Research on AI-Assisted Manuscript Screening Mechanisms in Editorial Publishing: Postprint

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Abstract

【Objective】To investigate the manuscript screening mechanism in AI-assisted editorial publishing for enhanced screening efficiency and quality. 【Methods】 This study overviews the current application status, analyzes core elements such as keyword matching and content quality assessment, elaborates on each screening process in detail, examines advantages and challenges, and proposes improvement recommendations. 【Results】 Key points of each stage of the screening mechanism and existing issues have been clarified. 【Conclusion】Optimizing data acquisition and integration, enhancing result interpretability, and incorporating manual review can effectively refine the AI manuscript screening mechanism.

Full Text

Preamble

Exploring AI-Assisted Manuscript Screening Mechanisms in Editing and Publishing

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Abstract

[**Objective**] This study explores AI-assisted manuscript screening mechanisms in editing and publishing to enhance screening efficiency and quality. [**Method**] We outline current application status, analyze core elements such as keyword matching and content quality assessment, detail each screening process, examine advantages and challenges, and propose improvement recommendations. [**Results**] The study clarifies key aspects of each screening mechanism link and existing problems. [**Conclusion**] Optimizing data acquisition and integration, enhancing result interpretability, and combining manual review can effectively improve AI manuscript screening mechanisms.

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In the digital era, AI technology has been widely applied in academic publishing, playing a significant role. The editing and publishing work of mathematics education journals is no exception. For mathematics journal editors, the substantial increase in submissions has made traditional manual screening methods inefficient. AI technology, with its powerful capabilities in data processing and intelligent analysis, provides effective technical support for manuscript screening and fundamentally transforms the model of editing and publishing work. An in-depth discussion of using AI to assist editors in screening manuscripts can significantly improve the quality of mathematics education journal publishing and holds considerable influence in the industry.

However, this does not mean AI is omnipotent. When reviewing manuscripts with complex semantics or innovative content, AI cannot function correctly and struggles to replace the humanized judgments that editors make based on their knowledge and experience reserves [2]. In terms of completeness, AI can accurately assess article layout and paragraph structure to ensure architectural rationality. It is evident that applying AI technology to screen manuscripts can significantly improve the efficiency of the publishing workflow, allowing editors to devote more energy to polishing excellent manuscripts.

1. Overview of AI Screening Application Status

Currently, AI screening technology has been widely applied in the editing and publishing industry. From publishing groups to emerging literary platforms and various academic journals, AI screening tools have been comprehensively integrated into different stages of the editorial workflow. Publishing institutions fully recognize that AI technology can extract valuable manuscripts from large volumes of submissions and significantly improve the quality of publishing work. AI demonstrates distinct advantages in manuscript screening. Previously, manual screening required editors to review large numbers of manuscripts word by word, which not only consumed considerable time but also failed to achieve ideal efficiency [1].

By leveraging its computational and algorithmic capabilities, AI can preliminarily screen large volumes of manuscript information in a short time. AI's high-speed computational advantages greatly reduce the time required to screen massive numbers of manuscripts, significantly shortening the initial review pe-

riod and accelerating the publishing workflow. In terms of screening criteria, AI can evaluate manuscripts across different dimensions. Regarding content, AI can accurately grasp core concepts and other information, using publisher-preset topics and audience preferences as screening standards to precisely determine consistency between manuscript content and publishing requirements. In terms of language expression, AI can scan manuscripts for grammar and fluency, promptly identifying language errors to provide a solid linguistic foundation for subsequent editorial work. Regarding structure, AI can accurately assess article layout and paragraph settings to ensure architectural rationality.

2. Core Elements of the Manuscript Screening Mechanism

2.1 Keyword Matching Mechanism

Screening mathematics education manuscripts requires keyword matching as a crucial component. Against the current information technology backdrop, mathematics education journals receive large volumes of submissions with diverse themes. Applying a keyword matching mechanism can assist editors in quickly and accurately identifying manuscripts that align with journal themes and requirements. Editorial teams can construct keyword databases based on their long-term focus areas, primarily including mathematical terminology and hot topics in the education industry. Examples include concepts like "function" and "equation" in middle school mathematics, "derivative" in high school mathematics, and hot-topic vocabulary such as "mathematical core competency cultivation." The information-based manuscript processing system can conduct preliminary screening of submitted manuscripts by comparing titles, abstracts, and high-frequency words against the database. If a manuscript focuses on research about implementing function teaching practice in middle school using information technology methods, frequently appearing keywords such as information technology methods and teaching effectiveness improvement would indicate close relevance to the journal's preset themes. This mechanism can significantly improve manuscript screening efficiency, fundamentally preventing editors from investing unnecessary time and energy. As mathematics education continues to evolve, keyword databases must also be updated promptly to incorporate cutting-edge educational concepts, methods, and topics, thereby adapting to new developments in educational research [3].

