Artificial Intelligence and the Reconfiguration of China–United States International Education Exchange: A Thematic Review with Bibliometric Visualization

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HOW TO CITE:

Tan, Jiabei (2026). Artificial Intelligence and the Reconfiguration of China–United States International Education Exchange: A Thematic Review with Bibliometric Visualization. International Journal of Special Education, 41(18s), 19-33

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ABSTRACT:

Artificial intelligence is reshaping higher education by altering how universities teach, research, evaluate, and collaborate across borders. Nowhere is this transformation more consequential than in the China-United States relationship, which remains central to global science even as geopolitical tension, technology controls, and risk-sensitive regulation complicate bilateral engagement. This paper examines how AI is influencing the coordinated development of China-U.S. international education exchange. The argument is that AI does not simply add a new technical layer to existing cooperation. Instead, it reorganizes the channels through which exchange occurs, expanding digital academic infrastructure, lowering certain transaction costs of collaboration, and raising the strategic importance of data governance, research security, and institutional trust. Methodologically, the study combines conceptual analysis with a structured thematic review of the relevant literature, supported by bibliometric visualization of the corpus. The analysis reveals that bilateral research collaboration intensity peaked around 2019 and has since contracted unevenly under policy pressures including the China Initiative and export controls, with sharp declines in strategic technology fields and relative resilience in biomedicine and earth sciences, suggesting that governance arrangements are becoming a precondition for sustained exchange rather than a by-product of it. The analysis shows that future China-U.S. exchange is likely to become more hybrid, more platform-mediated, and more dependent on governance arrangements than in the era when physical mobility alone dominated. The paper concludes that sustainable cooperation will depend on four sequentially dependent conditions: interoperable digital infrastructure as a foundation, transparent data and ethics protocols, incrementally rebuilt institutional trust, and multilateral formats that serve as a resilience mechanism against the fragility of purely bilateral arrangements.

Keywords: artificial intelligence; higher education internationalization; China-United States relations; thematic review; digital collaboration; hybrid mobility; governance

1. Introduction

Internationalization in higher education has long been characterized by student mobility, faculty mobility, joint research, transnational partnerships, and the movement of scientific talent. Within this broader field, the Sino-American connection occupies a central position given the weight of both nations in global knowledge production. The two academic systems have traditionally interacted through their doctoral programs, joint authorships, and collaboration for more than a decade, influencing the overall landscape of scientific development (Altbach & Knight, 2007; Marginson, 2016; Wagner, 2018).

This relationship is now being reshaped by two parallel dynamics. One is geopolitical. Competition in the sphere of technology, restrictions in exportation, visa policies, and increasing awareness regarding research safety have changed the context of collaboration. Based on the statistics provided, the number of Chinese students enrolled in the US dropped by about 22 percent since its maximum reached in 19-33 (Institute of International Education, 2024), while the intensity of collaboration between the two nations has been changing dramatically starting from 2019 (Tang, 2024; Kitajima & Okamura, 2025). China has also expanded research partnerships with non-Western nations, which may further shift the global balance of collaborative ties. A second dynamic is technological. AI-assisted technologies, data-intensive platforms, and cloud computing architectures are transforming the nature of collaborative learning and research. Today, digital spaces allow for collaborative supervision, virtual mobility, remote attendance at seminars and labs, co-authorship, and quick transfer of knowledge across borders. Consequently, the old debate about whether the exchange between two sides will persist has been replaced by a new one: in an era of strategic competition and rapid digitalization, what form will it assume?

This paper considers the problem through the lens of coordinated development of international education exchange between China and the United States in the AI era. By coordinated development, there is no suggestion that coordination is without problems. This term is used to reflect the ability of the relevant organizations and the policies to sustain an effective engagement process notwithstanding divergent political goals, divergent regulation, and divergent technology standards. Governance as much as technological capacity is critical to achieving coordination. AI can facilitate coordination, but it can also deepen asymmetries.

The three key points framing this discussion are: one, AI has expanded the architecture of internationalization in ways that have elevated digital cooperation to a core element of international exchange in academia. Two, for the China-U.S. scenario, the gains from this new mode of internationalization now depend more and more on trust, data management, and research security regulations. Three, going forward, any resilient model of internationalization will have to be based on hybrids of the aforementioned modes of cooperation. This assumption stems from the recognition that physical movement is increasingly being constrained by visa regimes and research security checks, and sudden decoupling could hurt productivity on both sides (Aghion et al., 2024). This paper builds on this argument by reviewing the relevant literature, developing a theoretical model, and employing bibliometric analysis with a carefully selected corpus of academic publications.

2. Literature Review

Scholarship on higher education internationalization has long recognized that universities operate within international networks carrying students, faculty, funding, ideas, and reputation. The works of Knight (2004) and Altbach and Knight (2007) stand out as seminal contributions since they understood internationalization not simply as mobility but rather as the integration of the international/intercultural dimension within the basic mission of higher education institutions. This has later been further developed through more specific studies focusing on the role of

marketization, ranking, world-class university approach, and global hierarchical inequalities (Hazelkorn, 2015; de Wit, 2020; van der Wende, 2017).

