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AI TOOLS AND RESEARCH PRODUCTIVITY AMONG FACULTY MEMBERS: ENHANCING SCHOLARLY EFFICIENCY, KNOWLEDGE CREATION, AND ACADEMIC PERFORMANCE IN HIGHER EDUCATION

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ABSTRACT

Artificial Intelligence (AI) has emerged as a transformative force in higher education and academic research, reshaping how faculty members generate, manage, and disseminate knowledge. The integration of AI-powered tools into scholarly activities has significantly enhanced literature discovery, academic writing, data analysis, citation management, and research collaboration. Consequently, AI technologies are increasingly viewed as strategic enablers of research productivity and academic performance. This chapter examines the role of AI tools in improving scholarly efficiency and knowledge creation among faculty members. Drawing upon the Technology Acceptance Model and Knowledge Management Theory, the chapter explores the opportunities, challenges, ethical implications, and institutional considerations associated with AI-assisted research. The discussion highlights how AI technologies contribute to research quality, publication productivity, and academic innovation while emphasizing the importance of responsible implementation, transparency, and digital competency development. The article concludes with recommendations for faculty members, universities, and policymakers seeking to maximize the benefits of AI-driven research ecosystems.

KEYWORDS: Artificial Intelligence, Research Productivity, Faculty Members, Higher Education, Academic Writing, Knowledge Management, Digital Scholarship

1. INTRODUCTION

Higher education institutions have experienced substantial transformation due to digitalization, globalization, and increasing expectations regarding research excellence. Universities are now evaluated not only on teaching effectiveness but also on research productivity, publication impact, innovation, and societal contribution. Faculty members play a central role in achieving these objectives through the generation and dissemination of knowledge.

The growing complexity of academic research has increased demands on faculty members. Researchers must navigate extensive literature, manage large datasets, publish in high-impact journals, secure external funding, and engage in interdisciplinary collaboration. These responsibilities often create significant workload pressures and time constraints.

Artificial Intelligence (AI) has emerged as a powerful technological solution capable of addressing many of these challenges. AI systems can process large volumes of information, identify meaningful patterns, generate text, automate routine tasks, and support evidence-based decision-making. The rapid development of generative AI technologies has further expanded the scope of AI applications within academic research.

Faculty members increasingly utilize AI-powered tools such as ChatGPT, Elicit, ResearchRabbit, Semantic Scholar, Consensus, Grammarly, Paperpal, and SciSpace to enhance research efficiency and scholarly output. These technologies have become valuable resources for literature review, manuscript preparation, citation management, and research planning.

The integration of AI into academic research has generated considerable interest among scholars and policymakers. While AI offers opportunities to improve productivity and innovation, concerns regarding academic integrity, transparency, intellectual ownership, and ethical responsibility remain important considerations. Understanding the implications of AI adoption within higher education is therefore essential for ensuring sustainable and responsible research practices.

2. The Evolution of AI in Academic Research

The application of AI in higher education has evolved significantly over the past decade. Early systems primarily focused on automating administrative functions and providing basic decision-support capabilities. Advances in machine learning, deep learning, and natural language processing have enabled AI technologies to perform increasingly sophisticated tasks.

Recent developments in generative AI represent a major breakthrough in scholarly communication. These systems can generate coherent text, summarize research findings, recommend literature, and assist researchers throughout the research lifecycle. As a result, AI has become integrated into multiple stages of academic research, from idea generation and literature review to publication and dissemination.

The widespread adoption of AI tools reflects broader trends associated with digital transformation and knowledge-based economies. Universities are increasingly investing in digital infrastructures that

support AI-enabled research ecosystems and promote innovation-driven scholarship.

3. Theoretical Perspectives

3.1 Technology Acceptance Model

The Technology Acceptance Model (TAM) provides a useful framework for understanding AI adoption among faculty members. According to TAM, technology acceptance is influenced primarily by perceived usefulness and perceived ease of use. Faculty members are more likely to utilize AI tools when they perceive these technologies as beneficial for improving research efficiency and reducing workload.