2.2 Content Quality Assessment Methods

Assessing manuscript content quality also ensures corresponding value in academic and writing aspects. First, evaluate the scientific rigor of the research. Mathematics education research must be based on appropriate theories. Combining specific cases with problem-solving methods and other approaches, the research must ultimately align with mathematical knowledge systems and curriculum standards. When introducing new problem-solving techniques, the rigor of these techniques must be ensured to help students solve problems smoothly [4].

Second, measure the depth and breadth of content. Evaluate the depth of exploration into mathematical problems and whether the manuscript can provide new methods and strategies for teaching activities to help students efficiently master knowledge. For example, when researching a particular subject concept, the manuscript should break through traditional teaching methods to form innovative strategies that guide students to grasp conceptual connotations from different perspectives and enhance the depth of their thinking. The assessment should also focus on whether the manuscript can cover multiple teaching segments from different aspects and accommodate students at different levels, demonstrating stronger content breadth advantages [5].

Finally, writing quality issues require focused attention, primarily ensuring language fluency and format standardization. Clear language can accurately express the author's viewpoints, and reasonable structural design can improve article hierarchy. Typically, the structure of mathematics teaching articles can follow the pattern of problem presentation, method elaboration, practice process, effect analysis, and conclusion to facilitate reader understanding. Standardized format must meet requirements for font size, line spacing, and other aspects. Evaluating these aspects can accurately determine manuscript consistency with journal publication standards. During assessment, editors must also pay attention to whether the manuscript reviews previous research findings and the author's familiarity with the field, thereby achieving innovation based on existing research [6].

2.3 Innovation Evaluation Criteria

Measuring a manuscript's publication value requires innovation as an important evaluation criterion. First, the manuscript must demonstrate innovation in content, methods, and other aspects. For example, it may propose cutting-edge teaching ideas or design innovative activity content. In middle school geometry teaching, activities could be designed using VR technology to allow students to intuitively understand graphic transformations. This teaching innovation can provide students with new experiences, effectively stimulate learning interest, and achieve content innovation. Second, authors must develop innovative research perspectives. Previous research perspectives cannot fully meet teaching needs, so new angles must be used to examine mathematical problems to achieve breakthroughs. For example, analyzing students' psychological barriers from a psychological perspective and proposing feasible strategies can break the original limitation of single-subject knowledge research and achieve perspective innovation [7]. Finally, teaching outcomes must be comprehensively organized to propose innovative viewpoints that promote educational development. When editors judge manuscript innovation, they can refer to relevant literature, understand research trends, and apply professional literature database tools to ensure the manuscript's innovation points hold corresponding value, thereby providing new educational concepts for the journal. Additionally, editors can consider the operability of innovation points—if innovative achievements can be applied in

teaching activities, they possess publication value.

3. Analysis of the Screening Process

3.1 Detailed Explanation of Initial Review Process

The first stage of mathematics manuscript screening is the initial review. Editors can use AI tools for preliminary format checking. Upon receiving manuscripts, they must first check their format. AI can quickly compare manuscripts against submission requirements. Regarding format, AI can check font, line spacing, abstract, keywords, reference format, and many other aspects to ensure all heading levels meet journal standards. It must also check information completeness, including author names and contact information. This not only facilitates communication with authors but also helps understand their backgrounds. If manuscripts contain obvious format errors, editors can use AI markings to promptly communicate modifications via email. If errors are excessive and not corrected in time, manuscripts can be directly rejected. After format review, content must be examined. Editors can use AI-assisted technology to review manuscript themes and relevance to the journal, preliminarily assessing the connection between manuscript content and mathematics education, teaching, and teacher professional development. For example, for a mathematics teaching manuscript where the author does not clearly specify whether the research problem targets middle or high school mathematics nor details the teaching content, AI assistance can quickly produce initial review results. Fluency and typographical errors also directly affect manuscript quality [8]. If manuscripts clearly do not align with journal positioning, AI can help editors quickly identify them for direct rejection. After confirming manuscript quality meets requirements, editors can form initial review opinions, clearly pointing out strengths (such as novel cases) and weaknesses (primarily including methodological deficiencies and language precision issues), thereby proceeding to the re-review process. Typically, initial review can be completed within two weeks, rapidly screening valuable manuscripts and reserving time for subsequent review stages. During initial review, editors must also assess whether plagiarism or other academic misconduct exists. AI can quickly assist editors in preliminary screening by comparing against massive databases.