The parallel literature on collaboration explores the organizational aspects of science. The key point here is that the production of scientific work is increasingly a result of networks rather than individual or institutional efforts. Wagner & Leydesdorff (2005) highlighted the principles of self-organization in international collaboration in science, whereas Adams (2013) brought forward the network nature of modern research. Persson et al. (2004) clarified how collaboration affects bibliometric results, while Wang & Barabási (2021) summarized general conclusions under the name 'the science of science'. These works are relevant to the current subject due to their perception of cross-national collaboration as an inherent aspect of modern science.

One such stream relates to cooperation between China and the U.S. within academia and scientific research. Studies have shown that the two nations became tightly interlinked in highly productive scientific research over the past two decades, particularly in engineering, computing, medicine, and materials science. According to Lee & Haupt (2021), the gains and risks associated with this connection are not equally shared by all sides involved. According to Tang (2024), by 2023, scientific articles with at least one author from China and one author from America constituted 52% of the global knowledge output registered in the SCIE database, where both independent and joint knowledge creation by both nations is included. The intensity of Sino-U.S. collaborations in science appears to have peaked in about 2019, after which time there has been a decline, especially in sectors related to strategic competition in terms of technologies like information technology, aerospace engineering, and new materials. On the other hand, biomedicine and earth sciences are areas in which collaborative activity has shown more resilience (Kitajima & Okamura, 2025).

DOJ China Initiative (19-33) represents an important point of reference in examining the change. While intended as a strategy against economic espionage, the initiative primarily focused on prosecuting academic scientists operating in the U.S. for their affiliation with Chinese institutions. As noted by Jia et al. (2024), based on their analysis of scientific publications made by more than 113,000 scientists between 2015 and 2021, the probes came amidst a noticeable decrease in productivity among those U.S. scientists who previously collaborated with Chinese scholars. According to Bound et al. (2024), the proportion of Chinese-born scientists leaving America started increasing after 2018, and a significant number returned back to their home country.

Further studies have examined how strategic tensions have transformed publication practices and collaboration motivations without entirely disengaging from scientific interdependence (Aghion et al., 2024). It is also observed that while some Western collaborations are on the decline, China has started to build more collaborative research relationships with nations like Pakistan, Saudi Arabia, and Belarus in nanomaterials and innovative fields (Kitajima & Okamura, 2025). These trends imply that instead of completely separating themselves, the future of these bilateral relations lies in realignment. Nevertheless, the effectiveness of this strategy compared to collaborations with China remains uncertain, especially regarding groundbreaking research.

Research in AI applications within education and higher education is another fourth line of research. In their review of initial AI applications within higher education, Zawacki-Richter et al. (2019) discovered that AI applications focused mainly on administration, profiling, prediction, and tutoring. Chen, Chen, and Lin (2020) provide an overview of AI applications within the domain of education, whereas Holmes, Bialik, and Fadel (2019), Luckin (2018), and Selwyn (2019) stress the importance of interpreting AI not only from the technological but also the pedagogical and ethical perspective. Newer research focuses on applications within online higher education, platformization, and large language models

(Ouyang et al., 2022; Kasneci et al., 2023; Tlili et al., 2023; Bond et al., 2024).

Two trends run through these reviews. One is functional extension, as AI is no longer confined to automated tutoring and student analytics but increasingly shapes content creation, research work, and administrative processes. A second is governance escalation: when AI systems grow smarter, questions of their openness, biases, privacy, copyright issues, and responsibility come to the foreground (Perrotta & Selwyn, 2020; Dwivedi et al., 2023; UNESCO, 2023). This becomes particularly relevant for international collaboration because cooperation among universities now increasingly relies on their handling of AI technology.

The remaining literature cluster connects digital transformation to internationalization. Learning analytics, datafication, and platform governance have altered how universities know and manage students, staff, and research performance (Siemens & Baker, 2012; Williamson, Bayne, & Shay, 2020). The pandemic accelerated the normalization of digital and distance formats, making hybrid models of teaching and collaboration far more legitimate than before (Williamson, Eynon, & Potter, 2020; Williamson, 2021). Pandemic-induced remote learning has been increasingly recognized as a norm for the adoption of online modes of cooperation, institutionalizing the hybrid modes of learning and research in academia as a legitimate form rather than a workaround measure (Bozkurt, 2023).

Three research gaps emerge from this body of literature. First, studies on higher education internationalization and studies on AI in education have developed along parallel tracks, with limited integration of how AI-enabled infrastructure reshapes cross-border academic exchange. Second, although the China–U.S. scientific collaboration has received growing empirical attention, existing work concentrates on publication-level bibliometric evidence and pays less attention to the governance conditions under which collaboration can be sustained. Third, the AI-governance literature is largely framed at the national regulatory level rather than at the institutional level where universities actually negotiate bilateral cooperation.

This paper contributes to addressing these gaps in three ways. It integrates the three strands by treating AI capabilities, digital academic infrastructure, and governance arrangements as interdependent layers rather than separate domains. It provides a structured thematic synthesis of the bilateral context with bibliometric visualization of the review corpus. And it proposes a four-condition framework—interoperable infrastructure, transparent protocols, incremental trust, and multilateral resilience—linking conceptual analysis to institutional practice.

