Parallel Tracks and Pedagogical Gaps: Investigating AI Adoption in Higher Education

Abstract

Since the public release of generative AI tools in late 2022, higher education has witnessed a rapid surge in adoption among students and faculty. This paper examines the extent to which pedagogical practices have substantively changed in response to this technological shift. Drawing on recent surveys, institutional reports, and global policy frameworks, the analysis focuses on three key domains: educational policy, faculty engagement, and student use of AI. While policy directives increasingly advocate for AI integration, and both students and educators report high usage rates, the evidence suggests that their practices remain largely utilitarian and disconnected. Students use AI for writing assistance and academic support, while educators focus on efficiency in grading and planning—often without institutional guidance. The paper argues that despite widespread adoption, AI has yet to catalyze a systemic transformation in classroom pedagogy. It concludes by calling for a shared pedagogical vision that bridges the gap between policy, practice, and innovation in teaching and learning.

Introduction:

OpenAI released its latest model, GPT-5, in the summer of 2025, nearly three years after the launch of ChatGPT-3, which marked a watershed moment in public engagement with artificial intelligence (AI). The release of ChatGPT-3 in late 2022 catalyzed one of the first widespread, hands-on interactions between the general public and generative AI technologies. Within just two months, over 100 million individuals had interacted with the model (Milmo 2023), generating a spectrum of reactions ranging from enthusiasm and curiosity to skepticism and concern. The initial response from educators was notably defensive. Many institutions implemented outright bans on AI tools and platforms across their networks (Barry 2023), while prominent voices in academia questioned the accuracy (Reed 2023) and pedagogical adequacy (Warner 2023) of these models. This resistance reflected broader anxieties about the implications of AI for academic integrity, learning outcomes, and the role of human expertise in education.

However, by 2025, the educational landscape at universities and colleges had shifted to a certain degree. AI adoption among students and educators surged, with 86 percent of students reportedly using AI tools and platforms (Digital Education Council 2024) and 61 percent of educators incorporating them into their professional practice (Digital Education Council 2025). Despite these impressive rates of adoption, quantitative rates alone offer limited insight into the deeper structural and pedagogical transformations within higher education. While it is easy to observe that students appear eager to adopt AI and that educators, by contrast, have been slower and more hesitant in their use of AI tools and platforms, it is harder to understand if and

how the pedagogical practice changed in response to the AI technology. In other words, are the universities' day-to-day practices in the classroom notably different since the emergence of AI? This paper investigates whether and how pedagogical practices in higher education have substantively changed in response to the widespread adoption of generative AI tools and platforms.

For that reason, this analysis collects the evidence of ways that AI impacted the lives of those who shape the pedagogical practices – teachers and students. In order to examine the impact of generative AI on education it is important to focus on the available evidence over the three year period since the widespread use of AI was first recorded. In addition, another crucial factor that directs the decisions and actions in daily operation of the university are the policies that guide and instruct the use. Therefore the third target of analysis is the educational policy during this period. All in all, this analysis examines three areas most likely to reflect the change in use of AI technolgies: educational policy, educators' adoption of AI and the students' uses of AI tools and platforms. While much of the research comes from the American colleges, this analysis includes international practices when possible, drawing on recent studies and institutional reports to highlight how universities in diverse contexts are engaging with AI.

Historical context and procedure

Concerns about the impact of AI on education have long been present in academic literature. Even prior to the invention and adoption of generative language models (LLMs), scholars anticipated significant disruptions to traditional educational paradigms (Holmes and Ilkka 2022). Simultaneously, cautionary perspectives emerged, highlighting potential risks across political, social, economic, environmental, and cognitive domains (Selwyn 2022; Poquet and Buckingham Shum 2022).

Multinational organizations and national governments began addressing these challenges early on. The Qingdao Declaration (2015) offered a set of policy recommendations for UN Member States to promote equitable and quality education in the digital age. Building on this foundation, the Beijing Consensus on Artificial Intelligence and Education, published by UNESCO in 2019, provided a comprehensive global framework for the ethical and effective integration of AI technologies into educational systems. Endorsed by representatives from 105 countries, the document aligns with the Education 2030 Agenda and Sustainable Development Goal 4 (SDG 4), which advocates inclusive and equitable education and lifelong learning opportunities for all (UNESCO 2019). Together, these frameworks underscored the need for a deliberate and values-driven approach to AI integration in education—one that balances innovation with equity, and technological advancement with human-centered pedagogy.

