ЭМПИРИЧЕСКИЕ ИССЛЕДОВАНИЯ

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Generative AI and the Transformation of Academic Norms in Higher Education

This study explores the sociological impact of generative AI on higher education, focusing on its role as both a cognitive tool and a catalyst for institutional transformation. Based on empirical data, the research reveals the emergence of a monocentric model of technological dependency, with generative neural networks dominating student preferences, while alternative platforms remain marginal. Stratified usage patterns highlight disciplinary divides, with students in humanities relying more heavily on AI systems, in contrast to the more diversified toolkits of those in technical fields. The findings point to a growing tension between rapidly evolving digital practices and lagging institutional norms. While the majority of students report improved academic performance due to AI-assisted learning, the process of digital adaptation remains uneven, marked by access disparities, epistemic uncertainty, and normative ambivalence. A paradox of trust emerges: although AI is widely used in academic routines, it is not yet fully accepted as a legitimate foundation for professional competence in

high-stakes domains. Drawing on theoretical frameworks such as digital augmentation and Bourdieu's field theory, the study interprets these dynamics as indicators of a transitional phase in academic culture. It argues for the need to rethink educational standards and ethics in light of distributed epistemic responsibility and to develop integrative strategies that align technological innovation with pedagogical and societal values. The article concludes that the future of higher education hinges on the institutional capacity to legitimize and regulate AI as a culturally embedded element of learning.

Introduction

The digital transformation [*Kopyrin*, 2023] of higher education has emerged as a key mechanism for adapting to the challenges of the knowledge economy — a socio-technological paradigm in which knowledge and competencies become the primary drivers of development and competitive advantage. In the context of growing technological disruption, digital transformation is not merely a technical shift, but a deeply socio-cultural phenomenon [*Ilichev*, 2023]. It reshapes the epistemological foundations of academic knowledge, the institutional modes of legitimation, and the mechanisms of social reproduction of professional competencies [*Gluhih*, 2022]. By technological disruption, we refer to a state of methodological and normative instability in higher education, driven by the rapid integration of AI technologies that outpace the adaptation of institutional and cultural frameworks. As the focus shifts from material production to the generation of symbolic and cognitive resources, higher education finds itself in a zone of methodological uncertainty, losing its former normative anchors. A particularly transformative force in this context is generative artificial intelligence [*Harrington*, 2024], which, as an agent of algorithmic rationality, blurs the boundaries between subjective and automated knowledge, between learning and delegation. Its widespread adoption is initiating the formation of new socio-technical regimes of academic activity, altering not only the form of educational practices but also the structure of academic identity itself [*Nelson*, 2024].

This article aims to provide a sociological reconstruction of the behavioral, cognitive, and normative changes occurring among students within algorithmically mediated education. The analysis is based on empirical data collected through an anonymous survey of university students. The research seeks to uncover the hidden structures of digital adaptation and the emerging mechanisms of normative legitimation for new technological intermediaries in the learning process.

Methodology

The study follows a sociological approach to examining educational transformation under the influence of generative AI tools [*Drach*, 2024], which act as mediators of cognitive and normative shifts within academic environments. The empirical basis is formed by data from a questionnaire survey that is representative of students from higher education institutions across the Russian Federation. The sample focuses on three universities with distinct geographical and institutional profiles:

— Bauman Moscow State Technical University (Moscow, Kaluga) — an engineering-oriented university representing high-tech education.
— Kazan State Power Engineering University (Kazan) — a technical university specializing in training for the energy sector.
— Sochi State University (Sochi) — a multidisciplinary institution with a focus on social and economic fields.

A probabilistic sampling strategy with multistage stratification was employed to ensure structural balance across academic disciplines and regional affiliations. The sample size exceeded the required threshold, minimizing random bias and enhancing the generalizability of the results. Methodological reliability was ensured through internal validity and statistical robustness. Although the sample is limited to three universities, their profiles (technical, energy, multidisciplinary) cover key areas of higher education in Russia.

The anonymous, voluntary survey was conducted using a custom-built digital platform (author's website https://drach.pro), which enabled automated metric aggregation, association coefficient calculation, and dynamic correlation analysis. Data processing was carried out using *Python 3.11*, allowing for the integration of quantitative analysis within a socio-technical research framework. The focus of the analysis was not on institutional differences, but rather on the structural patterns of digital subjectivity formation and the normative framing of educational legitimacy in algorithmically mediated learning environments.

