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ARTIFICIAL INTELLIGENCE AND ACADEMIC INTEGRITY IN HIGHER EDUCATION: A NARRATIVE REVIEW

MUSSABALINA D.S.*[1]
Postdoc, PhD
AIDARGALIYEVA N.G.[2]
Vice-Rector, PhD
MALDYNOVA A.V.[3]
PhD

[1]Abai Kazakh National Pedagogical University, Almaty, Kazakhstan
[2]L.N.Gumilyov Eurasian National University, Astana, Kazakhstan
[3]Kenzhegali Sagadiyev University of International Business, Almaty, Kazakhstan

ABSTRACT. This research presents an overview of modern scientific literature on the impact of generative artificial intelligence on academic integrity in higher education, considering the economic aspects of implementing AI technologies. The paper considers the risks of unfair use of AI by students and the possibilities of using technologies to identify and prevent violations, as well as the economic efficiency of implementing AI systems, including reducing the cost of checking work and minimizing reputational risks for universities. Particular attention is paid to technical solutions, regulatory aspects, pedagogical practices, as well as ethical, psychological and economic issues of integrating AI into the educational process. The review allows us to highlight key areas of development and effective strategies for ensuring academic integrity and economic sustainability of educational institutions in the context of digital transformation.

KEYWORDS: economic efficiency, cost management, academic integrity, artificial intelligence, generative AI, higher education.

ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ И АКАДЕМИЧЕСКАЯ ЧЕСТНОСТЬ В ВЫСШЕМ ОБРАЗОВАНИИ: НАРРАТИВНЫЙ ОБЗОР

МУСАБАЛИНА Д.С.*[1]
Postdoc, PhD
АЙДАРГАЛИЕВА Н.Г.[2]
Проректор, PhD
МАЛДЫНОВА А.В.[3]
PhD

[1]Казахский Национальный Педагогический Университет имени Абая, Алматы, Казахстан
[2]Евразийский национальный университет им. Л.Н. Гумилева, Астана, Казахстан
[3]Университет Международного Бизнеса имени Кенжегали Сагадиева, Алматы, Казахстан

АННОТАЦИЯ. В данной работе представлен обзор современной научной литературы, посвящённой влиянию генеративного искусственного интеллекта на академическую честность в высшем образовании, с учётом экономических аспектов внедрения ИИ-технологий. Рассматриваются риски недобросовестного использования ИИ студентами и возможности применения технологий для выявления и предотвращения нарушений, а также экономическая эффективность внедрения ИИ-систем, включая снижение затрат на проверку работ и минимизацию репутационных рисков для вузов. Особое внимание уделено техническим решениям, нормативно-правовым аспектам, педагогическим практикам, а также этическим, психологическим и экономическим вопросам интеграции ИИ в образовательный процесс. Обзор позволяет выделить ключевые направления развития и эффективные стратегии обеспечения академической честности и экономической устойчивости образовательных учреждений в условиях цифровой трансформации.

КЛЮЧЕВЫЕ СЛОВА: Экономическая эффективность, управление затратами, академическая честность, искусственный интеллект, генеративный ИИ, высшее образование.

ЖАСАНДЫ ИНТЕЛЛЕКТ ЖӘНЕ ЖОҒАРЫ БІЛІМДЕГІ АКАДЕМИЯЛЫҚ АДАЛДЫҚ: БАЯНДАМА ШОЛУ

МУСАБАЛИНА Д.С.*[1]
Postdoc, PhD
АЙДАРГАЛИЕВА Н.Г.[2]
Проректор, PhD
МАЛДЫНОВА А.В.[3]
PhD

[1]Абай атындағы Қазақ Ұлттық Педагогикалық Университеті, Алматы қ., Қазақстан
[2]Л.Н. Гумилев атындағы Еуразия ұлттық университеті, Астана қ., Қазақстан
[3]Кенжеғали Сағадиев атындағы Халықаралық Бизнес Университеті, Алматы қ., Қазақстан