OpenAI's release of ChatGPT-3 was an inflection point that changed everything for many educators in higher education in the US and globally. Different from the early predictive and recommender AIs that powered social networks, it relied on LLM infrastructure trained through reinforcement learning with human feedback. It featured a chat function which lowered the know-how barrier for an AI interaction. The release of the free model removed the cost obstacles propelling GPT-3 to achieve the fastest rate of adoption for a consumer application in history (Milmo 2023).

The educational reality changed as the first generative AI became available in 2023 to both students and teachers, each experimenting on their own in personal and professional settings. It also opened the door for other models and urged commercial cooperation to flood the digital space with different generative models, all competing for the consumers all over the world. In March of 2023, Anthropic's Claude and Google's Bard came out, Meta introduced Llama a month later and Microsoft unified all their AIs under the Copilot brand in November at the same time as X's Grok came out. What became obvious was that the educators and students were now operating in a new environment.

Therefore, the initial parameter that was used to frame this research is the particular time-frame that begins with the release of generative AIs in 2023. While it is important to note that the Chat GPT 3 originally launched in November of 2022 (and that other models existed prior to that time), it would be unrealistic to consider that the practice and the adoption of AI in the last months of 2022 would have significantly affected the educational system in such a short time. While artificial intelligence in its recommender and predictive formats has been considered to have made an impact on higher education in the years prior (Holmes and Ilkka 2022), this study is only concerned with change caused in the period since the popular adoption of generative AI tools and platforms. Additionally, three year time frame during which AI tools and platforms been in the hands of general public is of significant duration for it to make perceptible impacts in the spheres such as the economy, culture or educational systems.

Another parameter in framing the study is its focus on the pragmatic bend, a firmly utilitarian angle of analysis. Most existing studies justifiably concentrate on the multitudes of factors shaping AI technology. So it is not uncommon that a single study might explore benefits, drawbacks, motivations, and ethics all at once (Selwyn, 2022; Munaye et al. 2025). This study aims to focus singularly on the pragmatic, utilitarian approaches to AI, intentionally disregarding the other important questions. Informed by the normative ethical theory, the implementation of AI is evaluated based on the outcome - their utilization and implementation at different levels of university system. In other words, it is primarily concerned with the way the policy instructs the system to use AI and how students and teachers do so. This angle intentionally leaves out the important questions that some other studies explore richly. Therefore, it seeks to

understand the use and implementation of AI across three primary domains: the educator level, the student level, and policy dimensions.

Artificial Intelligence and Education Policy: Consensus Call for Adoption

In the realtivly short period of time for a systemic change in pedagogical practice, the best ancillary concept that could indicate the beginning of transformation is the educational policy. Assuming that initial adoption of AI might not reflect on the behavior of the entire system this early in the process, the policy is usually a driver of change in any complex system, and this is no different in education. However, educational policy is itself a complex system featuring variety of actors, levels of organization and difference across national systems. Here we must recognize international, national, and local organizations as well as diversity of actors proposing policy (administrators, faculty, researchers, etc.).

At the global level, several prominent organizations are urging for integration of AI tools in classroom. UNESCO has been the most vocal global leader calling for endorsement of AI in education. From its capacity to organize the international system into the Bejing Consensus in 2019 to the latest report in 2025 emphasizing the need for competency frameworks across diverse educational contexts, UNESCO has been leading the way.

The urgency for quick adoption of AI in the classroom is best illustrated by the reputation of organization that took the stand to issue the recommendation in the last two years. Almost all the global leading organization such as the World Bank, OECD, UNICEF, UNESCO, The World Economic Forum reported a consensus call in their reports confirm the resolve to change educational policy on the national and global stage.

