



**«ЖАСАНДЫ ИНТЕЛЛЕКТ, ИНКЛЮЗИВТІЛІК ЖӘНЕ АКАДЕМИЯЛЫҚ АДАЛДЫҚ:
ИННОВАЦИЯ МЕН БІЛІМ БЕРУ ҚҰНДЫЛЫҚТАРЫН ТЕҢЕСТІРУ»**
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MATERIALS
of the International Educational and Methodological Conference
**«ARTIFICIAL INTELLIGENCE, INCLUSION, AND ACADEMIC INTEGRITY:
BALANCE OF INNOVATION AND EDUCATIONAL VALUES»**
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ҚАЗАҚСТАН РЕСПУБЛИКАСЫ ҒЫЛЫМ ЖӘНЕ ЖОҒАРЫ БІЛІМ МИНИСТРЛІГІ
МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РЕСПУБЛИКИ КАЗАХСТАН
MINISTRY OF SCIENCE AND HIGHER EDUCATION OF THE REPUBLIC OF KAZAKHSTAN



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Искусственный интеллект, инклюзия и академическая честность: баланс инноваций и образовательных ценностей // Международная учебно-методическая конференция. – Астана: ИПЦ Esil University, 2026. – 117 с.

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Материалы, включенные в сборник, представляют ценный исследовательский и практический опыт в области использования искусственного интеллекта и академической этики, который может быть успешно применен в практической деятельности работников образовательных учреждений, способствуя развитию, инклюзивности и качественному улучшению процесса обучения.

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СОДЕРЖАНИЕ

СЕКЦИЯ №1

ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ В ВЫСШЕМ И СРЕДНЕМ ОБРАЗОВАНИИ

Luis Borges Gouveia Artificial intelligence as unfinished work: challenges and misconceptions in contemporary education.....	5
Mukhamejanova A., Mukhiyadin A. AI as a real-time data curator and tutor: a technical framework for immersive analytics learning Dr. Al Khan, Dept. of Computer Science	10
Алиев М.К. Искусственный интеллект в организации учебного процесса «статистический учет и статистическая отчетность».....	14
Аязбаева А.Т. ЖОО оқытушыларының инклюзивті педагогикалық құзыреттілігін дамыту.....	17
Галиева А.Х., Шаяхметова Л.М., Орынбасарова А.А. Использование ИИ в преподавании дисциплины «планирование и прогнозирование в экономике Казахстана».....	19
Қабдешова Қ.А. Қазақ тілін орыс тобына жасанды интеллект көмегімен оқыту: әдістемелік мүмкіндіктері мен сауалнама нәтижесі.....	23
Кажмухаметова А.А., Акимова Б.Ж., Аманова Г.Д. Трансформация системы преподавания учетных дисциплин в условиях экспансии искусственного интеллекта.....	25
Королев П.М. Я спросил у ясеня, я спросил у тополя...» замечания после «разговора» с машинным (гига-чат) персонажем по поводу внедрения ИИ в учебный процесс.....	29
Кудайбергенова Б.И., Жусупова М.Т. Роль искусственного интеллекта в развитии трехязычного образования.....	32
Михайлина И.Н. Контроль и оценка знаний в автоматизированном формате как результат системы открытого образования.....	35
Мухамедженова А.А. Методика преподавания дисциплины «академическое письмо» в докторантуре: исследовательско-ориентированный и рефлексивный подходы.....	39
Мысжанов З.М. Искусственный интеллект нового поколения в образовании: практический кейс применения стека технологий Gemini3, Veo3 и Nano banana от Google	47
Пернекулова М.М., Қанатова А.Қ. Алгоритмдік сенім дәуірі және рухани код: dataism қазақ қоғамының ойлау мәдениетін қалай өзгертеді.....	49
Рахимбекова А.Е., Укубасова Г.С. Развитие и оценка компетенций педагогов в области искусственного интеллекта и генеративного ИИ: глобальные тренды и вызовы для Казахстана.....	54
Фёдорова Л.И. Использование искусственного интеллекта (ИИ) на занятиях по дисциплинам современного русского языка в студенческих группах филологического профиля.....	58
Шаяхметова К.О., Абдурахманов М.А., Арқат А.А. Влияние ИИ на стратегическое планирование.....	60