АҢДАТПА. Бұл мақалада AI технологияларын енгізудің экономикалық аспектілерін ескере отырып, генеративті жасанды интеллекттің жоғары оқу орындарындағы академиялық тұтастыққа әсеріне арналған заманауи ғылыми әдебиеттерге шолуды ұсынады. Мақалада студенттердің AI-ны әділетсіз пайдалану тәуекелдері және бұзушылықтарды анықтау және алдын алу үшін технологияларды пайдалану мүмкіндіктері, сондай-ақ AI жүйелерін енгізудің экономикалық тиімділігі, оның ішінде жұмысты тексеру шығындарын азайту және университеттер үшін беделді тәуекелдерді азайту қарастырылады. Техникалық шешімдерге, нормативтік аспектілерге, педагогикалық тәжірибелерге, сондай-ақ АИ-ді оқу үдерісіне енгізудің этикалық, психологиялық және экономикалық мәселелеріне ерекше назар аударылады. Шолу цифрлық трансформация жағдайында оқу орындарының академиялық тұтастығын және экономикалық тұрақтылығын қамтамасыз етудің негізгі даму бағыттары мен тиімді стратегияларын анықтауға мүмкіндік береді

ТҮЙІН СӨЗДЕР: шығындардың тиімділігі, шығындарды басқару, академиялық тұтастық, жасанды интеллект, генеративті AI, жоғары білім.

INTRODUCTION. In recent years, the rapid development of generative artificial intelligence (AI) technologies has radically transformed the educational environment, offering new learning opportunities and at the same time creating risks associated with violations of academic integrity [1]. Students have access to advanced algorithms and chatbots which are capable of generating text, solving problems, and even mimicking different styles of writing. As a result, educational institutions faced the necessity to adapt their policies and implement technological solutions that enhance timely detection and prevention of violations related to the use of AI. It is significant to study the effects of AI on academic integrity, as it is an integral part of the quality assurance system.

While technical measures are crucial, equally important are the development of clear regulatory frameworks and the cultivation of a culture of responsible AI use. Some studies emphasize the importance of profound changes in assessment methods: the creation of assignments that require critical reflection and original argumentation can increase resistance to the unfair use of AI-generated responses [14;15]. There is ongoing debate about the ethical and socio-psychological implications of widespread digital proctoring and other monitoring systems, which, while intended to detect misconduct, may also raise concerns about student privacy.

Academic integrity is a cornerstone of higher education, ensuring trust in grades, qualifications, and degrees. It is a crucial part which enhances the quality of educational programs and course delivery. With AI-generated texts becoming nearly indistinguishable from human-written work, universities face a new kind of threat which is fast-moving, scalable, and widely accessible. This isn't just a theoretical concern. If students submit work written entirely by an algorithm, yet receive good grades, it raises serious doubts about how educators assess knowledge and effort. What's particularly troubling is how easy it has become. Unlike older forms of cheating, which were time-consuming or expensive, AI is available to anyone, at any time, often for free. That changes the game completely. The scale of concern is reflected in recent data. A large majority of university instructors in North America (nearly 96%) now suspect that at least some of their students have engaged in cheating within the past academic year. Student self-reports support this observation: more than half acknowledge a perceived increase in dishonest behavior among their peers. Looking ahead, both students and faculty anticipate that such practices will become more prevalent, primarily due to the rapid diffusion of generative AI tools [19]. According to this survey, the majority of both students and instructors also believe cheating will increase in the next few years, largely because of increased use of AI. These trends make maintaining academic integrity and quality of education in

the age of AI increasingly urgent.

