People and Machines or People Against Machines? How Readiness to Artificial Intelligence is Changing Higher Education: A Bibliometric Analysis

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Abstract: AI is rapidly shaping modern higher education in the last 3 years. This paper aims to identify key areas and prospects of readiness to use AI in higher education. The following research question was formulated: What new research directions are observed in the existing discourse on readiness for the spread of artificial intelligence technologies in higher education? To answer the research question, a bibliometric analysis of the joint citations of 2,138 publications indexed in the SCOPUS database for the period 2016-2025 was carried out. Further, within the framework of the study, qualitative coding of annotations was carried out to narrow the sample to 568 of the most significant publications. The analysis identifies five main research areas: (1) the development of strategic readiness for AI within universities, (2) the formation of organizational readiness for AI adoption, (3) the development of consumer readiness among faculty and students, (4) the establishment of psychological parameters of readiness, and (5) the creation of decision-making mechanisms for AI implementation. The integrated implementation of AI in higher education requires information, the development of digital literacy and legal regulation, as well as consideration of social impacts and motivating factors (including hedonism and anthropomorphism) to increase trust in technology. The findings reveal the multi-level nature of AI readiness in higher education, encompassing strategic, organizational, and individual-psychological dimensions. Successful integration of AI depends not only on technological infrastructure and regulatory frameworks but also on users' trust in algorithms, their emotional comfort, and a sense of personal competence. Effective integration is possible only with the coordinated participation of all stakeholders, focused on creating an ethically responsible and technologically advanced educational environment. The presented bibliometric analysis systematizes existing research and highlights new directions in the field of AI application in education. This bibliometric review contributes to an in-depth understanding of the role of artificial intelligence as an important factor in the transformation of higher education and forms the basis for further research directions and practical solutions.

Keywords: Artificial Intelligence, Higher Education, Bibliometric Analysis, Educational Technologies, Strategic Thinking

1. Introduction

Maintaining a competitive position across industries require nowadays organizations to continually adopt innovations (Bagrationi & Gordienko, 2024; Bagrationi & Thurner, 2020, 2023; Diakova et al., 2024; Teece, 2000; Zinchenko et al., 2024). Among these innovations, artificial intelligence (AI) has emerged as a transformative force in the 21st century, widely regarded as a tool for advancing various aspects of modern life (Górriz et al., 2020).

The concept of AI today is often closely associated with its generative form (GenAI), which refers to technologies using deep learning models to produce human-like content, such as text and images, in response to diverse and complex prompts (Choung et al., 2023; Lim et al., 2023; Michel-Villarreal et al., 2023). The launch of ChatGPT triggered a wave of technological breakthroughs across multiple sectors, fueling a surge of academic interest, particularly within higher education (Crompton & Burke, 2018; Nguyen et al., 2023).

Although AI has been actively adopted in universities for over two years, its full potential and impact is highlighted to be underexplored by some higher education professionals (Solís et al., 2023; Zawacki-Richter et al., 2019). Scholars claim that AI presents significant opportunities for both educators and administrators, enhancing instructional quality and streamlining management functions (Gordienko & Bagrationi, 2024; Katsamakas et al., 2024). In the teaching domain, AI promises to enhance learning through personalized education, immediate feedback, and innovative tools like virtual reality and chatbots that boost student engagement and comprehension (Zaman, 2023). From an administrative perspective, AI can optimize processes such as admissions, scholarship allocation, and student profiling, allowing institutional leaders to focus more on strategic quality assurance and less on routine operations (Gordienko & Bagrationi, 2024; Katsamakas et al., 2024).

Recent bibliometric research represents a sharp rise in AI-related publications within higher education segment between 2019 and 2023, underscoring the field's growing interest in adopting these technologies (Zawacki-Richter et al., 2019). In such a rapidly evolving area, it becomes crucial to understand the changing research landscape. Scholars continue to seek innovative ways to expand existing knowledge, stimulate new lines of inquiry, and engage in critical debates around AI in education (Crompton & Burke, 2018; Crompton & Song, 2021).