3. Conceptual Framework

The conceptual framework presented here considers the use of AI technology for international education exchanges as a hierarchical model. The lower level involves AI technologies such as analytics, NLP, adaptation, recommendation, and generation. The higher level involves digital infrastructure for academic purposes, including cloud collaboration platforms, learning environments, repositories, video conferencing infrastructure, and computing systems that enable distributed academic activities. At the third level, there are specific exchanges such as co-teaching, remote supervision, joint publishing, research assessment, online seminars, and hybrid mobility. Coordination becomes the result level, which means the ability to keep productive academic relations without succumbing to uncoordinated openness or reactive closure. Such levels are based on a sociotechnical system theory, whereby technology, infrastructure, practice, and governance are different analytical yet causally connected aspects of international academic exchanges.

The model itself is rooted directly in the theory of global knowledge networks. As pointed out by Castells (2010) and Wagner (2018), the creation of knowledge in today's world is dependent on network-like organizations, not on containers of bounded national nature. In this context,

universities function as nodes, and what is critical in this regard is the density of connections between them rather than their official positions. With regards to AI, its importance in this context comes from its ability to increase the speed of coordination, as well as sometimes decrease its cost.

The arrival of AI does not render politics obsolete; it shifts the target of governance. In earlier theories of internationalization, the means of governance included the visa process, scholarships, memorandums of understanding, and recognition policies. Under the new form of exchange via AI, the means of governance also include the provenance of data, transparency of modeling, computation capacity, data transfers, research integrity, authorship conventions, and appropriate usage in academic settings. Trust in institutions is then crucial to the theoretical framework since it works through three levels of trust: procedural trust (the confidence that the process of collaboration is fair and transparent), data trust (the mutual trust about data management issues), and reputational trust (trust in the good reputation of institutions associated with cross-border collaboration). Higher levels of trust would make it possible for institutions to cooperate more boldly, while low levels would make those same technologies risky.

Data governance becomes an important aspect in the relationship between China and the United States since they use various regulatory frameworks. In China, the country has put in place sectoral regulations concerning AI technologies such as Algorithm Recommendations Regulation in 2022, Deep Synthesis Regulation in 2023, and the Interim Measures for Generative AI Services in 2023, all regulated by the Cyberspace Administration of China. Public generative AI services require security reviews and registering their algorithms (Roberts et al., 2024). The United States, by contrast, lacks comprehensive federal AI legislation and relies on executive directives, agency guidance such as the NIST AI Risk Management Framework, and a growing but fragmented body of state statutes. Such disparities cause real-world difficulties for international academic cooperation. If, for instance, a collaborative AI research venture is obliged to follow the algorithm registration policies of China but must also conform to US restrictions on export controls, especially where high-performance computing capabilities are concerned, university institutions engaged in bilateral ventures will find themselves faced with devising institutional procedures in response to jurisdictional disparities.

In the case of institutional trust acting as a moderator, an asymmetrical process emerges in this association. As for the United States, the impact of the China Initiative (19-33) remains influential in terms of the risks associated with the research environment. Even though the program was officially terminated in February 2022, empirical evidence indicates that its chilling effect persists: Chinese-born researchers still feel anxious about government interference, and a few of them have become less interested in international partnerships (Jia et al., 2024). In terms of China, the ban on foreign access to some of the CNKI databases in 2023, alongside the general constraints on data movement across borders stipulated by the Data Security Law (2021) and the Personal Information Protection Law (2021), have led to reciprocal concerns amongst foreign academics regarding data availability. While these trust gaps vary in nature and source, their common effect is the need for a greater degree of institutional negotiation before meaningful cooperation can commence.

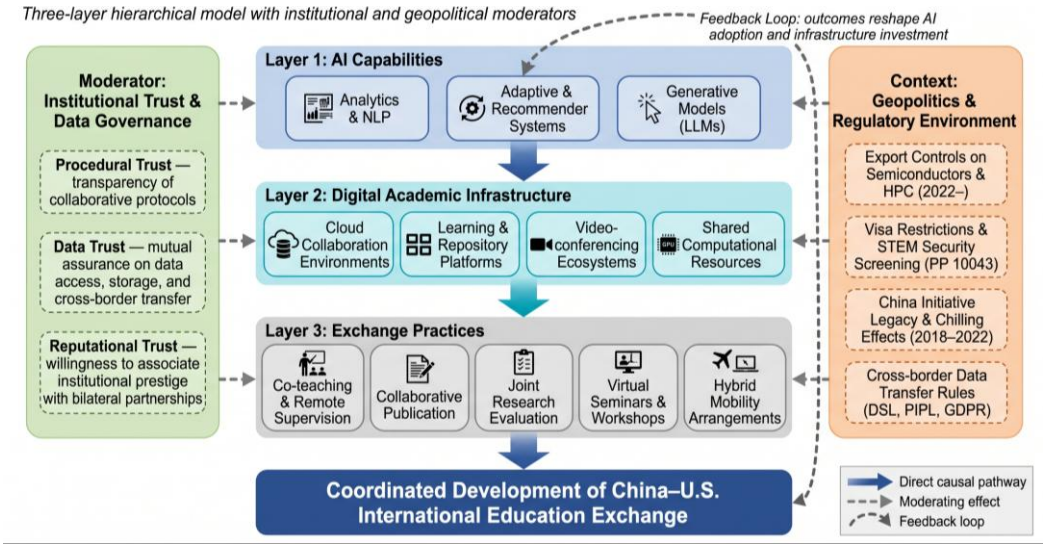

Figure 1. Conceptual framework for AI-enabled coordination in China–U.S. education exchange (schematic). Solid arrows: direct pathways; dashed arrows: moderating effects; curved arrow: feedback loop.