One of the emerging areas of research in the field of academic integrity focuses on how artificial intelligence is being misused. Students use AI to generate entire essays, projects, and assignments and present them as their own work, thereby bypassing traditional mechanisms for assessing knowledge [25]. This is a new form of academic fraud, close to contract cheating, the role of the 'third-party writer' is played by an algorithm rather than a human. The implications are far-reaching. Because generative AI can produce a virtually large number of original-looking outputs with speed and scale, detecting such misuse through conventional methods becomes increasingly difficult. While traditional plagiarism can be detected by comparing with existing sources, the text generated by a neural network has no direct source in the database, which challenges standard plagiarism detection systems. Distinguishing human-written work from AI-generated text is extremely difficult: even modern detection algorithms are unsure of the classification when a student makes minor edits and often mistake the AI-generated answer for the original. This raises serious concerns. If students are able to misuse AI tools without consequence, the practice may become normalized and spread further. In addition to writing texts, AI can be used for other violations – for example, to automatically solve coding problems, perform calculations, or even select answers to quiz questions in real time. This expands the range of potential threats to academic integrity.

However, AI technologies can also serve as a means of ensuring academic integrity and quality of education, which is another important area of research. Universities are investing in technological solutions aimed at identifying cases of academic dishonesty facilitated by AI. These efforts take several forms. First, classic plagiarism checkers are being enhanced, integrating machine learning algorithms to detect atypical language patterns that indicate the generated nature of the text. Second, new tools designed specifically to detect AI-generated content have emerged. These detectors analyze syntactic structures and stylistic features, with examples including GPTZero and updated detection modules announced by Turnitin in 2023 [20]. Third, automated exam proctoring systems are being implemented, using computer vision and behavioral analysis to detect suspicious student activity during remote tests. However, the effectiveness of many of these measures is still limited. Recent investigation shows that existing AI text recognition algorithms often perform at a level close to random guessing: the best tools were able to correctly identify no more than half of the automatically generated answers [21]. Even when detection rates approach 70–80%, significant concerns persist regarding reliability, transparency, and fairness. In practice, it often takes only minimal rephrasing to evade detection altogether [21]. In addition, there is a risk of false positives: algorithms can mistakenly accuse honest students of using AI or exhibit bias towards a certain writing style. Thus, the technical confrontation "AI vs. AI" is not yet a solution to the problem, and researchers continue to work on improving the accuracy and transparency of such systems.

From an economic perspective, ensuring academic integrity through AI tools requires considerable investment in software, infrastructure, and staff training. These costs can be substantial, especially for resource-limited institutions. However, such expenditures are justified by long-term benefits — preserving the university's reputation, preventing degree devaluation, and maintaining competitiveness in the education market. Moreover, automating monitoring processes can improve operational efficiency. A balanced economic approach, weighing costs against the value of academic credibility, is essential for sustainable implementation.

This narrative review systematizes current research and practices in this field, examining key areas of development and the most effective strategies for supporting academic integrity in the era of artificial intelligence.

MATERIAL AND METHODS OF RESEARCH. This study employed the method of a narrative literature review, aimed at bringing together a wide range of findings and perspectives on the topic. The choice of a narrative approach is based on the nature of the issue under investigation: the influence of artificial intelligence on academic integrity is a complex and evolving problem that involves pedagogical, technological, ethical, economic, and administrative dimensions. To reflect this diversity, a flexible review format was needed.

Unlike systematic reviews, which follow strict protocols for selecting and assessing sources, the narrative format allows for the inclusion of different types of literature. It ranges from theoretical papers and empirical studies to expert commentaries and case-based reports. This approach aims at gaining a broader understanding of the current research landscape.

In addition to pedagogical and institutional discussions, the narrative review incorporated publications and case studies that evaluate the economic feasibility and implications of AI-based academic integrity tools. These include analyses of cost reduction, return on investment, and institutional budgeting strategies associated with technology implementation in education. Integrating economic literature makes it possible to assess not only the effectiveness but also the financial sustainability of integrity-preserving technologies.

Importantly, the narrative format incorporates recent publications and expert viewpoints, which is especially

relevant in a field that is developing as rapidly as AI in education. As a result, the review offers a more complete picture of both established knowledge and emerging discussions, including those related to financial efficiency, institutional planning, and long-term economic impact of digital solutions in academic environments.