However, a crucial determinant of AI's successful integration into educational settings is the readiness to embrace change (Rane et al., 2024). Psychological readiness which us marked by openness to innovation, positive attitudes toward change, and recognition of its value could be a key to driving successful organizational transformation (Bagrationi & Thurner, 2020; Wang et al., 2024).

Given the dynamic growth of this research domain, scholars increasingly call for comprehensive literature reviews to consolidate existing findings on AI readiness within higher education (Zawacki-Richter et al., 2019). Such reviews are essential for mapping intellectual developments, highlighting leading contributors, research institutions, and prominent themes, and identifying emerging trends that shape the field’s trajectory (Anand et al., 2021).

Despite an expanding body of work on AI in education, much of the existing literature focuses on isolated aspects, without providing a holistic understanding of how readiness for AI adoption is developing. Recent studies highlight this gap, stressing that the readiness dimension remains insufficiently addressed (Takahashi et al., 2024). Several scholars advocate for a deeper examination of institutional preparedness for AI integration within higher education (Zaman, 2023; Zawacki-Richter et al., 2019).

Bibliometric techniques, especially when combined with science mapping software, offer a robust alternative to traditional narrative and structured reviews. These methods allow for more systematic categorization, conceptual mapping, and trend identification within academic literature (Anand et al., 2021; Anand & Dumazert, 2022). This study employs relational bibliometric approaches (Benckendorff & Zehrer, 2013) to trace theoretical underpinnings (Zupic & Čater, 2015) and uncover emerging research patterns (Walsh & Renaud, 2017).

This research addresses the current gap by systematically examining the scholarly discourse on AI readiness in higher education through bibliometric analysis. Both evaluative and relational methods are utilized to assess the state of research globally, identify leading scholars, the most influential publications, and pinpoint new research trajectories (Walsh & Renaud, 2017)

2. Methodology

To address the gap highlighted within the introduction section, the following research question was formulated:

RQ: What new research directions are emerging in the discourse on readiness for the spread of AI technologies in higher education?

The study proceeded in five stages. First, relevant literature was identified through a structured search in the Scopus database, using keywords related to AI higher education and readiness to change. The search was limited to peer-reviewed journal articles in English, published across the fields of business, economics and sociology. After deduplication in MS Excel, the final dataset comprised 2,138 articles focusing on the readiness of higher education staff for AI integration. Second, science mapping techniques were employed to explore the intellectual structure of the field, following the methods of Anand et al. (2021). Data visualization, including cluster and network maps, was performed using VOSviewer (Van Eck & Waltman, 2010). This step involved analyzing keyword co-occurrence and co-citation patterns to reveal thematic connections across publications. Third, a co-citation analysis (CCA-R) was conducted, building on the framework of Anand & Dumazert (2022). Out of 101439 cited sources, articles cited at least seven times were selected, resulting in a focused set of 568 significant sources. Five major research clusters were identified, each representing key interconnections among authors, topics, and studies. Fourth, qualitative descriptive coding of the abstracts of these 568 articles were performed, following guidelines by Anand et al. (2021) and Salager-Meyer (1990). Two researchers independently coded the abstracts, with a third researcher verifying consistency to ensure reliability and minimize bias. Finally, the data were synthesized using the integrative approach outlined by Schick-Makaroff et al. (2016). This stage focused on consolidating the findings into a coherent overview, providing a structured understanding of the current research landscape regarding AI readiness in higher education.

3. Results

The bibliometric analysis results are represented in the Figure 1.