The model applied in this paper is depicted in Figure 1. Solid arrows represent direct causal pathways between layers, dashed arrows denote moderating effects exerted by institutional trust and geopolitical context, and the curved feedback arrow indicates that exchange outcomes reshape subsequent AI adoption and infrastructure investment. AI technologies facilitate the digitalization of academic infrastructure, which facilitates collaboration in research and education, thus fostering hybrid mobility, thereby influencing the development of bilateral exchange. Two moderating factors, namely trust/data governance and geopolitics/regulation, influence the extent to which the outcome is either resilient cooperation or fragmented, low-trust interactions. This model is helpful in understanding how AI technologies can simultaneously increase and restrict exchange.

4. Methodology and Bibliometric Design

The current work employs a structured thematic literature review method enhanced with bibliometric visual analysis. It does not seek to be a definitive overview of all the Scopus publications related to China, the U.S., AI, and higher education. Rather, it seeks to construct a coherent analytical corpus that addresses the core conceptual threads that pertain to the research inquiry. Fifty sources were chosen due to their frequent citation, theoretical relevance, or their significance for developments in five areas: internationalization in higher education, global scientific cooperation, AI in education, learning analytics and datafication, and latest discussions about generative AI and governance.

The dataset was compiled according to four criteria for inclusion: (1) cited in Scopus or published in journals aimed at being cited in Scopus; (2) focused on any of the five predefined topics; (3) shown to have a conceptual impact, which is judged based on citation scores greater than 100 in Google Scholar or its reputation as a fundamental source in two earlier reviews related to that topic; and (4) representing new ideas, especially those published since 2020, concerning generative AI and AI governance. The dataset did not include any paper that mentioned AI or internationalization without addressing cross-border higher education. The procedure described above leads to the creation of a purposive sample instead of an exhaustive one. In contrast to scientometric surveys, which attempt to map out all research areas comprehensively, the current visualization functions as a structural audit of the thematic review, depicting the internal structure of a purposefully sampled literature base. This methodological strategy aligns with the principles of an integrative review, in which the construction of the literature base is based on theoretical pertinence rather than complete

retrieval (Torraco, 2005). The screening procedure is summarized in Figure 2 following a PRISMA-style flow adapted for purposive review (Page et al., 2021). Table 1 presents an overview of the structure of the literature base in terms of the number of references, the period in which they were published, and their key sources.

Table 1. Summary of the review corpus by domain

Domain	N	Year range	Key journals	Representative authors
Higher education internationalization	13 (26%)	2004–2022	Journal of Studies in International Education; Higher Education; Journal of International Students	Knight; Altbach; de Wit; Marginson; Hazelkorn; van der Wende
Global science collaboration	9 (18%)	2004–2025	Research Policy; Scientometrics; Nature; PNAS; AER: Insights	Wagner; Adams; Wang & Barabási; Lee & Haupt; Aghion et al.; Tang; Kitajima & Okamura
AI in education	16 (32%)	2018–2024	International Journal of Educational Technology in Higher Education; IEEE Access; Learning and Individual Differences; Education and Information Technologies	Zawacki-Richter; Chen; Holmes; Bond; Kasneci; Crompton & Burke
Governance, platformization, and policy	12 (24%)	2012–2024	Learning, Media and Technology; Teaching in Higher Education; International Journal of Information Management	Williamson; Selwyn; Perrotta; Dwivedi et al.; UNESCO; Roberts et al.; Jia et al.; Lee; Bound et al.
Total	**50 (100%)**	**2004–2025**		

Records were retrieved from Scopus and Web of Science between March and June 2025, supplemented by Google Scholar for highly cited works not indexed in the two main databases. The search combined three keyword blocks covering internationalization, AI, and the China–U.S. context, with the time span set to 2004–2025. An initial pool of 412 records was identified. After removing 78 duplicates, 334 records were screened at the title and abstract level, of which 196 were excluded for falling outside the five predefined domains. The remaining 138 records were assessed in full text, and 88 were further excluded for insufficient conceptual influence or redundancy with stronger sources in the same cluster. Two foundational works (Castells, 2010; Torraco, 2005) were added through backward citation tracing, yielding a final corpus of 50 references.