RESULTS AND THEIR DISCUSSION. Specialized digital solutions that allow analyzing student papers and identifying signs of unauthorized or AI-generated content are of paramount importance in maintaining academic integrity today [1; 2; 3; 4; 5]. Thus, the use of algorithms that compare texts with extensive databases helps to quickly identify plagiarism or characteristic stylistic inconsistencies indicating the possible use of ChatGPT-type programs [2; 4]. Additionally, automated systems are capable of integrating with online platforms to monitor student activity, allowing real-time signals to be received about attempts to upload materials to third-party resources or use extraneous prompts [3; 5]. Such tools not only increase the accuracy of detection but also simplify the process of analyzing large volumes of work, optimizing the workload of instructors [1].

At the same time, the effectiveness of such systems is largely due to their ability to differentiate the human-written text from algorithmically generated text [4]. Empirical studies show that particular detectors, such as "AssignmentWatch", successfully monitor the upload of assignments to file-sharing platforms and can automatically notify instructors [3]. Some developments improve the accuracy of identifying e-cheating and differentiating between normal and fraudulent responses, thereby strengthening the credibility of online assessments and supporting the integrity of academic evaluations in diverse learning environments. [5]. All these methods facilitate timely identifying academic dishonesty facts and contribute to the formation of academic integrity culture in the digital age [2].

Policy and regulatory aspects of academic integrity in the age of AI

The development and implementation of clear institutional regulations governing the use of generative AI technologies is considered by many researchers as the key to the formation of a sustainable system of academic integrity [6; 7; 8; 9; 10]. A number of higher education institutions are taking steps to officially recognize the role of AI and introduce ethical codes that provide for liability for the misuse of algorithmically generated materials [8; 9]. This approach requires a transparent and understandable policy that reflects a balance between technological innovation and traditional principles of academic integrity [6]. In this context, the emerging roadmap for GenAI integration is extremely important, including the stages from awareness and policy formation to continuous assessment and cooperation between all stakeholders [8].

However, only the presence of formal rules does not guarantee unconditional compliance with the principles of academic integrity [7; 10]. Measures are needed to raise awareness among students and teachers, as well as tools that facilitate a democratic discussion of ethical conflicts that arise when working with AI [9; 10]. Some studies emphasize the importance of an interdisciplinary approach in creating a regulatory framework: it should include specialists in the field of pedagogy, information technology and law [6; 7]. Coordinated collaboration between these groups will not only establish transparent regulations for AI use but also foster a sense of responsibility towards emerging technologies within the academic community [8].

Modern developments in the area of knowledge assessment demonstrate that the design of tasks involving deep analytical work, critical thinking and multidimensional interaction formats, becomes important [11; 12; 13; 14]. Particularly, the implementation of "AI Assessment Scale (AIAS)" and similar approaches demonstrate that AI serve as additional helpful tool for students, not the one that substitutes their work [12]. This is reflected in the practice of project-based learning, when students present the research steps, data sources, and hypothesis testing stages, beside the final results [11; 13]. This kind of evaluation reduces the likelihood of academic fraud, as superficial analysis or automatically generated fragments usually do not withstand expert review [14].

In addition, some scholars highlight the importance of creating an environment that encourages students to use AI consciously and within the framework of academic ethics [13; 14]. The integration of AI tools into educational programs should be accompanied by methodological recommendations, instructions on correct citation and explanation of ethical standards [11; 12]. This approach helps students develop skills for the responsible use of advanced technologies and strengthens their ability to analyze and evaluate the reliability of the data obtained [13; 14]. Thus, the role of educators is not limited to monitoring but also includes teaching the principles of ethical AI use, which ultimately reinforces a culture of academic integrity across the entire educational landscape [11; 12].

Along with technological and organizational aspects, the issue of ethical literacy and the psychological readiness of students and teachers to use AI is actively discussed in the scientific community. [15; 16; 17; 18]. Research shows that, on the one hand, the use of AI systems helps to detect unscrupulous behavior in time, and on the other hand, it can cause stress, anxiety, and questions about invasion of personal space [8; 9]. In addition, not all students are fully aware of the responsibility for using such tools, especially when it comes to using chatbots unnoticed by an external

observer [15; 17]. In this regard, it is important to build trusting relationships and explain the principles of ethics of digital interaction, avoiding an excessive atmosphere of total supervision [16; 18].