Governmental efforts are not lagging behind the international trends. Individual governments are trying to urge the rate od adoptions, for example by the end of 2024, “10 countries have issued guidance on Artificial Intelligence in education.” (Maslej et al., 2025). The US government has done it twice in the last two years, similarly across the two administrations that seem to agree on very little else. Both Presidents, Biden in 2023 and Trump in 2025 issued executive orders urging the educational system to embed the AI in educational practice.

Individual educational institutions continue to be the primary venue where policy can actively shape the curriculum standards and broad and diverse recommendations are being promoted. A lot of universities have responded individually with their own institutional efforts, launching AI centers and hubs. For example, Harvard University’s Bok Center (2025) and Elon University AI Hub (2025) provide the faculty and staff with recommendations, resources, but also official university’s policies for instructors’ use in their own teaching practices.

At the level of the classroom, faculty are not only end-users of policies but also policy influencers and ethical stewards. The American Association of University Professors (AAUP)

emphasizes that faculty are best positioned to understand and improve teaching and learning conditions, including the development and implementation of institutional policies. Their 2025 report calls for active faculty input in decisions related to AI deployment and oversight, particularly in regards to academic freedom, intellectual property, and equitable working conditions.

In sum, looking at the available evidence from the recommendations in the policy across multiple levels of actors, there are strong indicators that the pedagogical practice is indeed about to undergo a significant transformation. There is a proliferation of policies on all governing levels, from the classroom level to the national as well as international guidelines. Integration of such a transformative tool like AI requires determination of active agents at all levels. Best summarized in the report by World Economic Forum (2024), the collaboration and variety of actors, each having their own responsibility depends on not only on the top-down actors but specify the responsibilities of institutions (government and NGOs), researchers, faculty and students (World Economic Forum 2024).

Artificial Intelligence Use by Educators: Patterns, Purposes, and Implications

Artificial Intelligence is increasingly embedded in the fabric of higher education, yet its adoption among faculty remains dubious and inconsistent. In the first two years, findings revealed low to moderate levels of the use of AI, with educators primarily using these tools to automate routine tasks (Al-Zahrani, 2024; Belloula, 2025; Cambra-Fierro et al. 2024).

More recent surveys demonstrate an increasing adoption of AI tools by the educators. A 2025 survey by the Digital Education Council found that 61% of faculty have used AI in teaching suggesting a growing but cautious engagement with the technology. A 2025 report from Ellucian found that 84% of higher education professionals now use AI either professionally or personally, marking a 32-point increase from the previous year (Ellucian 2025). Most palpable trend confirmed in the report is the expectation that the use of AI for work will expand over the next two years.

However, these figure mask significant variation in depth and frequency of use. Among those that report the use of AI in Digital Education Council survey, 88% engaged with AI minimally (2025). 39% of faculty members had not used AI in their teaching and 40% of faculty reported feeling that they are at the beginning of their AI literacy journey.

Additionally, an important caveat is the North American origin of these studies where college-trends in regards to rate of technology adoption tend to rate higher than the global average. Comprehensive studies that examine comparative global rates of adoption are yet to report AI use at the global level.

Baytas and Ruediger (2025) summarize the problem eloquently indicating that most faculty members have experimented with AI tools, but far fewer have settled into sustained and productive integration. The American Association of University Professors confirms this conclusion in their survey of 500 faculty members across nearly 200 U.S. campuses finding that while many faculty use AI tools and platforms in their teaching and research, they often do so without institutional support or clear instruction (AAUP Survey 2025).

In terms of quality of use, AI adoption among faculty remains largely utilitarian. The dominant use cases remain focused on time-saving and efficiency, rather than transformative pedagogical change (Kamalov et al, 2023). At the individual level, faculty members are exploring a number of ways they can optimize their workflows and reduce the time-consuming administrative tasks (Chan and Tsi 2023; Mikeladzee et al., 2024).

The common thread across the literature and the primary reason that educators use generative AI tools is to increase efficiency (Maslej et al. 2025). Several useful strategies are reported where AI was helpful in suggesting course outlines, designing learning objectives, and even offering assignments and activities for class. Harvard's Generative AI also suggests a variety of ways that AI can help their teachers summarize the sources they wish to use in their syllabi, create slideshows for lectures, and brainstorm further questions to explore (Harvard University 2025).