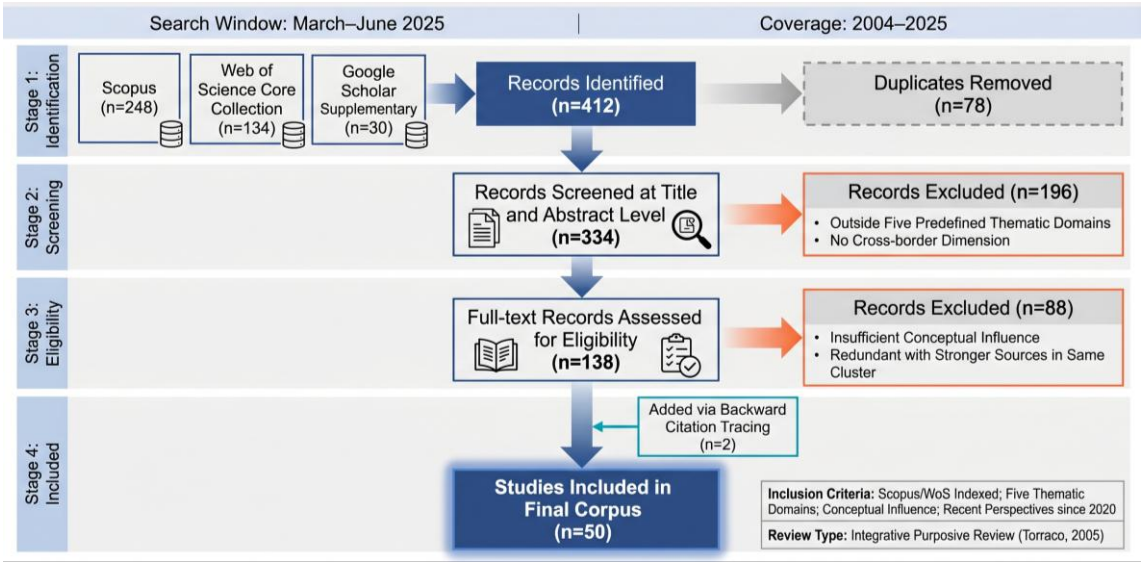

Figure 2. PRISMA-style flow diagram of the corpus selection process.

The bibliometric visualizations are author-constructed conceptual maps, not algorithmically generated outputs from a Scopus export. Each of the 50 references was manually coded along four dimensions: primary thematic domain (Table 1), publication year, up to five content keywords extracted from titles and abstracts, and disciplinary affiliation. The coded dataset was then used to produce network-style visualizations illustrating thematic clustering, temporal shifts, and author prominence within the corpus. It is quite suitable for theoretically oriented research with policy implications as its main output.

Three perspectives on bibliometrics are discussed. Keywords were manually extracted from titles, abstracts, and author keyword lists. Co-occurrence was counted at the reference level, with a minimum threshold of two shared appearances applied to filter peripheral links. The first perspective is a keyword cocitation graph showing the three themes into which the review's body of literature is organized: AI, internationalization, and governance. The second perspective is the evolution graph of thematic center-of-gravity indicating the shift of focus within the literature from internationalization and mobility to AI, generative systems, and data governance. Lastly, the third perspective is an author prominence graph depicting important authors and source traditions that underpin the review.

From a methodology perspective, it combines these visuals with textual analysis. The citations have been classified in terms of the primary theme addressed, the year of publication, and the relevance to any of the following research questions: What kind of internationalization is being talked about? What is the role played by digital technology in this process? How do the processes of cooperation operate? And what implications are drawn specifically for cross-border higher education?

To assess the stability of the thematic structure, a robustness check was performed by re-running the search with two alternative keyword configurations. The first substituted "transnational higher education" and "academic cooperation" for the original internationalization block, while the second replaced "artificial intelligence" with "machine learning" and "educational technology". Both configurations returned corpora of comparable size (n=47 and n=52) after applying the same four inclusion criteria, and their thematic distributions across the five predefined domains deviated from the main corpus by no more than three references in any single domain. The three-cluster structure reported in Section 5 (AI, internationalization, governance) remained identifiable under both configurations, with governance-related keywords consistently bridging the AI and internationalization clusters. This suggests that

the main findings are not driven by specific keyword choices.

5. Bibliometric Reading of the Corpus

The network map for the curated set is presented in Figure 3 Node size reflects keyword frequency in the corpus, and edge width represents co-occurrence strength. Clusters were assigned through modularity-based grouping of the co-occurrence matrix. Three distinct clusters appear to be present. The first one is the blue one, which focuses on terms directly related to AI, such as learning analytics, natural language processing, digital platforms, and generative AI. The second one is the red cluster, where one can find the classic terminology of internationalization, such as student mobility, partnership, global science, and internationalization itself. The third cluster consists of terms relevant for the topic of governance, such as trust, ethics, data governance, policy, and research security. What matters here is not the existence of three clusters but that the strongest associations are formed by platform-mediated and governance-oriented terms rather than by mobility alone.

The bridging nature of terms like 'generative AI' and 'research security' needs further exploration. Bridging nodes link the AI and governance clusters, indicating that generative AI has become a field in which technology and governance issues have begun to intersect more and more frequently. Such a situation has certain significance when considering China-U.S. relations. China and the United States take distinct approaches to managing generative AI. China mandates algorithm registration and security evaluation before releasing generative technology on the market, whereas regulation in the U.S. remains voluntary and self-implemented (Roberts et al., 2024). Universities that seek to co-develop or share generative AI technology between these two states can find the differences between the two approaches manifested through the bridging nodes.