Results and Discussions

Digital preferences structure: cognitive divide and socio-technical shifts

The analysis of students' use of digital tools in educational practices revealed a clear binary pattern, reflecting a shift in emphasis between traditional academic formats and high-tech media-based solutions. One of the key survey questions asked respondents to identify the digital learning resources they use most frequently. Multiple choices were allowed, including online courses, recorded lectures, gamified platforms, virtual labs, external video content, and generative AI services (such as *ChatGPT*-style chatbots).

The aggregated results show the overwhelming prevalence of generative AI tools, with 93% of students reporting regular use. This indicates a significant transformation in the nature of learning interactions, where algorithmically guided dialogue increasingly replaces traditional forms of knowledge transmission. External video resources (e. g., *YouTube*) followed closely at 88%, highlighting a growing preference for unstructured, short-form, and visually driven content.

In contrast, traditional academic sources — such as scholarly articles, books, and specialized academic platforms — were used by less than 1% of respondents, pointing to a crisis in text-based didactics in the context of information overload. Online courses (23%), recorded video lectures (20%), and gamified platforms (19%) showed moderate popularity, suggesting their auxiliary status in the new learning ecosystem. Virtual labs (12%) maintained a niche role, mostly within engineering and natural science disciplines.

These findings point to the emergence of a new hierarchy of educational resources, with generative AI acting not just as a tool, but as a socio-technical mediator and an infrastructural element of academic socialization. The observed divide between high-tech and

classical formats reflects what may be interpreted as a digital gap — a tension between institutionally embedded pedagogical practices and de facto emerging models of self-directed, technology-mediated learning [*Liang*, 2024].

Preferences in text generation tools

The analysis of students' preferences among generative AI tools revealed the dominance of *ChatGPT* (84%) as the primary educational mediator, suggesting the emergence of a centralized model of technological reliance. *DeepSeek* attracted notable but significantly lower attention (55%), often positioned as an academically oriented alternative. Other tools — such as *Perplexity* (19%), *Claude* (16%), and *Gemini* (10%) — showed more fragmented usage, while platforms like *Phind*, *HuggingChat*, *Grok* and *Bard* collectively accounted for less than 3%, indicating a strong user concentration around a few leading solutions.

An interesting pattern emerged during data stratification: students specializing in machine learning or information technologies were more likely to use *DeepSeek*, while those from humanities disciplines predominantly preferred *ChatGPT*. A follow-up survey showed that the ability to recognize differences between LLM models and their versions was typically limited to high-performing students within technical fields (such a part of students is statistically almost indistinguishable).

Choice of supplementary educational platform

Responses to the question "Which digital tool has been most useful for your professional development?" revealed a clear stratification of preferences. Generative AI systems emerged as the top choice (32%, considering variations in phrasing), indicating a shift in the structure of professional socialization: intelligent agents are becoming a normalized part of students' everyday cognitive routines. In second place were video content platforms (20%, mostly *YouTube*), reflecting a move toward visually fragmented and informal knowledge sources.

Formal educational tools such as online courses (10%) were considered of secondary importance, trailing behind personalized digital learning paths. Development environments and coding platforms (10%) were mostly relevant to technically specialized fields. Alternative AI tools (8%) remained marginal, reinforcing the trend of platform dominance. A small portion of responses (6%) reflected semantic ambiguity, with students providing unclear or inconsistent answers — possibly indicating cognitive fragmentation in how the digital learning environment is perceived.

An evaluation of the perceived impact of digital tools on academic performance revealed a notable trend: 92% of students reported an improvement, with 53% indicating a significant improvement. This supports the argument that digital technologies serve not only as learning aids but also as catalysts for reconfiguring educational trajectories. Neutral (7%) and negative (1%) responses point to the existence of cognitive, disciplinary, and normative limitations, which merit further interpretation in the context of digital inequality and individual adaptation strategies.