These uses reflect a broader trend of exploratory engagement, where the focus is on faculty enhanced productivity rather than potential substantial change of pedagogy. Even if such use can be described as the use of AI for course design or curriculum development, the emphasis is on efficiency and time saving benefits for the teachers rather than on novel benefits that these changes might bring to students.

Another example of similar use is automation of time-demanding process involved in grading and assessment. Grading and assessment represent one of most substantial and laborious tasks among university faculty. AI-assisted grading tools are increasingly used to automate feedback, reduce instructor workload, and improve consistency in evaluation. Among these, a growing number are leveraging AI for grading tasks, particularly in large-enrollment courses where manual feedback is often impractical.

Large language models (LLMs) can be effective in grading short-answer questions (Heinrich et al. 2025). Their study found that AI can mimic instructor's personalized feedback providing comments comparable to that of small-class settings. More sophisticated grading frameworks, like GradeOpt, were found to be able to grade open-ended and short-answer questions (Yucheng et al. 2025). Automated essay scoring (AES) tools such as PEG, e-rater, and

IntelliMetric revealed that AI excels evaluating written assignments based on linguistic features such as grammar, vocabulary, and essay organization (Bouziane and Bouziane 2024).

All in all, educators' employment of AI for grading offers the most palpable benefit of time-saving. They can significantly reduce the evaluation time and simplify the grading effort. Despite these benefits, concerns about grading practice persist (Najafi et al 2025). Faculty members worry about the fairness and transparency of AI-generated grades as well as the potentially undermining effects of their professional autonomy (American Association of University Professors 2025). Another concern is that student use of AI will lead to the loss of critical thinking and iterative writing processes and therefore some have started to build the grading assignments that are "AI-resilient," focusing on oral exams and in-class reflection (Derek Bok Center 2025).

The focus on efficacy in the workflow extends on other faculty responsibilities: professional development, research and advising. Educators, much like students, also use AI as a creative assistant in academic work, supporting ideation and exploration in research and teaching (Romero and Urmeneta 2025). Khlaif et al. (2003) studied the way that ChatGPT can generate high-quality research, with limitations on data interpretation. Unsurprisingly, AI also increases the efficacy of academic advising. Some optimizing activities in academic advising have been reported primarily in the US. Dawood (2024) highlights the use of conversational agents to automate repetitive advising tasks, such as scheduling, content delivery, and feedback freeing up faculty advisor time for more complex guidance. Thottoli et al. (2024) search academic literature between 1984 and 2023 in search of the model for "auto-advising system". Again, the focus is on time-saving for faculty who are perceived as inundated with teaching and research and not on improved experience in the classroom.

Artificial Intelligence Use by Students: Assistant and Plagiarist

AI tools have permeated the entire higher education system suddenly over the last three years, but the most prolific is the use of AI at the student-level. Students emerged as the most widespread adopters of technology - at astonishing 86 percent of use (Digital Education Council 2024) - despite the scarce instruction and formal encouragement from the educators (Valentini and Blancas 2025). Students increasingly rely on AI tools and platforms for academic and personal support, ranging from intelligent mentoring systems and writing assistance to mental health support, organization and planning. This shift reflects both the opportunities and challenges posed by AI integration in educational contexts.

One of the most frequent uses of AI - writing assistance- is both well recognized and highly controversial. Students use AI appropriately to generate writing, employing tools like ChatGPT to engender ideas, summarize readings, and refine drafts (Huff 2025; Maslej et al. 2025).

However, this convenience comes with major ethical concerns, the most obvious is the increased frequency of plagiarism – where AI tools and platforms complete the entire assignments replacing the student writing and thinking process. Such use of AI has brought some to declare a crisis in education claiming that widespread use of AI in writing is seen to undermine the educational process and devalue academic credentials (Kovari 2025). The obvious trend of AI-facilitated plagiarism is not only well documented but also on a steep rise (Lund et al. 2025), prompting institutions to rethink academic integrity policies (Cotton et al. 2023; Tlili et al. 2023).