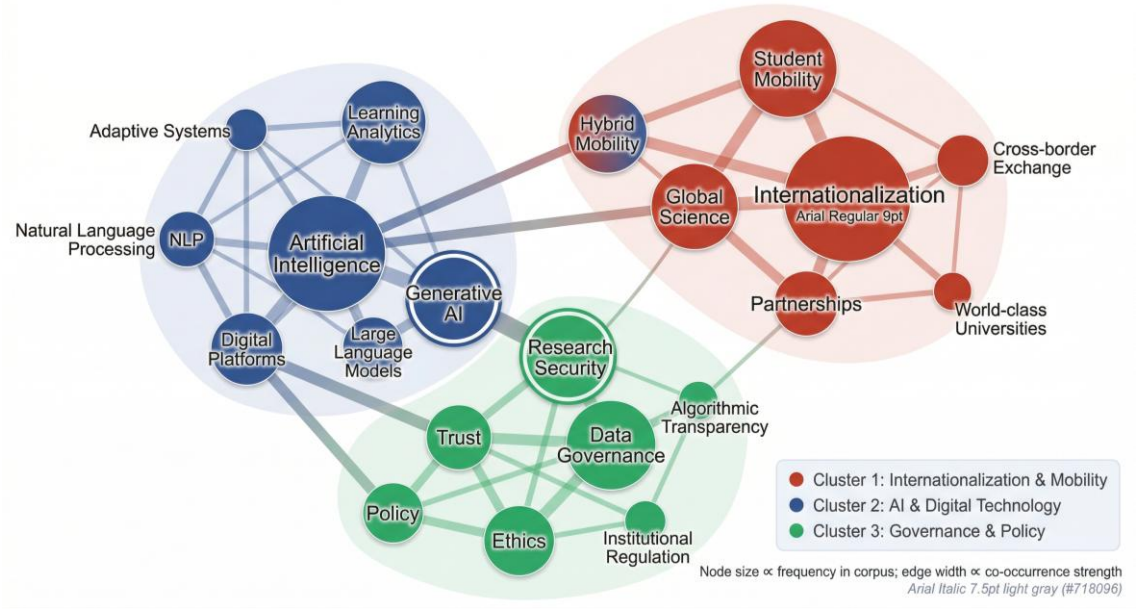

Figure 3. Keyword co-occurrence map of the review corpus (schematic illustration). Node size ∝ keyword frequency; edge width ∝ co-occurrence strength; node positions are layout-driven without quantitative meaning.

The timeline included in Figure 4provides us with yet another dimension to consider. During the initial period of our corpus, the topics discussed include internationalization, mobility, and collaboration in science. It is noteworthy that this conforms to what can be found in the literature from the 2000s and early 2010s. At about the time of 2019 to 2024, on the other hand, the focal

point of discussion has clearly shifted towards AI in education, generative AI, and data governance. This does not mean, of course, that the traditional aspects of internationalization have ceased to be important.

The transition of focus over time from the themes related to mobility to AI and data management (19-33 vs. 2019-now) coincides to some degree with the policy changes occurring in the context of Sino-American relations; however, the mere coincidence should not be viewed as causality. The former timeframe is associated with the era of increased bilateral interaction, where the number of Chinese PhDs studying in America was significantly increasing. The turning point in the theme that can be seen around 2019 is consistent with the establishment of the China Initiative, the increased scrutiny in STEM visa application processes following Presidential Proclamation 10043, and the concurrent intensification of China's national AI policy landscape (Bound et al., 2024). It is possible that such geopolitical developments have had an influence on shaping the issues that researchers deemed pressing, shifting attention from mobility issues to governance of data and technology in contentious bilateral territories, although it is possible that advances in AI technology itself played a more prominent role in driving the theme change.

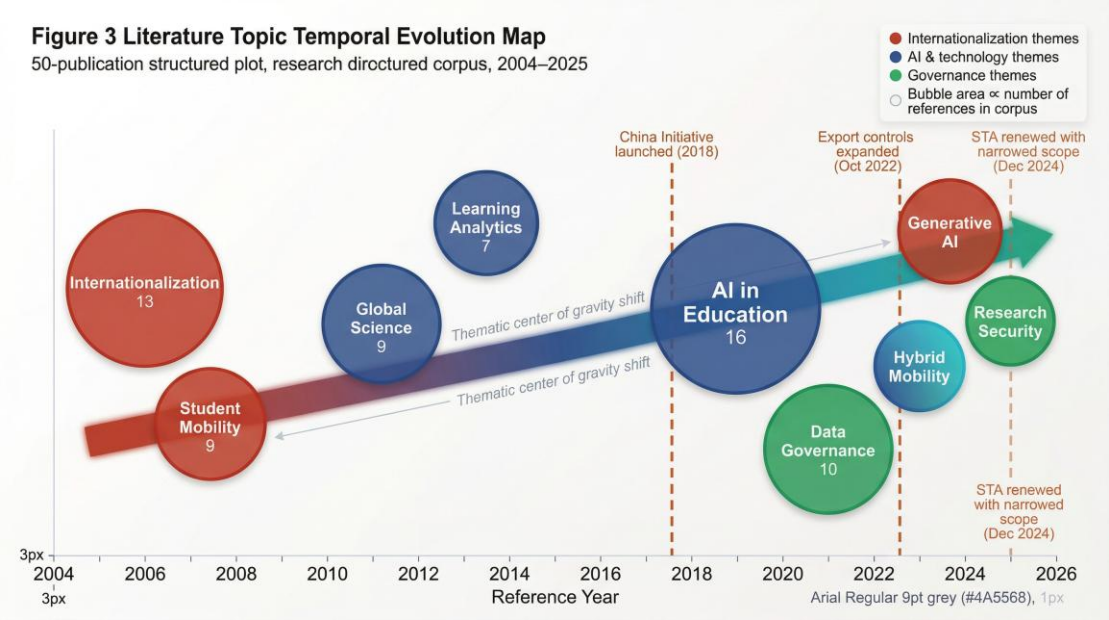

Figure 4. Thematic evolution map of the reference corpus (schematic illustration). Horizontal axis: reference year; bubble area ∝ number of references per theme; vertical positioning is illustrative only.