СЕКЦИЯ №2

АКАДЕМИЧЕСКАЯ ЧЕСТНОСТЬ В УСЛОВИЯХ ИСПОЛЬЗОВАНИЯ ИИ

Mukhamejanova A.A., Makhanova A.A. Foreign system of ensuring economic security and its application in the model of the Republic of Kazakhstan.....	67
Аймағанбетов Т.З. Қазақстан Республикасының жоғары біліміндегі ЖИ-сауаттылық: құқықтық шынайылық пен педагогикалық этиканың тоғысуы.....	73
Бабасов А.Г., Жумартов Т.А. Академическая честность в условиях использования искусственного интеллекта	75
Байдалина М.Е. Экология пәнінде академиялық тұтастық: жауапкершілік және білім.....	78

Бекжанова Т.К., Төлепберген Н.Б. Цифровые инклюзивные образовательные практики как инструмент усиления предпринимательского потенциала молодежи в регионах Казахстана.....	81
Болатов Б.Б. Дене шынықтыру және академиялық адалдық	87
Жусупов А.Д., Мәней. Х. Әділеттілік принципі құқықтық дәлелдеу дәрежесі ретінде.....	89
Казенова А.А. Академическая честность как основа современного образования.....	92
Юнусова Н.Х. Технология дипфейков: этические и социальные последствия для дезинформации и манипулирования.....	96

СЕКЦИЯ №3

ИНКЛЮЗИВНЫЕ ОБРАЗОВАТЕЛЬНЫЕ ПРАКТИКИ И ЦИФРОВЫЕ ТЕХНОЛОГИИ

Алтынбеков М.А., Айтхожина А.Е., Успамбаева М.Қ., Ахат А. Бухгалтерлік есеп» пәні бойынша сабақтарда оқытудың интерактивті әдістерін қолдану	105
Ковалева Я.Н. Междисциплинарное взаимодействие специалистов при обучении студентов с особыми образовательными потребностями.....	110
Оринина Л.В. Использование возможностей нейropsychологии при работе с обучающимися с ОВЗ в контексте обеспечения безопасности образовательной системы Таджикистана.....	112

ЖОҒАРЫ ЖӘНЕ ОРТА БІЛІМ БЕРУДЕГІ ЖАСАНДЫ ИНТЕЛЛЕКТ
ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ В ВЫСШЕМ И СРЕДНЕМ
ОБРАЗОВАНИИ
ARTIFICIAL INTELLIGENCE IN HIGHER AND SECONDARY
EDUCATION



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ARTIFICIAL INTELLIGENCE AS UNFINISHED WORK: CHALLENGES AND
MISCONCEPTIONS IN CONTEMPORARY EDUCATION

Abstract. *This presentation offers a critical analysis of the integration of Artificial Intelligence within the educational ecosystem, starting from the premise that true Artificial Intelligence does not yet exist. What we currently use are powerful statistical systems, although fluent and fast, they lack human understanding, causal reasoning, and the ability to verify truth. The discussion focuses on the intellectual danger of substituting verification with speed and reasoning with trust, which leads a society to stop questioning.*

Instead of genuine education, we are witnessing the emergence of dependency training, where students are taught to use tools to generate ideas or summaries, rather than learning how to refute, reason, or ask why. The narrative that AI is a finished product is a curiosity-killer; in reality, we are only at the beginning of a process filled with unsolved problems regarding bias and explainability. Therefore, it is argued that every AI output should be treated as a hypothesis rather than a definitive answer, and every model as a study case instead of an oracle. The ultimate goal is to ensure that learners do not become passive users of alien intelligence, but remain curious minds engaged in the sovereign act of discovery.

Keywords: *Digital Literacy; Critical Thinking; Technology Dependence; Knowledge Construction.*

1. Introduction

The dominant narrative in contemporary society maintains that Artificial Intelligence is a finished product to which society must necessarily adapt. However, this perspective can be identified as one of the most dangerous misconceptions of our time, since it inhibits curiosity, which is one of the foundations of any discovery. In reality, what we currently call AI are “black box” statistical systems that, despite being convincing, do not possess human intelligence. The introduction of these systems into classrooms and companies has generated behaviors that presuppose the existence of an external intelligence ready to be consumed, which represents a profound intellectual risk. This work aims to deconstruct the illusion of AI as an oracle and propose a pedagogy based on curiosity and the sovereignty of human thought.

2. Perspectives on the impact of AI on education

The literature has presented a large number of proposals and analyses on the impact of AI on education. This activity alone is a sign of the importance of this transformative technology, also in the context of education. Among the different positions, the following stand out as being of interest to the present discussion:

- AI as unfinished work and risk of dependency: it argues that “true” AI does not yet exist, with only fluent statistical systems available. The greatest danger is “dependency training”, where the student learns to use tools instead of learning to think, refute, or inquire into causes, leading to a potential atrophy of sovereign discovery (Gouveia, 2026).