Theoretical Interpretation: Digital Augmentation and Social Stratification

The findings align with the concept of digital augmentation, where AI tools function as cognitive extensions that enhance individual capabilities through algorithmic optimization. This phenomenon manifests in three key ways:

— enhanced cognitive productivity;
— personalized learning trajectories, both in terms of time and content;
— development of meta-competencies for interacting with non-human agents.

At the same time, the presence of a neutral perception (7%) points to latent forms of digital inequality, expressed through selective access to and assimilation of new technological modes of learning.

The analysis of how students perceive professional skills gained through digital tools reveals a strong technocratic bias. Skills such as programming (83%), analytics (70%), and data handling (51%) dominate over communicative or reflexive competencies like teamwork (32%). This configuration highlights a structural asymmetry between operational and social dimensions of professional development. The marginal role of "creative" skills (1%) suggests an effect of digital reductionism, where emerging technologies reproduce a narrow range of functional tasks. As a result, a competence gap emerges — reflecting a mismatch between the instrumental focus of digital environments and the demand for hybrid, adaptive professionals.

Despite clear cognitive benefits, the widespread adoption of AI is accompanied by notable sociological risks, including increased vertical stratification, the normative devaluation of soft skills, and the institutionalization of asymmetrical distribution of cognitive capital [*Davies*, 2020].

When asked whether the presence of digital technologies in universities should be expanded, 76% of respondents supported further technological transformation of the educational environment. This indicates a normative acceptance of digitalization as a new educational standard and reflects a high level of both institutional and everyday adaptation among students to digital agents. However, 24% of students expressed either neutral or negative views (split evenly), suggesting the persistence of digital skepticism linked to overload, distrust in effectiveness, or a perceived loss of control over the learning process.

The results are consistent with previously established patterns of mass technological integration (93% — the use of AI, 92% — a positive assessment of the impact on learning) and confirm the request for a reassembly of university practices.

The preference for a hybrid learning model (74%) indicates the institutionalization of a mixed format as the most legitimate (see fig. 1). The equally low interest in the extreme formats (completely in person and completely remotely — 12% and 14% respectively) confirms the crisis of the binary opposition 'digital vs. tradition'.

In the sociological dimension, this indicates the formation of new educational attitudes in which digital presence is perceived not as an alternative, but as a necessary element of the learning environment.

Educational institutions, therefore, face the need to develop not universal, but flexibly configurable pedagogical modes that take into account the multiplicity of students' digital identities.
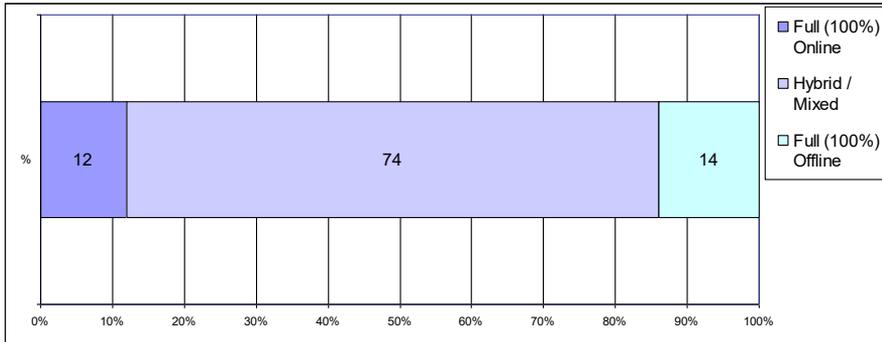
Fig. 1. The diagram for the question "Which training format is most effective for you in terms of gaining real knowledge, skills, and abilities?"

Digital Barriers and Normative Transition: Access, Trust, and Adaptation

One of the most sociologically significant components of the study was the analysis of difficulties encountered when using digital technologies in higher education. The dominant barrier (22.7%) relates to institutional access limitations — from technological instability to geopolitical restrictions. However, a notable proportion (27.3%) reported no difficulties at all, which may indicate either high levels of digital resilience or superficial engagement with digital tools.

At the level of cognitive and organizational barriers, three key issues were identified: epistemic unreliability (10.6%), technical failures (7.6%), and ergonomic challenges (9.1%). Additional obstacles included instructional gaps (9.1%) and financial constraints (1.5%). Heterogeneous "other" responses (12.1%) point to the multilayered nature of digital inequality.