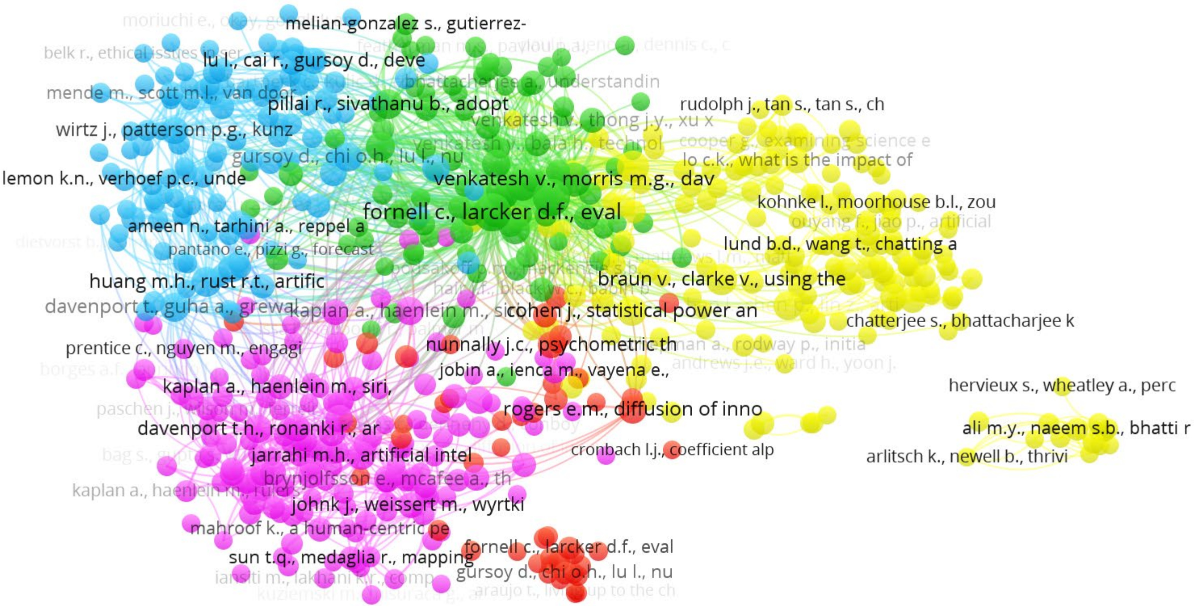

Figure 1: RCC-A results

The yellow cluster, resulting in 168 articles, emphasizes a strong focus on how universities can strategically integrate AI to enhance teaching and learning performance. Key studies within this cluster highlight trends such as chatbot adoption and the rise of generative language models (Chiu et al., 2023; Crompton & Burke, 2023; Crompton & Song, 2021; Zawacki-Richter et al., 2019). Studies highlight trends such as chatbot adoption and the rise of generative language models. Authors like Venkatesh (2022) claim that readiness depends not only on technical infrastructure but also on awareness of AI's potential and limitations (Celik, 2023; Hwang & Chang, 2023). Ethical concerns and privacy issues are also crucial, leading to the development of interdisciplinary AI literacy and ethics courses (Zhang & Aslan, 2021).

The purple cluster, resulting in 148 articles, addresses strategic and organizational factors shaping AI adoption. Scholars within this cluster discuss technological, organizational, and environmental elements ("TOE" framework) influencing digital maturity (Aboelmaged, 2014; Chowdhury et al., 2023; Hradecky et al., 2022). Some scholars underline the need for systematic project management approaches that consider economic, social, ethical, and psychological barriers (Budhwar et al., 2022). Several papers discuss changes in work nature and competencies, drawing on dynamic capabilities theory (Chowdhury et al., 2023; Pan et al., 2023). Other studies note fears of job displacement and resistance (Brougham & Haar, 2018).

The blue cluster, with 105 studies within, examines how users perceive AI in education, emphasizing anthropomorphism, trust, and technology readiness. Research finds that human-like AI features can boost loyalty but may also cause discomfort if overemphasized (Araujo, 2018; Bigman & Gray, 2018; Huang & Rust, 2018). Studies show that perceived usefulness, emotional satisfaction, and ease of use drive adoption (Tung & Au, 2018). Trust plays a crucial role, while algorithm aversion can inhibit engagement unless users can understand or control AI outputs (Dietvorst et al., 2018; Sheehan et al., 2020). The cluster highlights that emotional, ethical, and practical factors jointly shape user acceptance.