AI applications that simplify literature review, enhance writing quality, and support data analysis are often viewed as highly useful. Ease of use further influences adoption decisions by reducing barriers associated with technological complexity.

3.2 Knowledge Management Theory

Knowledge Management Theory emphasizes the processes of knowledge creation, acquisition, sharing, storage, and application. AI technologies strengthen these processes by facilitating information retrieval, evidence synthesis, and collaborative knowledge exchange.

Through intelligent search algorithms and automated information processing, AI tools enhance researchers' ability to access relevant knowledge and transform information into scholarly outputs.

4. AI Tools Supporting Research Productivity

4.1 Literature Discovery and Review

One of the most significant challenges faced by contemporary researchers is the exponential growth of scientific literature. Thousands of scholarly articles are published daily across various disciplines, making comprehensive literature review increasingly complex and time-consuming. Artificial Intelligence (AI)-powered literature discovery platforms have emerged as valuable tools for addressing this challenge by facilitating efficient evidence identification, retrieval, and synthesis.

Platforms such as ChatGPT, Elicit, ResearchRabbit, Semantic Scholar, Consensus, Connected Papers, and Scite employ machine learning algorithms and natural language processing techniques to identify relevant research articles, summarize findings, map citation networks, and detect emerging research trends. Unlike traditional keyword-based database searches, these systems analyze semantic relationships among publications and provide contextually relevant recommendations.

For example, ResearchRabbit enables researchers to visualize citation networks and identify influential studies connected to a selected article. Similarly, Elicit utilizes language models to extract

key findings, methodologies, sample characteristics, and limitations from academic papers, thereby reducing the time required for evidence synthesis.

Recent studies indicate that AI-assisted literature review can significantly reduce search and screening time while improving comprehensiveness. Faculty members using AI-supported discovery tools report enhanced ability to identify interdisciplinary connections and research gaps that might otherwise remain unnoticed. In systematic review projects, AI-assisted screening has demonstrated substantial efficiency gains by automating article classification and relevance assessment.

Illustrative Case

A multidisciplinary research team conducting a systematic review on digital transformation in higher education employed Elicit and Semantic Scholar to screen more than 3,000 articles. The AI-assisted process reduced the initial screening period from several weeks to a few days while maintaining acceptable levels of accuracy and relevance. Consequently, AI-powered literature review technologies contribute to improved research efficiency, evidence synthesis quality, and scholarly productivity.

4.2 Academic Writing Assistance

Academic writing represents one of the most demanding components of scholarly research. Researchers must communicate complex ideas clearly, adhere to disciplinary conventions, maintain logical coherence, and satisfy journal-specific formatting requirements. These challenges become particularly pronounced for faculty members operating in multilingual academic environments.

Generative AI tools such as ChatGPT, Grammarly, Paperpal, QuillBot, Wordtune, and Writefull provide extensive support throughout the writing process. These systems assist researchers in drafting content, refining language, improving readability, enhancing coherence, correcting grammatical errors, and organizing manuscripts.

Recent evidence suggests that AI-assisted writing technologies improve manuscript quality by enhancing clarity, reducing linguistic inaccuracies, and strengthening argument development. Faculty members report that AI tools are particularly useful during early drafting stages, where they facilitate idea generation, outline development, and content organization.

Illustrative Case

A faculty member preparing a manuscript for submission to an international journal utilized Grammarly and Paperpal to improve language quality and readability. Reviewer feedback indicated substantial improvement in manuscript presentation compared to previous submissions, resulting in a reduced revision cycle and faster publication process.

For researchers whose first language is not English, AI-assisted writing technologies help reduce linguistic barriers and improve participation in global scholarly communication. However, scholars emphasize that AI-generated content should always be critically evaluated and revised by human authors to ensure originality, accuracy, and intellectual integrity.