Statistical analysis of students' self-reported academic performance shows a positive perception of digital integration: 70% noted significant improvement in their results. Neutral (24%) and minimal negative responses support the notion of an overall adaptive digital socialization. Yet, behind this consensus lie latent cognitive burdens and risks of overload.

Normative Dissonance in Technology-Mediated Learning: A Sociological Perspective

The empirical data highlight a fundamental socio-cultural paradox in contemporary higher education, where technological practices and normative expectations coexist in a state of ongoing tension. The distribution of responses to the question "How often do you use chatbots to complete graded assignments?" forms a distinctive bimodal curve (see fig. 2), with a central cluster ("sometimes" — 34%) flanked by zones of intensive ("often" / "always" — 39%) and limited ("rarely" / "never" — 26%) usage. This distribution closely mirrors Everett Rogers' diffusion of innovations model, with 34% representing the early majority who drive normalization of new technologies.
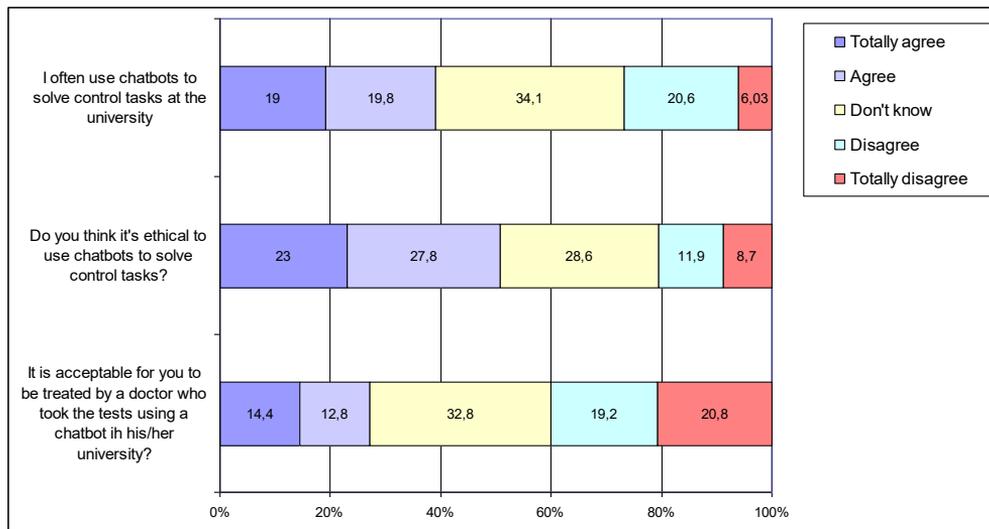
Fig. 2. Responses to key questions on the use of chatbots in university control tasks and professional ethics

A parallel analysis of ethical attitudes ("Do you consider it ethical to use chatbots for completing graded assignments?") revealed three competing normative regimes (see fig. 3):
— traditionalist ("absolutely not" / "no" — 21%)
— transitional ("not sure" — 28%)
— innovative ("probably yes" / "definitely yes" — 55%)

This triangulation of value orientations reflects the active renegotiation of academic norms under the influence of digital practices. Notably, the size of the "not sure" group nearly mirrors that of occasional chatbot users, suggesting a "buffer zone" of normative transformation.

A comparison of both distributions reveals a sociologically relevant pattern — the effect of normative lag, where the widespread adoption of a technological practice (73% reporting at least moderate use) outpaces the formation of a shared ethical consensus. This dissonance is especially evident in the contrast between 19% who use chatbots "very often" and only 28% who fully endorse the practice ethically. The gap points to a substantial group of actors who engage regularly with the technology while experiencing normative conflict.

Using Pierre Bourdieu's theoretical lens, these results can be interpreted as a struggle for symbolic capital within the academic field, where chatbots become a tool for navigating educational demands but are not yet culturally legitimized. The resulting gap between embodied practices (habitus) and institutional norms creates space for the emergence of a new type of academic subjectivity — the "digital double", simultaneously embedded in digital routines and reflexively negotiating their normative status.