The green cluster, consisting of 96 articles, centers on psychological aspects like trust, risk perception, and personal innovativeness. Studies find that perceived ease of use, usefulness, and trust significantly influence satisfaction and continuance intentions to implement AI (Adam et al., 2021). Personal traits such as computer self-efficacy and technology innovativeness positively affect AI acceptance (Balakrishnan et al., 2022; Kasilingam, 2020). Anxiety and fears can hinder adoption (Damerji & Salimi, 2021). Anthropomorphism plays a double-edged role: moderate human-likeness fosters trust, while excessive personalization may lead to discomfort (Cheng et al., 2022). Classical adoption models (TAM, UTAUT, TTF) remain fundamental but must be expanded with constructs like trust, transparency, and emotional comfort (Moussawi et al., 2021).

The red cluster, consisting of 51 articles, explores how AI adoption is framed by decision-making theories (Ajzen, 1991; Rogers & Smith, 1962) and factors like personal innovativeness (Agarwal & Prasad, 1998). Studies show that AI's perceived value and trustworthiness influence its adoption in businesses and educational settings (Chatterjee & Bhattacharjee, 2020). Research also examines AI's role in risk management, highlighting its potential to enhance predictive capabilities (Baryannis et al., 2019). Successful AI integration depends on user experience design and building trust-based interactions (Gursoy et al., 2019; Roy et al., 2022)

4. Discussion

The findings highlight the need for university leadership and policymakers to proactively support AI adoption. The analysis of publication venues showed that journals like Sustainability and IEEE Access are prominent in disseminating AI-in-education research. This prominence suggests a convergence of interests between educational innovation, sustainable development, and technological advancement. University administrators should interpret this as a mandate to embed AI into strategic planning in a way that supports sustainable education goals and technical excellence. Administrative readiness involves establishing clear policies, ethical guidelines, and support structures for AI use on campus.

According to the Unified Theory of Acceptance and Use of Technology (UTAUT), performance expectancy (belief that using AI will improve outcomes) and effort expectancy (perceived ease of use) are primary drivers of technology adoption, along with social influence (peer and societal encouragement) and facilitating conditions (availability of support and resources) (Venkatesh, 2022). Our analysis found corroborating evidence: across many studies, the anticipated benefits of AI (e.g., enhanced learning personalization, efficiency in grading or administrative tasks) and the perceived ease of using AI tools emerged as significant predictors of stakeholders' intention to use AI (Balakrishnan et al., 2022).

Situating findings within established frameworks provides deeper insight. The patterns observed resonate with the UTAUT model, which integrates elements from earlier models (including TAM) and emphasizes that technology uptake results from a mix of expected performance gains, user-friendliness, social norms, and organizational supports. Our findings that performance expectancy and ease of use are crucial confirm the applicability of UTAUT in the AI-in-education context. Moreover, the identification of hedonic motivation as a factor suggests that many users engage with AI not just out of necessity but also curiosity or enjoyment, an extension captured by UTAUT2 (García de Blanes Sebastián et al., 2022). On the other hand, the noted barriers (distrust, lack of knowledge) point to additional theoretical considerations (Chatterjee et al., 2021). The TOE framework posits that successful adoption depends on technological factors (e.g., maturity and fit of AI tools), organizational factors (e.g., leadership, culture, internal processes), and environmental factors (e.g., policy, market, social pressures). In our context, an institution with robust IT infrastructure and tech support (technology), visionary leadership and agile governance (organization), and a favourable external environment such as government incentives or clear regulations (environment) is far more likely to be ready for AI integration. Indeed, recent analysis emphasizes that technology–organization–environment synergy is needed: technology should match user demands, organizations must optimize decision-making and support, and the broader environment should provide enabling policies (Bigman & Gray, 2018; Choi et al., 2022).