3.2 Exploration of Re-review Process

Editorial departments can hire industry experts or senior editors to conduct re-reviews of manuscripts. After initial review opinions are formed, experts conduct more detailed reading of manuscripts, using AI tools to assist in analyzing content quality. AI tools can comprehensively review everything from the scientific nature of teaching methods to logical argumentation. For example, for a manuscript related to teaching methods for "congruent triangles" in middle school, AI tools examine consistency between teaching methods and students' cognitive patterns, the effectiveness of teaching methods, and other aspects of article content, while also providing suggestions on article structure. If paragraph

design is unreasonable, AI technology can provide authors with suggestions for reorganizing content to improve framework structure rationality. If academic terminology is used inappropriately, corrections must be made to ensure precise expression. Experts can use their experience and AI tools to make scientific judgments about manuscript innovation, measuring the innovative value of manuscripts in the field of mathematics education. Additionally, experts can use AI tools to analyze manuscript issues, such as consistency between teaching methods and educational policy requirements. With AI assistance, experts can complete review work and must form re-review reports that not only clearly state opinions on manuscripts (such as recommending acceptance or rejection) but also provide explicit explanations for revision directions. Editors can then measure manuscript conditions based on expert opinions to determine handling decisions. If different experts have conflicting review opinions, editors can further organize expert discussions or invite other experts for arbitration [9]. With AI assistance, the re-review stage can comprehensively ensure manuscript quality, ultimately enabling published manuscripts to hold high value in the research field.

3.3 Analysis of Final Review Process

The final review stage is completed by the journal's chief editor or editorial board. At this stage, opinions from the previous two stages must be comprehensively considered, and manuscript content must be thoroughly weighed. The chief editor or editorial board can use AI tools to re-evaluate manuscript educational value and alignment with journal positioning. In addition to manuscript quality, current journal topics and planning factors must also be comprehensively considered. AI can assist editors in making judgments through data analysis. During the final review stage, if AI identifies controversial issues, AI's intelligent communication assistance system can play a role, enabling in-depth communication with authors or experts. For finally accepted manuscripts, authors are contacted and required to revise format and content according to expert opinions. During communication with authors, AI tools can be used to annotate revision requirements, ensuring authors can clearly understand modification directions. Revised manuscripts can also be re-reviewed with AI assistance to ensure modifications meet requirements. The final review serves as an important stage in manuscript screening, ensuring all published manuscripts reflect journal standards and align with the development direction of mathematics education, guaranteeing scientific decision-making [10]. Additionally, for manuscripts not passing final review, editors can use AI assistance to generate detailed rejection reports, clearly explaining specific reasons for non-acceptance to authors, such as research method limitations or insufficient innovation in manuscript writing, helping authors avoid these issues in subsequent academic research and continuously improve research capabilities. For journal manuscript management, AI can also be used to classify and archive manuscripts that pass final review, organizing them into databases based on manuscript themes and research directions to ensure systematic analysis of subsequent published con-

tent. With AI assistance, further analysis of past final review data can provide references for future journal topic planning, such as predicting popular research trends, ensuring published articles consistently stand at the forefront of mathematics education and continuously provide high-quality academic achievements for related research.

4. Advantages and Challenges

4.1 Advantages

Current manuscript submission volumes in mathematics education publishing continue to rise, and applying AI screening systems can effectively address screening efficiency issues. AI systems fully leverage their computational capabilities to complete screening of tens of thousands of manuscripts in a short time. For example, mathematics journals with national distribution may receive hundreds of manuscripts monthly. With AI participation in screening, work that originally required weeks can be completed in days, significantly shortening screening time and reserving more time for subsequent editing and typesetting [11]. AI screening demonstrates obvious objectivity. Manual screening results are naturally influenced by human factors—editors' personal knowledge, experience, and preferences all affect screening results, and different editors may propose different opinions on the same manuscript, leading to misjudgment. AI screening systems, based on preset algorithms, can make scientific judgments on manuscript information, such as keyword matching degree and literature application standardization, without forming human bias due to factors like author reputation. All manuscripts can be screened under unified standards, thereby ensuring fair screening results. For example, when screening teaching manuscripts targeting rural areas, AI systems will not form bias against high-quality rural mathematics education manuscripts due to cognitive differences. Additionally, AI screening systems possess significant expansion potential. As artificial intelligence technology continues to advance, new algorithms constantly emerge. Developers can optimize and innovate AI systems according to journal screening needs. If journals need to focus on screening manuscript innovation, they can introduce new semantic analysis algorithms to ensure precise identification of innovative teaching concepts and methods proposed in manuscripts. If screening interdisciplinary manuscripts, AI can form knowledge graphs to comprehensively consider the integration degree between mathematics and other disciplines [12].