This configuration is of particular interest to the sociology of morality, as it demonstrates how technological innovations disrupt traditional binary ethical classifications, creating a complex mosaic of transitional normative states. The observed phenomenon calls for a reconsideration of classical theories of academic integrity through the lens of distributed epistemic responsibility in algorithmically mediated environments.
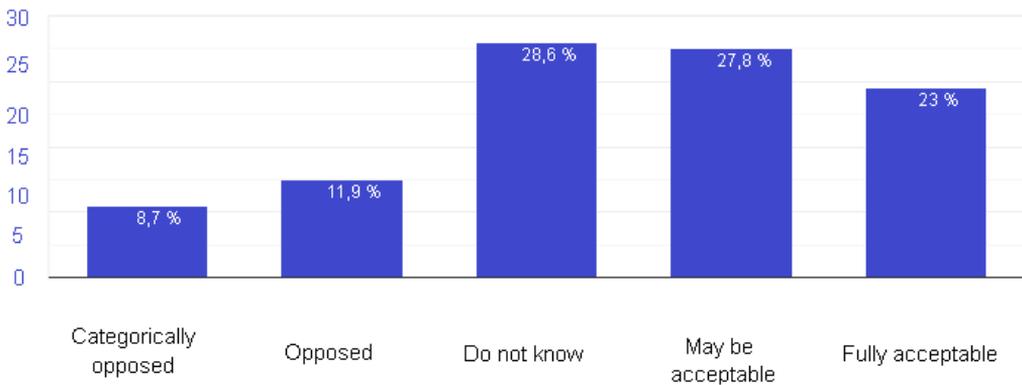
Fig. 3. Response distribution to the item: "The survey is anonymous; please respond candidly:
Do you consider it ethically permissible to utilize chatbots for completing academic assessment tasks?"

Transformational Shift and the Paradox of Trust:
Digital Competence and the Boundaries of Professional Legitimacy

We are witnessing a phase of transformational shift, in which academic norms and educational structures are increasingly pressured by the digitalization of everyday learning. This necessitates a critical rethinking of academic integrity models and the development of pedagogical strategies that can balance technological realism with sociocultural responsibility.

The closing section of the study addresses the paradox of trust — specifically, the perception of digital competence within high-stakes professional contexts. A deliberately provocative question — "Would it be acceptable to be treated by a doctor who completed exams with the help of a chatbot?" — was used to explore tensions in the public evaluation of AI-mediated professional formation.

Results reveal a sharp normative divide:
— 39% of respondents rejected the idea outright, appealing to an ideal of autonomous knowledge acquisition. This group reflects persistent academic purism and resistance to the transformation of traditional conceptions of expertise.
— 27.4% were open to such a scenario, often correlating with their own routine use of AI in learning. This indicates the emergence of a normative bifurcation, splitting society into technological pragmatists and traditionalists (see fig. 4).

The central phenomenon here is cognitive uncertainty: 32% of students were unable to give a definitive answer. This reflects a crisis of epistemic trust and institutional unpreparedness to legitimize new forms of competence construction. Paradoxically, the widespread use of AI in academic practice (73%) coexists with a widespread refusal to recognize these tools as legitimate foundations for professional responsibility.

This contradiction stems from a form of cognitive dissonance: individual benefit derived from AI use is not easily extrapolated to socially critical domains. Theoretically, this relates to the concept of epistemic responsibility — students' concerns are less about knowledge accuracy and more about the erosion of symbolic foundations of trust in professional fields.
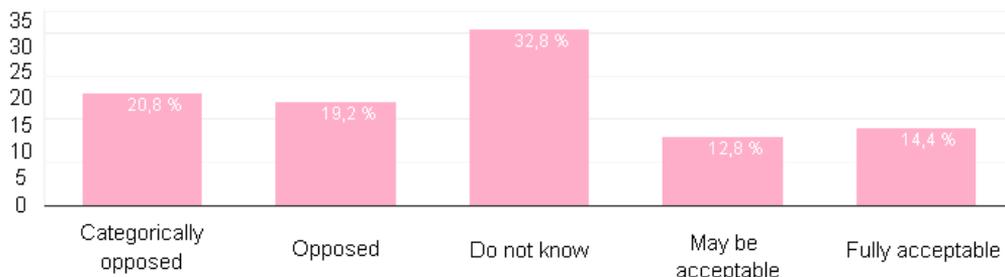
Fig. 4. Response distribution to the item: "Would you find it acceptable to be treated by a medical professional who utilized a chatbot to prepare for or complete their licensing examinations?"