Despite the widespread use of AI, many students feel ill-equipped to navigate this new landscape which could serve as an explanation for steep inclines in plagiarism. According to Valentini and Blancas (2025), 58% of students feel unprepared for AI's impact on education, and nearly half lack confidence in their AI-related skills. This could be the reason why students wholeheartedly embrace the sanctioned and supervised AI tools and platforms offered by the instructors. One such transformative application is in intelligent tutoring systems. Kestin et al. (2025) found that college students using an AI-powered tutor learned more than twice as much in less time compared to those in an active learning class. The AI tutor, designed with pedagogical best practices, also enhanced student engagement and motivation. Similarly, Kamalov et al. (2023) highlight AI's role in personalized learning, where adaptive systems tailor content to individual student needs, improving comprehension and retention. Similarly to tutoring are the virtual mentoring system. Gudoniene et al. (2025) describe how conversational agents provide guidance and feedback, simulating human mentorship in scalable ways. What these isolated examples seem to underscore is the need for personalized learning. Such an approach would represent a revolutionary change of pedagogy, and it is likely to take time and have a comprehensive implementation strategy.

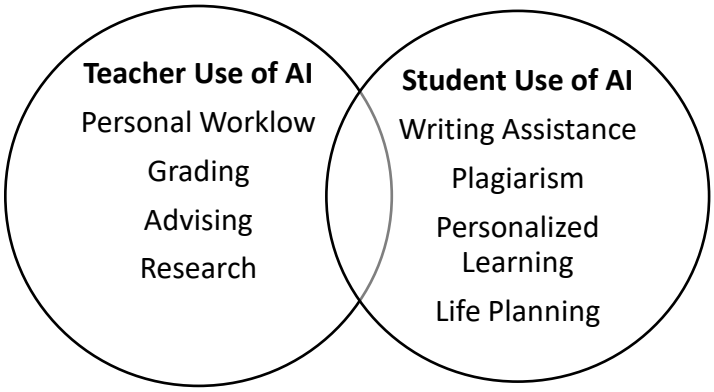
Another significant potential for student AI's use extends to advising, organization and planning. Moquin (2025) emphasizes that AI-driven advising systems can deliver early intervention strategies, improving both student experience and institutional scalability. Apps like YouLearn exemplify this trend, integrating AI to streamline routine advising tasks and provide real-time feedback. General availability of 24/7 support and personalized recommendations enhances students' ability to organize and plan for their academic obligations.

In brief, AI is reshaping student experience in higher education. While its benefits— writing assistance, personalized learning, and efficient advising —are clear, the challenges around preparedness and integrity remain. Addressing these issues requires a balanced approach that promotes responsible the use of AI, supports student skill development, and safeguards academic standards.

Lessons learned from early AI adoption: Parallel tracks with little convergence

When it comes to the early lessons on the implementation of AI in higher education, there is little ambiguity about the policy directive –urgency to adopt AI is present in all the reports. In response, students and teachers demonstrate a high rate of adoptions and willingness to use AI, but the question remains whether such a change is sufficient to make an impact on pedagogical practice in general. From the examples and evidence above, it appears that students and educators are using AI to improve their workflow and ease their workloads. Educators are concerned with making their grading, lesson planning and professional obligation less time-consuming and more efficient and students are interested in easing the work required for the assignment and assistance with academic life issues. Summarized in graph, it appears that the primary way each of them is using the AI leads to no natural overlap (Graph 1).

Graph 1: Primary use of AI by teachers and students



This is not to say that the outcome of the work produced by utilization of AI by both parties is not beneficial, it simply suggests that the primary way of AI utilization is apart from one another. It also appears that it happens apart from the classroom as well as away from affecting the daily in-class pedagogy. More cynically, the adoption of AI in higher education appears disconnected, with students and educators using it past one another, as if navigating parallel tracks with little convergence. It appears that both parties use it to ease and lessen the workload, thus decreasing the effort without apparent benefit for the middle ground.

At the moment, focusing on either educators' or students' use predominates the research discourse. Such separate approach is most evident in the studies by Digital Education Council. An excellent report called Global Artificial Intelligence Faculty Survey, (Digital Education Council,

2025) provides detail accounts from 1,681 faculty members across 28 countries but says little about the students or AI rates of adoption in the classroom. Instead, they conducted a separate study a year earlier that examined students' use (Digital Education Council 2024). Carried out separately, one year apart from each other, these two examples tell us little about the middle ground, namely about how the classroom instruction, pedagogy, interaction and learning has changed in response to technology.