4.2 Challenges

Although AI screening demonstrates obvious application advantages, it also encounters certain problems. Among these, training data bias is relatively prominent. AI systems primarily rely on training data for decision-making. If data collection contains deviations—for example, if data sources mainly come from developed regions and key schools—then using such data-trained systems for manuscript screening will create bias. For manuscripts from remote areas or

ordinary schools, AI systems may fail to make more objective screening conclusions due to unfamiliarity with data characteristics, thereby reducing screening objectivity. The AI screening process is also difficult to explain to users. When editors or authors receive screening results, they cannot understand the basis for the system's non-compliant judgments, nor can the system intuitively present whether problems lie in keywords or teaching methods. This decision-making opacity also causes user skepticism, reducing acceptance of AI screening systems. In the mathematics education publishing industry, screening results are directly related to authors' recognition of teaching research achievements, so trust deficits also affect the widespread application of AI systems [13].

Furthermore, AI systems also demonstrate application defects when solving complex problems. Mathematics education research extensively involves multiple factors such as student differences, teaching environments, and policy changes. For example, some manuscripts designing tiered teaching require not only assessment of teaching method feasibility but also comprehensive consideration of the method's application value in different regions, schools, and student populations. Systems cannot make comprehensive judgments from different angles like experienced experts, so for relatively complex manuscripts, manual review methods must also be applied to ensure screening accuracy. However, this increases certain screening costs, which to some extent limits the application scope of AI screening systems [14].

5. Improvement Recommendations

5.1 Optimizing Data Acquisition and Integration

Fully leveraging AI's auxiliary functions in all manuscript screening stages can accurately and efficiently obtain and integrate information, significantly improving screening precision, and data acquisition channels can be further expanded. Widely utilizing resources from different academic platforms and small publishing organizations can not only comprehensively include data from highly influential journals but also consider grey literature, local publications, and other data information, thereby improving data richness and ensuring AI systems can make objective judgments based on comprehensive information when screening manuscripts. After data acquisition, integration processing is also required. Due to different data sources, obvious differences exist in format and quality. Standard data interfaces must be established—for example, original data information such as subject classification and author background must be formatted to standard formats to facilitate data fusion. Additionally, data association techniques can be applied to establish connections between manuscript data and market feedback or academic citation data (such as CNKI), enabling AI to objectively evaluate manuscripts' publication value from different perspectives. If manuscripts are highly innovative and consistent with market popularity, comprehensive judgments can be made regarding their academic and application value [15].

5.2 Enhancing Result Interpretability

Making AI screening results sufficiently interpretable can effectively gain user acceptance. On one hand, visualization tools can be developed to intuitively present the AI screening process. For example, when AI screens mathematics manuscripts, visualization interfaces can present information such as keywords and teaching method evaluation scores, allowing users to objectively understand the basis for system screening. Additionally, natural language explanation modules can be applied. After AI generates screening results, plain language can be used to explain conclusions. If some manuscripts fail screening, specific reasons must be explained—such as low matching degree between keywords and mathematics teaching priorities, with specific data listed, or imprecise elaboration on teaching methods. This approach also allows editors and authors to clearly understand manuscript problems, thereby pointing out clear directions for subsequent revisions. Visualization tools or language explanation modules can effectively break the "black box" drawback of AI screening conclusions, thereby expanding AI's application scope.

5.3 Combining Manual Review Judgment

Although AI screening demonstrates obvious efficiency advantages, manual methods must also be considered when handling complex problems. During specific work implementation, AI systems can first conduct initial manuscript screening to accurately identify manuscripts that do not meet requirements in format and theme. For example, among daily received manuscripts, AI systems can screen out unqualified manuscripts, leaving remaining high-quality manuscripts for editor processing. Editors can use manual methods to review complex issues that AI cannot handle, such as measuring whether the integration degree between mathematics and other disciplines in interdisciplinary manuscripts is logical. Additionally, editors can correct AI screening results and promptly identify problems. The combined application of manual and AI screening methods can not only fully leverage AI's efficiency characteristics but also consider the comprehensiveness of manual review, ensuring more scientific screening results and safeguarding journal manuscript quality.

In summary, AI-assisted manuscript screening mechanisms in editing and publishing have emerged in the industry, demonstrating potential for efficient screening but also facing numerous challenges. With technological development and in-depth application, continuous optimization and improvement are needed in manuscript screening stages to leverage AI's auxiliary advantages and overcome limitations. Simultaneously, emphasis must be placed on human-machine collaboration, allowing deep integration between AI and editors' professional knowledge to jointly promote the steady advancement of the editing and publishing industry in the digital wave, laying a solid foundation for producing higher-quality content.

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