Figure 5highlights the authors and the sources on which the review is based. Relative Prominence is a composite of two indicators: the number of corpus entries authored and a normalized Google Scholar citation count (ratio to corpus median). The horizontal axis is the weighted mean publication year of each author's corpus contributions. Authors such as Knight, Altbach, de Wit, Marginson, and Wagner set the stage for the concept of internationalization and collaboration within science. The shift from mobility and collaboration to more intensive discussions about AI can be seen in authors such as Zawacki-Richter, Chen, Bond, Kasneci, and Williamson. The presence of both sets of authors underscores the key point of the paper – namely, that the future of China-US exchange cannot be discussed solely within the context of either mobility or AI.

One noteworthy aspect of the author map warrants discussion here. The data used in this study (as well as the general body of literature on Sino-U.S. education exchange in English) is mostly composed of contributions made by scholars from Western universities. Scholars affiliated with Chinese universities are featured

only at the margins (Zhou et al., 2009; Xiao & Yi, 2022). It goes without saying that this situation arises because of known inequalities in academic publication in English language journals and visibility of works written in Chinese in the Scopus database. As an article discussing a bilateral phenomenon, the current imbalance is theoretically relevant because it implies that the theoretical models which may be used to analyze China-U.S. cooperation emerge in just one of the two parties. For future research, a conscious effort should be made to consider Chinese literature and perspectives of Chinese universities.

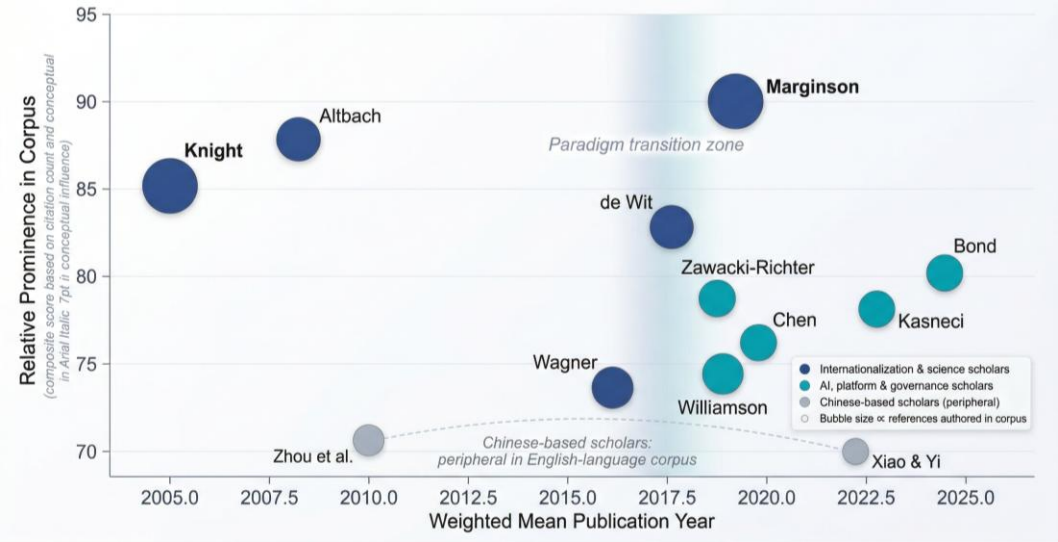

Figure 5. Author prominence map (schematic illustration). Horizontal axis: weighted mean publication year; vertical axis: composite prominence score (corpus entries + normalized citation ratio); bubble size ∝ number of references authored. Scores reflect position within this curated corpus only.

As a whole, these bibliometric trends can be summed up in an important conclusion about the nature of the research being published. The field is clearly not moving towards a purely technocratic approach where the problems associated with politics will be solved by the use of AI systems alone. To the contrary, the rise of governance terms suggests quite the opposite. The greater the degree of datafication and involvement of AI technologies, the greater the importance of ethical norms, transparency, and legitimacy.

6. Discussion: Implications for China-U.S. Exchange

The China-US scenario reveals the potential and limitations of AI-driven internationalization. As shown by the bibliometric analysis, today AI capacities meet the issue of governance within the very core of the discipline, and the interaction between these two domains is especially vivid in the context of the bilateral relations. In times of limited mobility or enhanced risk assessment, AI-based technologies that allow for conducting doctoral supervision, joint writing, seminar sessions, and coordinated research across different locations become more flexible.

Existing evidence indicates that such flexibility tends to be context-dependent rather than universal. Scientific cooperation in low-risk disciplines like climate change research, seismology, and epidemiology has proven to be relatively robust despite the shrinking of cooperative initiatives in highly technological industries (Kitajima & Okamura, 2025; Tang, 2024). In December 2024, the extension of the U.S.-China Science and Technology Agreement, following extensive negotiations, including two six-month extensions, incorporated new clauses on data exchange and safeguards for researchers. It should be noted that in the updated agreement, the scope of activities was significantly reduced to basic research at the level of government to government, which did not include key or emerging technologies like AI or semiconductors, among other changes. Even

though such reduction can be viewed as an approach to risk minimization, it also indicates that the realm of bilateral higher education exchanges is now outside of the STA framework.

