers, tens of thousands of newspapers, and printing enterprises [5].

CNKI' s Tengyun Journal Collaborative Processing System can automatically compare reference information, verify reference accuracy and format completeness, and discover citation number errors, greatly improving proofreading efficiency.

Currently, Sancai Technology' s Reference Assistant Editing System (NoteFirst Reference Editing System) can automatically detect and correct format and data errors in references. This system operates with one-click convenience in Word. Additionally, the widely used Heima Proofreading Software and the newly promoted Shanfeng Automatic Reference Proofreading Software can both assist editors in detecting errors and ensuring journal quality [1].

Given the characteristics of various proofreading software, proofreading software is not omnipotent. Therefore, in practice, journal proofreading work cannot completely rely on computer proofreading software. Editorial staff should adopt human-machine collaboration based on actual conditions to modify manuscripts scientifically and accurately.

3. Word Software Changing Traditional Work Patterns

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4. XML Software Improving the Integrated Editing-Typesetting-Proofreading Workflow

Currently, most domestic publishing departments continue using traditional production processes, while technologically advanced editorial departments use Word software for integrated editing-typesetting-proofreading production workflows. However, PDF files produced by these two production processes are not supported by some new media and cannot meet readers' all-media reading needs, requiring new technologies to improve and connect publishing workflows. Extensible Markup Language (XML) technology can improve the integrated editing-typesetting-proofreading model and reinvent publishing workflows [7].

Major foreign publishing houses have already adopted XML-structured production workflows, and some domestic sci-tech journals have implemented XML typesetting cooperation with data processors. Su Lei [8] introduced the application of XML-structured typesetting at home and abroad, noting that some medical journals requiring instructional videos are particularly suitable for this publishing model, as only through this workflow can the final production effects be achieved [9].

XML-structured typesetting achieves workflow reinvention, improves work procedures, and extends digital product services. It enables one-time production, multi-channel release, and repeated usability (Figure 2 [Figure 2: see original paper]), with standardized norms for format conversion and data exchange and integration with major databases, forming new media [10] and achieving new media convergence.

5. Integration of New Media and Sci-tech Journals

The rapid development of science and technology has created emerging media. New media mainly refers to networks and mobile phones, while traditional media mainly refers to newspapers, radio, and television. New media breaks the single information presentation form of traditional media, integrates the three traditional media, and achieves audience convergence among readers, listeners, and viewers. Media convergence is the integration of traditional and new media. "Media convergence" refers to the multifunctional integration of various media [11]. The rapid development of Internet and digital technology has made the convergence of traditional and new media unstoppable.

Most sci-tech journals have established their own WeChat public platforms. However, because traditional academic journal editors lack sufficient technical skills in using network technology to process information, most journals have blindly followed the trend of opening WeChat public accounts without fully

mastering the technology. Without attention-grabbing content, they simply migrate print content to websites, Weibo, WeChat, and Apps, considering this as convergent communication [12], resulting in most journals having few followers and low readership, with WeChat public accounts becoming "zombie accounts" with low influence. The key is the genuine integration between WeChat public accounts and print journals. *Acta Aeronautica* and *China Journal of Chinese Materia Medica* have used WeChat to develop derivative products, truly achieving deep integration between the two, which is worth learning from [13].

The rapid development of emerging media has greatly impacted traditional media, which have reached a survival crossroads. Transformation and self-revolution are inevitable choices for academic journals. Staff using new technologies to innovate media communication forms and complete work quickly and efficiently will no longer be constrained by time and space factors. We must correctly handle the relationship between traditional and new media, grasp their respective roles, and how to organically combine them is an important issue we face.

We editorial staff must quickly adapt to the development needs of the new media era, keep pace with new technology trends, strive to master various new media technologies, strengthen new media integration capabilities, update thinking patterns in all publishing segments, and actively embrace the new media era to comprehensively improve the social influence and competitiveness of academic journals.

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Author Biography

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