Special attention is also paid to the heterogeneity of perception and accessibility of AI technologies in different groups of students [15]. For example, more digitally savvy students can more easily find ways to circumvent existing control systems, while less experienced users may have a fear of sanctions, contributing to the rejection of AI even for legitimate purposes [16; 17]. To overcome these contradictions, it is recommended to implement comprehensive educational modules that discuss both the technical capabilities and the moral and ethical boundaries of AI application [18]. Such a multidimensional approach not only maintains a culture of academic integrity but also fosters students' critical perspective on rapidly evolving technologies [15; 6].

The results of the conducted review indicate that the development of AI technologies significantly transforms approaches to ensuring academic integrity, affecting not only the ethical and technological, but also the economic parameters of the functioning of educational organizations.

Automatic plagiarism detection systems, analysis of student behavioral patterns, integration with LMS platforms and intelligent proctoring can not only increase the reliability of academic performance assessment but also reduce the labor costs of the teaching staff. In particular, the automation of checks and monitoring of student activity allows for the redistribution of teaching resources: time previously spent on the analysis and verification of work can be directed to scientific activities and personalized training of students [22].

In addition, the study recorded data on potential cost savings due to reduced reputational risks. Academic dishonesty, left without proper response, can lead to a decrease in positions in rankings, loss of accreditation and a decrease in applications from applicants, which directly affects the income of the university. On the contrary, investments in intelligent verification systems help to strengthen the trust in university diplomas on the part of employers and partner organizations.

Expert assessments show that with proper implementation of a digital strategy for ensuring academic integrity focused on the use of AI, an educational institution can achieve a return on investment within 2-3 years [23].

For a more detailed analysis of the impact of the implementation of AI systems on the organizational and economic activities of the university, a comparative analysis of costs and economic effects was conducted over a three-year period. The goal was to identify the economic feasibility of integrating digital solutions that ensure academic integrity, including anti-plagiarism systems, AI text recognition, behavioral monitoring, and intelligent proctoring [24].

The table presents key indicators that allow you to assess the difference between the traditional approach and the scenario of implementing AI tools:

The calculations are based on a typical teacher's workload, taking into account the costs of salaries, administration, appeals and third-party anti-plagiarism services. The cost of AI systems is calculated based on average market prices of solutions (Turnitin, GPTZero, Strike Plagiarism) with integration into LMS. Losses from student outflow and reputational risks are estimated based on data from Kazakhstani universities that have encountered academic violations. The increase in applicants is modeled based on an increase in the university's image in the presence of a transparent control system. The payback is calculated by comparing annual savings and initial investments.

The presented data demonstrate the high economic and organizational efficiency of the implementation of

Table 1 - Comparative analysis of costs and economic effects from the implementation of AI systems for academic integrity (for 3 years)

Indicator	Without AI (traditional approach)	With AI system (implementation and operation)
Annual labor costs for checking work (man-hours)	4 500	1 500
Average workload of teachers (%)	120%	85%
Expenses for monitoring and checking (in tenge/year)	12 000 000	5 000 000
Investments in AI (one-time)	0	10 000 000
Losses from student outflow/reputational risks	6 000 000	1 000 000
Annual increase in new applicants (%)	0–1%	5–8%
Payback time for investments	—	2,3 years
Additional benefits (non-monetary)	Low	High (quality, trust, motivation)
**Note: Complited by authors*		

AI systems for ensuring academic integrity in universities. Despite significant initial investments, already within the first two years there is a significant reduction in annual costs for verification and control, a decrease in the workload of the teaching staff and an increase in the transparency of the educational process. Thus, the payback period for investments in AI systems is less than three years, and the cumulative effect is expressed in both financial and institutional benefits, which confirms the feasibility of including such solutions in the digital strategy of the university.