4.3 Citation and Reference Management

Reference management is an essential component of scholarly communication. Accurate citation practices support academic integrity, facilitate knowledge verification, and acknowledge intellectual contributions. Nevertheless, managing extensive bibliographies can be labor-intensive and prone to errors.

AI-enhanced citation management systems such as Zotero, Mendeley, EndNote, RefWorks, and Paperpile automate reference organization, storage, retrieval, and formatting. These tools integrate with word-processing software and automatically generate citations according to journal-specific styles.

Recent advances in AI have further improved citation management by enabling intelligent recommendation systems that suggest relevant references based on manuscript content. Some applications can identify missing citations, detect inconsistencies, and recommend seminal works within a research domain.

Illustrative Case

A faculty member preparing a review article with more than 250 references utilized Zotero and Semantic Scholar integration. The automated citation management process significantly reduced formatting errors and ensured compliance with APA guidelines, thereby improving manuscript quality and reducing editorial corrections. Such technologies contribute to enhanced research efficiency while minimizing citation-related inaccuracies.

4.4 Data Analysis and Interpretation

Data analysis represents a critical stage of the research process and often requires substantial methodological expertise. AI technologies have transformed analytical practices by introducing advanced capabilities for pattern recognition, predictive modeling, automated coding, and knowledge extraction.

Machine learning algorithms support quantitative research through regression analysis, classification, clustering, forecasting, and predictive analytics. Similarly, AI-powered qualitative analysis software facilitates thematic coding, sentiment analysis, discourse analysis, and content categorization.

Tools such as NVivo AI, MAXQDA, Orange Data Mining, RapidMiner, IBM SPSS Modeler, and Python-based machine learning frameworks enable researchers to analyze large and complex datasets more efficiently than traditional methods.

Illustrative Case

Researchers investigating social media engagement among university students employed machine learning techniques to analyze over one million online interactions. AI-based sentiment analysis identified behavioral patterns and thematic trends that would have been difficult to detect through manual analysis alone. Consequently, AI technologies improve analytical efficiency, facilitate evidence-based decision-making, and support advanced research methodologies.

4.5 Research Collaboration and Knowledge Sharing

Contemporary research increasingly depends upon interdisciplinary and international collaboration. Faculty members frequently engage with colleagues across institutions, countries, and academic disciplines to address complex societal challenges.

AI-supported collaboration platforms facilitate communication, project management, document sharing, and knowledge exchange. Intelligent recommendation systems can identify potential collaborators based on research interests, publication records, and citation networks. Platforms integrating AI functionalities enable researchers to coordinate tasks, monitor project progress, share resources, and maintain collaborative workflows regardless of geographic location.

Illustrative Case

An international consortium studying artificial intelligence in education employed AI-enabled collaboration systems to coordinate researchers from multiple countries. Automated project management and communication tools improved efficiency, reduced administrative burden, and enhanced collaborative productivity.

These developments demonstrate the potential of AI technologies to strengthen global research networks and facilitate knowledge creation across institutional boundaries.

5. Benefits of AI Adoption among Faculty Members

Improved Research Efficiency

The automation of repetitive and time-consuming tasks represents one of the most significant benefits of AI adoption. Activities such as literature searching, reference formatting, data coding, and language editing can be completed more efficiently through AI assistance.

Studies indicate that researchers using AI-supported tools experience substantial reductions in administrative workload, enabling greater focus on theoretical development, methodological innovation, and scholarly creativity.

Enhanced Academic Writing Quality

AI-powered writing assistants improve readability, coherence, grammar, and manuscript structure. These improvements contribute to higher-quality scholarly outputs and increase the likelihood of publication acceptance. Researchers operating in multilingual environments particularly benefit from language-enhancement capabilities that reduce communication barriers and improve academic visibility.

Increased Publication Productivity

Several studies suggest that AI adoption contributes to increased publication productivity by accelerating various stages of the research process. Reduced time requirements for literature review, writing, editing, and data analysis allow researchers to complete projects more rapidly. Although AI does not replace intellectual contributions, it functions as a productivity-enhancing technology that supports efficient knowledge creation.