Therefore, one of the most important lessons for further analysis should be a more direct emphasis on the changes in pedagogical practical environment in the middle - the overlapping space between students and teachers. The best way to operationalize that space in the middle ground is by acknowledging the classroom as one of the observable indicators where the change in practice could be studied. In other words, asking how the classroom changed in the age of AI could provide a better understanding of how teaching and learning has changed.

But such studies are currently in short supply. When it comes to impact on the pedagogical environment, the number of empirical examples dwindles, and the studies tend to assume more advocative tone (Kamalov et al. 2023). For example, Kamalov et al. explain the clear benefit of grading automation, strong evidence about intelligent tutors but in the section on the collaboration between teachers and students in the class does not cite single empirical evidence of such shift (2023). Reports of significant changes in instructional design or pedagogical philosophy are scarce, and there is limited evidence of systemic transformation (Alqahtani and Wafula 2025).

Another possible explanation for the lack of change in pedagogical practice could be that such a change in classroom activities is happening organically on a smaller scale in the individual classes driven by enthusiastic early adopters. As such, it might take significant time before the practice begins to feel like a substantive change. Just like in any bottom up effort, the change is slow and hard to notice in the beginning. Some studies indeed showed potential examples of changes in the classroom, however; at the moment examples like the ones from Virginia Tech classroom (Weichert and Eldardiry 2025) or a Swiss university case studies (Walter 2024) are isolated anecdotal impacts on individual classes that do not offer substantive distinguishing patterns. It is possible that the technology has not been used long enough across the board for the studies to demonstrate an impact of AI on that pedagogical practice in any substantive way. In other words, in order to examine the systemic change, longitudinal studies and meta-analysis would have to be conducted in the future in order to capture the sense of how teaching and learning changed under the influence of AI tools and platforms.

Most optimistic angle of analysis would point out that the policy calls are in congruence with the behavior of students and teachers and that the change in practice might just be a lagging indicator. While the policy recommendation and use of AI appear to be in concord, it is less clear

why universities have not settled on productive ways of integrating the tools in the classroom. It appears that policy recommendation sufficiently understands the problem at hand but despite recognizing the urgency and vibrant use of AI tools and platforms most universities have not established a clear pathway of action in the classrooms.

Another obstacle to a faster change is the complexity of the consequences of AI use along with the many unresolved issues from the earlier adoption of digital platforms. Some of the concerns date back to the well documented issues with data privacy, algorithmic bias, and institutional oversight that continue to limit broader integration into practice (AAUP 2025). AAUP recent survey of 500 faculty members across 200 campuses revealed widespread unease about the uncritical adoption of AI and its implications for academic labor, intellectual property, and shared governance. Faculty respondents emphasized the need for transparent policies, professional development, and the ability to opt out of AI-based tools.

Conclusion

In conclusion, AI adoption in higher education is characterized by cautious experimentation and pragmatic utility of AI tools under a clear directive of multilayered policies. While most faculty members use AI to explore the possibilities, they primarily use it to automate routine tasks and enhance efficiency. Students primarily employ AI as reading, writing and mentoring assistants and, in many cases, for plagiarizing homework, assignments, and assessments. If the existence of wide-ranging policies is an indicator of change, it seems that AI role in education will continue to proliferate in the future.

The future of AI in academia depends not only on utility of technology but also on ethical frameworks, institutional support, and pedagogical imagination. As universities continue to invest in technological advancement and professional development, educators should be moving beyond basic automation toward more transformative uses that redefine teaching and learning in the digital age.

Finally, the future of AI in education will depend not only on technological innovation but also on the cultivation of a shared pedagogical vision. This vision must be co-created by educators, students, administrators, and policymakers, grounded in ethical principles and responsive to the evolving needs of learners. Rather than viewing AI as a substitute for human teaching, universities should explore its potential as a collaborator in the learning process—one that augments creativity, fosters critical thinking, and supports inclusive and adaptive pedagogies. Only through intentional design and sustained dialogue can AI become a transformative force in higher education, rather than a disruptive one.

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