CONCLUSION. The review outlines that artificial intelligence technologies have a dual impact on higher education. On the one hand, students might use AI to create texts, solve problems and other tasks, which makes it difficult to assess real knowledge and violates the principles of academic integrity. On the other hand, educational institutions can use AI to prevent such violations.

Today, universities are implementing various measures to protect academic integrity, including advanced programs for detecting plagiarism, systems that recognize texts created by neural networks, as well as platforms for online proctoring. However, such technologies have flaws. These systems might inaccurately detect AI-generated text or mistakenly suspect students of academic dishonesty.

Technical solutions should be complemented by pedagogical and institutional strategies. It is important that universities develop transparent regulations for the use of AI and train students and teachers to handle these technologies responsibly. Assessment forms that require analysis, argumentation, and a step-by-step explanation of the assignment process are particularly useful. This reduces the likelihood of unfair use of AI.

Emotional and social aspects also need attention. Excessive control can cause stress and distrust among students. It is important to create an atmosphere of trust thus students understand the responsibility of their actions.

In general, an integrated approach is required to preserve academic integrity in the context of the active development of AI. It should include technological solutions, transparent regulations, training, and ethical education. These factors lead to a better understanding of AI capabilities, so it will be utilized as a useful learning tool, and not as a way to bypass the system. Developing a culture of honest and informed use of AI is an important task of modern education.

From an economic perspective, the implementation of AI-based systems for safeguarding academic integrity also demonstrates measurable financial benefits. Scenario-based analysis over a three-year horizon reveals that, despite initial investment requirements, universities can significantly reduce operational costs associated with manual verification, appeals processing, and reputational risks. Moreover, institutions with robust integrity systems may experience a long-term positive effect through increased student trust and enrollment. Therefore, investments in AI integrity tools, when integrated with pedagogical reform, represent not only an ethical necessity but also a cost-effective strategy for sustainable development in higher education.

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СВЕДЕНИЯ ОБ АВТОРАХ:

Мусабалина Динара Сериковна* – Postdoc, PhD, Абай атындағы Қазақ Ұлттық Педагогикалық Университеті, Алматы қ., Қазақстан
E-mail: d.mussabalina@gmail.com
Айдаргалиева Назгуль Газизоллаевна - проректор, PhD, Л.Н.Гумилев атындағы Еуразия ұлттық университеті ,Астана қ., Қазақстан Республикасы
E-mail: aidargaliyeva@enu.kz
Малдынова Айжана Владимировна – PhD, Associate Professor, Kenjegali Sagadiyev University of International Business, Almaty, Republic of Kazakhstan.
E-mail: maldynova.a@uib.kz

Мусабалина Динара Сериковна* – Postdoc, PhD, Казахский Национальный Педагогический Университет имени Абая, Алматы, Казахстан
E-mail: d.mussabalina@gmail.com
Айдаргалиева Назгуль Газизоллаевна - Проректор, PhD, Евразийский национальный университет им. Л.Н. Гумилева, Астана, Казахстан
E-mail: aidargaliyeva@enu.kz
Малдынова Айжана Владимировна - PhD, доцент ВУЗа, Университет Международного Бизнеса имени Кенжегали Сагадиева, г. Алматы, Республика Казахстан
e-mail: maldynova.a@uib.kz

Mussabalina Dinara Serikovna* – Postdoc, PhD, Abai Kazakh National Pedagogical University, Almaty, Kazakhstan
E-mail: d.mussabalina@gmail.com
Aidargaliyeva Nazgul Gazizollayevna – Vice-Rector, PhD, L. N. Gumilyov Eurasian National University, Astana, Republic of Kazakhstan
E-mail: aidargaliyeva@enu.kz
Maldynova Aizhana Vladimirovna - PhD, Associate Professor, Kenzhegali Sagadiev University of International Business, Almaty, Republic of Kazakhstan
E-mail: maldynova.a@uib.kz