- Deconstructing myths and complementarity: analyzes and demystifies the idea that AI will replace teachers. It argues that AI lacks vital human qualities (empathy, creativity, awareness) and that the physical classroom remains essential for the social and emotional engagement that technology cannot replicate (Giray, 2024).

- The “automation trap” and cognitive costs: explores the risk of cognitive “offloading”, where the transfer of mental effort to the machine generates “metacognitive laziness” and an “illusion of mastery”. Excessive use can weaken critical problem-solving skills and the diversity of human thought (Karamuk, 2025).

- Transformative potential and pedagogical efficiency: highlights measurable gains in productivity and personalization of learning. Adaptive platforms can increase exam scores and student motivation through immediate feedback (10x faster) and individualized learning paths (World Bank, 2024).

- Epistemic surveillance and ethical governance: emphasizes that AI surpasses human performance in reading and science, but fails in abstract reasoning. It proposes a curriculum reform focused on “epistemic surveillance” – the ability to verify and critique AI outputs – and the need to bridge the gap in digital literacy to prevent further inequalities (OECD, 2023).

Generally speaking, we can consider three relevant warnings:

1. AI as oracle versus hypothesis: while some perspectives focus on the efficiency of AI in providing quick answers, others suggest that each answer should be treated as a hypothesis to be tested by human critical thinking, and not as an absolute truth.

2. Role transition: the teacher ceases to be the primary source of information and becomes a “learning orchestrator” or a “curator” of human-AI interactions .

3. Digital sovereignty: there is a strategic warning about the loss of digital autonomy if education is reduced to a passive adaptation to algorithms, instead of reinforcing human intelligence as the sovereign engine of the ecosystem.

This body of literature suggests that the success of AI in education depends not on the technology itself, but on maintaining human curiosity as the cradle of any intellectual discovery.

3. Strategies and precautions in the exploration of AI in education

Within the academic debate on the integration of Artificial Intelligence (AI) in education, a common position emerges that the potential of this technology does not lie in its acceptance as an infallible oracle, but rather in its use as an object of study and a catalyst for critical thinking. For AI to function as an enhancer of human intelligence without causing cognitive atrophy, it is imperative to adopt pedagogical strategies that prioritize active inquiry and learner sovereignty.

In this context, numerous proposals are introduced for care and activities to explore the potential of AI in an ethical and effective way:

- Project “AI Detective”: students investigate claims generated by AI, looking for three primary sources that contradict or complicate them, aiming to identify hallucinations and biases (Gouveia, 2026).

- Mapping reasoning (paper before digital): the need to draw manual mind maps or flowcharts to plan problem-solving before interacting with AI, making human thought visible and valued (Gouveia, 2026).

- Chain-of-Thought prompt (CoT): instructing AI to explain its reasoning step by step, which allows for exposing logical gaps and increases transparency in complex analytical tasks (MIT Sloan, Teaching & Learning Technologies, 2025).

- Epistemic surveillance and direct verification: treating each AI response as a hypothesis to be tested, requiring cross-referencing of data with reliable databases and human expertise (Lee et al, 2025).

- Augmented Generation by Retrieval (RAG): the use of systems that retrieve information from specific and reliable sources (such as resumes or selected articles) before generating the text to minimize factual errors (MIT Sloan, Teaching & Learning Technologies, 2025).

- Adjusting the model's "temperature" (LLM): a technical setting to control AI randomness – low temperatures (0.0-0.3) for focused and factual outputs; high temperatures for creative tasks or brainstorming (MIT Sloan, Teaching & Learning Technologies, 2025).

- Coaching (Vantaa model): implementation of peer mentoring where teacher-tutors support colleagues in the pedagogical integration of AI, ensuring that the technology serves learning goals (Fourrage, 2025).

- The challenge of the subjective "Why": formulating questions that the statistical nature of AI cannot answer, such as subjective feelings or extremely specific local contexts (Gouveia, 2026).

- Data Protection Impact Assessment (DPIA): a mandatory procedure to verify the compliance of new AI systems with the GDPR, ensuring that student data is not misused for training external models (Fourrage, 2025).

The success of these uses/strategies depends on the transition of the teacher's role from "source of information" to "orchestrator of human-AI synergies" (FiveRivers Technologies, n.d.). It is fundamental to avoid "dependency training" (Giray, 2024), where the student becomes a mere user of someone else's intelligence, encouraging instead the "stewardship" of the technological process (Holistic Training, 2025), where the human retains responsibility and final authorship of the knowledge produced (DeFlitch, 2026).