Practical implications include:
— the development of digital training standards for high-risk professions;
— the creation of new models for competence verification;
— engagement with public perception and normative ambiguity.

In conclusion, we observe a legitimacy gap: technological practices advance faster than institutional mechanisms of recognition, producing social turbulence in the system of professional education. This gap demands urgent sociological attention — not only to manage risk, but to imagine new ethical and epistemological frameworks for digital expertise.

Conclusion

This study highlights the emergence of new sociotechnical regimes within academic environments, where generative artificial intelligence (AI) is no longer merely a tool for cognitive support but a transformative force reshaping norms, practices, and identities. The dominance of AI in students' educational routines is accompanied by normative tensions and cognitive uncertainties, revealing a growing disconnect between institutional regulation and lived academic practices.

Our findings suggest that digital adaptation is unfolding as a fragmented — and at times conflicting — process, in which technological development outpaces the social mechanisms needed to interpret and integrate it meaningfully. On a sociological level, this signals a transformation in the very nature of academic legitimacy, where the boundaries between autonomous knowledge and algorithmic assistance are becoming increasingly blurred.

Universities, caught in the midst of digital turbulence, now face a dual challenge: not only to modernize technologically, but also to reimagine the foundations of pedagogical responsibility and institutional trust. It is no longer sufficient to view AI as an external supplement; it must be critically embedded into the cultural and normative fabric of higher education as a legitimate and sustainable element of academic practice.

Our conclusions point to the urgent need for systemic change across three key dimensions.
1) Normative — through the regulation of AI-assisted academic practices (Development of codes for the use of AI in the academic environment is needed?).
2) Didactic — through the thoughtful integration of AI tools into curricula and learning processes (Integration of ethics modules into curricula is needed?).

3) Social — through the mitigation of digital inequality and enhancement of equitable access.

Ultimately, the future of higher education will be determined not by the speed of digitalization, but by society's ability to institutionalize, legitimize, and critically reflect upon its consequences. Without such a comprehensive adaptation, universities risk deepening the gap between technological capacity and cultural acceptance, compromising their role as ethical and inclusive spaces of knowledge production.

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Генеративный ИИ и трансформация академических норм в высшем образовании

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В настоящей статье рассматривается социологическое влияние генеративного искусственного интеллекта на высшее образование, уделяется особое внимание его роли как когнитивного инструмента и катализатора институциональных преобразований. Основываясь на эмпирических данных, исследование показывает появление моноцентрической модели технологической зависимости, при которой использование генеративных нейросетей доминирует в предпочтениях студентов, в то время как альтернативные платформы остаются в тени. Стратифицированные модели использования подчеркивают дисциплинарные различия: студенты-гуманитарии в большей степени полагаются на системы искусственного интеллекта, в отличие от более разнообразного инструментария тех, кто работает в технических областях. Полученные данные указывают на растущее противоречие между быстро развивающимися цифровыми практиками и отстающими институциональными нормами. Хотя большинство студентов сообщают об улучшении успеваемости благодаря обучению с помощью искусственного интеллекта, процесс цифровой адаптации остается неравномерным, отмеченным неравенством в доступе, эпистемологической неопределенностью и нормативной амбивалентностью. Возникает парадокс доверия: хотя искусственный интеллект широко используется в академической практике, он еще не в полной мере признан в качестве законной основы профессиональной компетентности в областях с высокими ставками. Опираясь на теоретические основы, такие как цифровое расширение и теория Поля Бурдье, авторы исследования интерпретируют эту динамику как показатели переходного этапа в академической культуре. В нем обосновывается необходимость переосмысления образовательных стандартов и этики в свете распределенной эпистемологической ответственности и разработки интегративных стратегий, которые увязывают технологические инновации с педагогическими и общественными ценностями. В статье делается вывод о том, что будущее высшего образования зависит от институциональной способности узаконить и регулировать искусственный интеллект как культурно укоренившийся элемент обучения.

Ключевые слова: генеративный искусственный интеллект, машинное обучение, обработка текста, высшее образование, социологическая методология, социологические исследования.