Better Knowledge Management

Knowledge management involves acquiring, organizing, storing, sharing, and applying information. AI technologies strengthen each of these processes by facilitating information retrieval, synthesis, and dissemination. Faculty members can access relevant knowledge more quickly and transform information into actionable insights, thereby improving research performance.

Expanded Research Collaboration

AI-supported communication and networking technologies facilitate interdisciplinary and international research partnerships. Such collaborations often generate higher-impact publications and contribute to broader scholarly influence.

6. Challenges and Ethical Concerns

Academic Integrity and Authorship

The emergence of generative AI has intensified debates regarding authorship, originality, and intellectual responsibility. Publishers increasingly require disclosure of AI-assisted content generation to ensure transparency and accountability.

The fundamental principle remains that human researchers retain responsibility for all scholarly outputs, regardless of technological assistance.

Hallucinated References and Factual Errors

One of the most widely reported limitations of generative AI systems is their tendency to generate fabricated citations, inaccurate information, and nonexistent references. Studies have documented instances in which AI-generated bibliographies contained substantial inaccuracies. Researchers must therefore verify all references, quotations, statistical information, and factual claims before publication.

Algorithmic Bias

AI systems learn from existing datasets that may contain social, cultural, linguistic, and disciplinary biases. Consequently, AI-generated outputs may inadvertently reproduce or amplify existing inequities. Critical evaluation and human oversight are essential to mitigate these risks.

Overreliance on Technology

Excessive dependence on AI tools may weaken critical thinking, methodological rigor, and scholarly judgment. Faculty members should employ AI as a supportive technology rather than a substitute for intellectual engagement.

Transparency and Disclosure

Leading publishers increasingly require authors to disclose the use of AI technologies during manuscript preparation. Transparent disclosure promotes research integrity and strengthens trust in scholarly communication.

7. Institutional Implications

Universities play a pivotal role in shaping responsible AI adoption. Institutions that proactively develop governance frameworks and digital research infrastructures are better positioned to leverage AI for academic advancement.

Key institutional priorities include:

- Establishing comprehensive AI governance policies.
- Developing faculty AI literacy and competency programs.
- Integrating AI ethics into research training initiatives.
- Providing access to reliable AI research tools and digital infrastructure.
- Encouraging responsible innovation while safeguarding academic integrity.

For example, several leading universities have established institutional guidelines governing AI usage in teaching, research, and scholarly publishing. These policies provide clear expectations regarding transparency, disclosure, and ethical conduct.

8. Future Directions

Future scholarship should move beyond exploratory investigations toward rigorous longitudinal and cross-disciplinary studies.

Important research priorities include:

- Longitudinal assessment of AI's influence on publication productivity.
- Comparative analysis across academic disciplines.
- Investigation of AI literacy and digital competency development.
- Evaluation of ethical governance frameworks.
- Integration of AI technologies with open science and research analytics initiatives.
- Examination of AI's influence on creativity, innovation, and scientific discovery.
- Development of AI readiness models for higher education institutions.
- Assessment of faculty perceptions regarding trust, transparency, and accountability in AI-assisted research.

As AI technologies continue to evolve, understanding their long-term implications for knowledge creation and scholarly productivity will remain a critical area of academic inquiry.

9. Conclusion

Artificial Intelligence is transforming academic research by enhancing efficiency, supporting knowledge management, and improving scholarly productivity. AI-powered tools assist faculty members throughout the research lifecycle, from literature review and writing to data analysis and dissemination. These technologies offer substantial opportunities for improving academic performance and institutional research outcomes.

However, maximizing the benefits of AI requires responsible implementation, ethical governance, and continuous development of digital competencies. Faculty members must retain intellectual responsibility while utilizing AI as a supportive tool rather than a substitute for scholarly judgment. As higher education institutions continue to evolve within increasingly digital knowledge environments, AI will play a central role in shaping the future of academic research and innovation.

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