The same technologies also generate forms of dependence and contention. Channels of exchange now rely on infrastructure, computing resources, and data that are far from neutral. Issues such as access, terms of service, algorithmic reliability, regulatory compliance, and data hosting determine which actors can engage in the process and under what conditions. When the context is politically volatile, these factors take on added significance. An otherwise simple partnership between disciplines may turn out to be difficult when organizations raise questions about data hosting, model training, export controls, or whether AI-augmented work passes the test for integrity.

These difficulties are currently evident. The United States' export restrictions on semiconductors and computing hardware, which were first introduced in October 2022 and subsequently modified in October 2023, influence the availability of computing power used for collaborative AI research. Chinese researchers who were able to utilize cloud-based GPU computing services from the United States might be constrained in their ability to do so due to potential compliance requirements, even though the implementation is subject to the application in question. As far as China is concerned, its decision made in 2023 to limit the availability of international access to certain parts of the CNKI database sparked worries regarding the issue of reciprocity in data sharing, which is an essential precondition for cooperation in bibliometrics and social science research. It seems that the importance of platform dependency in the theoretical model has real-world implications for the research process.

Hybridity will therefore be important. Neither a reversion to the earlier mobility-focused approach nor an entirely virtual alternative is the expected path forward. Rather, several forms of hybrid cooperation could assume increased relevance in the China-U.S. case. For one, the multi-country project model, where both Chinese and U.S. scientists collaborate not only with each other but also with researchers from third-party nations, might mitigate the bilateral sensitivity of data exchange and publications by dispersing collaboration efforts geographically. Indeed, examples from big science projects, like CERN or SKA, show that multi-country arrangements can successfully support international cooperation despite difficult bilateral relations. A more immediate case is the LIGO–Virgo–KAGRA gravitational wave collaboration, in which Chinese and U.S. researchers continued joint data analysis through a multilateral consortium after the 2020 suspension of several direct NSF–NSFC channels, suggesting that multilateral embedding can partially absorb bilateral shocks. Second, tiered access systems, in which shared teams use analyzed or synthesized information rather than the raw data itself, might provide a solution to this problem in practice. The principle is used in genomics, where the Global Alliance for Genomics and Health has established federated data-analysis mechanisms, which let scientists search for data from distributed databases without actually downloading it. A comparable institutional solution is NYU Shanghai, which operates under a joint venture between NYU and East China Normal University and maintains separate but interoperable data environments to accommodate both U.S. research integrity requirements and Chinese data-localization rules, illustrating how tiered access can be embedded in routine teaching and research. Lastly, digital collaboration carried out via the Internet remains an alternative when traveling and visa issues become problematic, although they do not replace trust built through personal meetings.

The argument behind multilateral configurations follows from a fundamental structural characteristic; the risk of bilateral cooperation is concentrated in one relationship alone. If relations between China and the U.S. deteriorate, then bilateral collaboration is threatened directly. Collaboration that takes place within the context of a multilateral configuration, whether this involves an international organization or a

university network across regions, disperses risk into multiple relationships. Yet multilateral collaboration also entails certain coordination problems and could mean less deep collaboration than would be possible bilaterally. The problem is therefore not to shift from a bilateral to a multilateral approach, but to create a combination of configurations which maximizes depth and resilience at the same time. The implication for university policies should be that internationalization should not be considered as a distinct matter from the regulation of AI. Universities that spend a lot on tools yet ignore cross-border norms and relationships will continue to experience fragility in their collaborations. However, universities that develop norms regarding how data should be managed, the use of AI, research ethics, and digital teaching and learning are likely to build more resilient channels of exchange even in an adversarial geopolitics. The Duke Kunshan University and Tsinghua–MIT Global MBA programs offer practical illustrations: both maintain continuous faculty co-teaching and dual-degree pathways despite policy turbulence, largely because governance protocols on curriculum equivalence, data handling, and ethics review were established before the exchange practices themselves.

7. Conclusion

The rise of artificial intelligence is changing the shape, scope, and governance needs of international educational exchange between China and the United States. The most significant development regarding the China-U.S. connection involves an emerging structure for collaboration that involves greater reliance on digital platforms, processes, and governance than ever before. Indeed, while mobility, partnerships, and collaboration on publication remain fundamental elements of internationalization, they now depend more heavily upon data platforms and technologies.

From the carefully selected bibliometric analysis conducted by this study, it is clear that the academic discourse on the topic has evolved along these lines. Internationalization and global science have been recurrent themes, but they are now inextricably linked to artificial intelligence, data governance, and hybrid mobility. Clearly, this suggests that future studies should not regard technological change and geopolitical change as entirely separate spheres. These four elements – interoperability of infrastructure, clarity of protocols, reciprocity of trust, and multilateral resilience – indicate that the governance aspect of this bilateral academic relationship is equally worthy of strategic consideration as the research outcomes and student recruitment activities that organizations already devote considerable attention to. While such measures may not eliminate differences or address the strategic dilemmas that limit the relationship, they could facilitate greater governability and resilience than would be possible under ad hoc approaches alone. There are three possible directions of research which can be proposed based on the results of this study. The first one involves conducting empirical investigations focused on the current application of certain AI instruments in cross-border academic cooperation, rather than studying applications of AI tools to learning generally. The second direction involves comparing universities which continue cooperating effectively with Chinese partners in spite of all challenges imposed by the current political situation. It may be interesting to analyze whether such cases may be regarded as universal solutions. Finally, the third research direction includes designing bilingual research projects since, according to the author prominence analysis, there is an obvious prevalence of English-language literature on this topic.

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