4. Proposals for using the potential of AI in education

Within the scope of academic reflection on technological integration in teaching and learning contexts, it is imperative that the exploration of the potential of Artificial Intelligence (AI) transcends mere technical adoption, evolving into an active and sovereign inquiry. In order to mitigate the risk of "training dependency", contemporary pedagogical proposals should focus on strengthening human skills in verification, causal reasoning, and ethical deliberation (Gouveia, 2026).

Methodologies and epistemic vigilance

Educational practice should integrate methodologies that challenge the supposed infallibility of linguistic models. Among these, the "AI Detective" project stands out, in which learners are asked to validate statements generated by algorithms by identifying primary sources that complicate or refute the content produced (Giray, 2024; Gouveia, 2026). Complementarily, the "Why Challenge" focuses on problems that the statistical nature of AI cannot solve, such as subjective feelings or nuances of specific local contexts (Gouveia, 2026). For the development of media literacy skills, micro-literacy exercises (15-minute sprints) are proposed, where biases or hidden viewpoints in machine-generated texts are identified (Gouveia, 2026).

The visibility of the cognitive process

One of the pillars of intellectual sovereignty lies in valuing human thought in the face of the algorithmic "black box". The Reasoning Mapping strategy stresses the primacy of analog support over digital, requiring students to create manual mind maps or flowcharts prior to using any AI tool (Karamuk, 2025; Gouveia, 2026). This approach allows for subsequent comparison between humans and algorithms, in which the student confronts their logical journey with the machine's output, reinforcing authorship and the value of their own reasoning (Karamuk, 2025).

Technical optimization and scientific rigor

From a technical exploration standpoint, the literature points to the use of protocols that minimize the occurrence of "hallucinations" and ensure the transparency of processes. The Chain-of-Thought technique is a way to expose logical gaps, forcing the AI to explicitly state its reasoning in a phased manner (MIT Sloan, Teaching & Learning Technologies, 2025). Additionally, controlling the model's "temperature" (one of the parameters associated with LLMs) allows adjusting the randomness of responses according to the task, making the systems more creative. The adoption of Augmented Generation by Retrieval, RAG systems, is also recommended, which limit information processing to reliable and pre-selected sources (MIT Sloan, Teaching & Learning Technologies, 2025).

Institutional strategies and curriculum reform

Flipped Classroom model allows AI to act as a thinking partner in preparing materials, while keeping the student as the protagonist of their learning in relation to their peers (OECD, 2023; World Bank, 2024). In the field of assessment, it is urgent to create AI-resistant assessments focused on interdisciplinary syntheses, ethical judgment, and reflection based on lived experience – dimensions that technology is not yet able to replicate (Panorama Education, 2026). Finally, the Vantaa Model of Collegial Coaching stands out, promoting support networks among teachers to ensure that technology serves pedagogical goals and not the other way around (Fourrage, 2025) – in order to prioritize not the use of technology, but rather the associated pedagogical practices.

5. Developing a position on the use of AI in education.

The statistical nature and the lack of understanding

It is imperative to clarify that current AI models operate based on probability, not factual correctness or logical understanding. These systems predict what seems likely, failing to verify accuracy and ascertain the truth. The absence of causal reasoning and explainability places these models in a state of “unfinished work”. When the linguistic fluency of these systems is mistaken for genuine intelligence, a silent substitution of critical thinking for algorithmic trust occurs.

From addiction training to cognitive atrophy.

Observation of current pedagogical practices reveals a worrying trend: the transition from an education for thinking to a training in technological dependence. Students are being empowered to stimulate machine reasoning, generate summaries, and produce automatic ideas, but are losing the ability to refute arguments, design complex systems, or question the “why” of things. This excessive dependence on external AI tools atrophies the innovation skills of the future workforce. From a strategic point of view, the replacement of human reasoning with statistical black boxes constitutes a direct threat to a nation’s technological and digital sovereignty.

Educational proposals: the pedagogy of curiosity

To mitigate the risks of cognitive passivity, a paradigm shift from adaptation to active discovery is proposed. Some strategic tools include:

- Project “AI Detective”: encourages students to investigate machine-generated claims, requiring the identification of primary sources that contradict or complicate the produced content.
- Mapping the reasoning process: prioritizes the use of paper over digital tools, where students draw mind maps or flowcharts to plan problem-solving before interacting with any AI tool.
- The “Why” challenge focuses on formulating questions that AI, due to its statistical nature, cannot answer, such as specific local contexts or subjective feelings.