While existing studies within each identified cluster provide valuable insights into specific dimensions of AI readiness in higher education, our bibliometric synthesis reveals several intersections and silences across these domains that have not been adequately addressed in prior work, especially within the lens of institutional theory (DiMaggio & Powell, 1983; Scott, 2013). Although, organizational and psychological readiness and are extensively discussed (e.g., clusters 2 and 4), few studies (e.g. Rudko et al. (2025)) systematically examine institutional configurations that balance individual perceptions and behaviours in practice. This fragmentation creates a blind spot in understanding how readiness is shaped by different levels of decision making within the organizations.

Another topic narrowly discussed within the existing literature is the role of government initiatives, that could vary across different cultures (Chatterjee & Bhattacharjee, 2020; Zawacki-Richter et al., 2019). This issue surfaced in several abstracts but was not thematized in prior systematic reviews, indicating a potential research opportunity.

5. Conclusion

The findings underscore the societal and educational importance of proactively preparing higher education institutions for AI integration. Higher education sits at the nexus of knowledge creation and human capital development, and as such, it plays a pivotal role in how society adapts to the AI revolution. Our analysis resonates with global viewpoints that universities are crucial in shaping and advancing national AI strategies by driving innovation, developing an AI-skilled workforce, and modelling ethical technology use. Indeed, as educators and researchers, universities are responsible for training the next generation of citizens and professionals to thrive in an AI-augmented world. By ensuring that higher education is ready for AI – through updated curricula that include AI literacy, investments in cutting-edge educational technologies, and policies that safeguard ethical practices – we are in effect safeguarding the future competitiveness and well-being of society. Preparing institutions for AI integration means that students will graduate with relevant skills for the future economy, and that academic research can continue to push the frontiers of what AI can do for human learning and development. In a broader sense, university readiness for AI contributes to society by promoting informed and ethical AI use beyond campus, as graduates carry those values and practices into their communities and workplaces.

This study also emphasizes that the integration of AI in higher education is not purely a technical endeavour, but a transformative educational mission. We highlighted how AI has the potential to offer personalized learning experiences, more efficient administrative services, and data-informed decision-making in academia. These opportunities, if effectively harnessed, could foster deeper student engagement and improve educational outcomes, helping institutions better fulfil their pedagogical missions. However, realizing this potential requires careful readiness and change management. Our conclusions stress that preparing for AI involves cultivating a supportive institutional culture and strong ethical governance. As such, one of the key contributions of our work is drawing attention to the human-centric and ethical dimensions of AI readiness. We have shown that issues of trust, equity, and inclusivity are intertwined with technical readiness. A major societal implication of these findings is the need to ensure that AI integration in education enhances equity and access rather than exacerbating divides. If only elite universities or certain countries lead in AI-readiness, we risk creating a new digital divide in which some graduates are AI-proficient, and others are left behind. Therefore, the importance of widespread readiness is both an educational and a social imperative – it speaks to the role of higher education in fostering an inclusive knowledge society where AI benefits all.

6. Future Research Directions

Future studies should track the evolution of AI adoption and impacts in universities over time. Long-term research could examine how initial readiness (in infrastructure, policy, and culture) influences outcomes such as student performance, faculty workload, or institutional efficiency after several years of AI integration. Such longitudinal data would help distinguish short-term novelty effects from sustainable improvements, and reveal how acceptance factors (e.g., trust or perceived usefulness) change as users become more familiar with AI. Research should also delve deeper into how AI readiness and adoption differ across disciplines and institution types. Also, studies on AI in higher education should focus on uncover context-specific barriers and enablers. Understanding these nuances will guide more tailored readiness strategies. Given the importance of administrative readiness, further research is needed on organizational change models and policy frameworks that facilitate AI integration in the universities.

Ethics Declaration

This study did not involve human participants, personal data collection, or experimental interventions and therefore did not require ethical clearance.

AI Declaration

During the preparation of this paper, AI tools (specifically, ChatGPT o1 by OpenAI) were used to assist in language editing and improving the clarity and fluency of the text. The content generated by the AI was critically reviewed, edited, and integrated by the authors to ensure accuracy, originality, and academic integrity.

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