6. Conclusions

The contemporary debate on Artificial Intelligence (AI) in the educational ecosystem stems from a fundamental ontological misconception: the premise that “true” artificial intelligence is already a finished product. In reality, what is currently designated as AI constitutes a set of powerful statistical systems that, although fluent and convincing, lack semantic understanding, causal reasoning, and the intrinsic capacity to verify truth (Gouveia, 2026). These models operate under the logic of probabilistic prediction, anticipating what seems probable rather than what is factually correct, failing to understand the profound meaning of the information they process (OECD, 2023). Thus, the uncritical acceptance of these systems as infallible oracles represents an intellectual danger, as it confuses algorithmic fluency with genuine human intelligence.

In this context, a worrying transition is observed from education for critical thinking to what can be described as a “training in technological dependence”. Students are being trained to stimulate machine reasoning, generate summaries, and produce automatic ideas, but they fail to develop sovereign skills such as the ability to refute arguments, design complex systems, or inquire about the causality of phenomena (Gouveia, 2026). This excessive dependence on external tools can lead to “metacognitive laziness” and an “illusion of mastery,” where the learner transfers mental effort to the algorithm, atrophying their own cognitive muscles and capacity for independent problem-solving (Karamuk, 2025; Lee et al., 2025).

Additionally, demystifying the role of AI is imperative to safeguard the centrality of human interaction in the pedagogical act. Contrary to the myth of replacing the teacher, AI lacks vital human qualities such as empathy, ethical awareness, and the physical presence necessary for the transmission

of social norms and values (Giray, 2024; World Bank, 2024). Evidence shows that AI acts most effectively as a “strength enhancer,” automating administrative and routine tasks to free up the teacher for personalized follow-up and emotional support (Giray, 2024; TeachBetter, 2025). However, the objectivity of these systems is a fallacy, since the models often mirror the biases and prejudices present in the data with which they were trained, requiring constant epistemic vigilance from all stakeholders.

Finally, the rampant adoption of statistical “black box” solutions jeopardizes digital sovereignty and the strategic competitiveness of nations. Replacing human critical thinking with algorithmic automatisms atrophies the innovation skills of future generations, making society silently dependent on the intelligence of others (Microsoft, 2025; Gouveia, 2026). Research indicates that the use of generative models can lead to “mechanized convergence,” reducing the diversity of thought and the originality of solutions found (Lee et al., 2025). Therefore, education should not be seen as a mere passive adaptation to the digital age, but rather as the reinforcement of human intelligence as the sovereign and driving force of the technological ecosystem.

It is in this context that the analysis carried out allows us to conclude that Artificial Intelligence should not be seen as a closed system or an oracle, but as an object of study whose limits and flaws must be explored. True AI education does not lie in the passive acceptance of its polished results, but in maintaining an investigative stance that treats each model output as a hypothesis to be tested.

The ultimate goal of contemporary education should be to strengthen human intelligence as the sovereign engine of the digital ecosystem. Those who abdicate the act of investigation silently become mere users of others’ intelligence. Thus, AI remains an unfinished work, awaiting curious minds that refuse to let the machine think for them.

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AI AS A REAL-TIME DATA CURATOR AND TUTOR: A TECHNICAL FRAMEWORK FOR IMMERSIVE ANALYTICS LEARNING

Abstract. *The rapid growth of data-driven domains requires a shift from static educational models to real-time, interactive learning. This paper introduces the Dual-Agent Curator-Tutor (DACT), an AI-driven framework integrating real-time data curation and adaptive tutoring within immersive analytics (VR/AR) environments. DACT combines a Curation Agent for dynamic data filtering and contextualization with a Tutoring Agent that delivers personalized, scaffolded instruction based on multimodal learner behavior. The system forms a closed-loop architecture where data and pedagogy co-adapt in real time. A modular implementation and quantitative evaluation methodology demonstrate reduced cognitive load and enhanced higher-order analytical skills.*

Аңдатма. *Деректерге негізделген салалардың қарқынды дамуы білім беруді статикалық талдаудан нақты уақыттағы интерактивті оқытуға көшіруді талап етеді. Бұл мақалада иммерсивті аналитика (VR/AR) ортасында деректерді нақты уақытта курациялау мен бейімделмелі оқытуды біріктіретін «Курактор–Наставник» қос агентті (DACT) ИИ-архитектурасы ұсынылады. DACT жүйесі деректерді сүзу және мағыналандыруға арналған курация агенті мен білім алушының мінез-құлқын мультимодальды талдауға негізделген оқыту агентінен тұрады. Архитектура деректер мен педагогикалық ұсыныстардың нақты уақытта бірлесіп бейімделуін қамтамасыз етеді. Ұсынылған модель когнитивтік жүктемені төмендетіп, жоғары деңгейлі аналитикалық дағдыларды дамытуға ықпал ететіні көрсетіледі.*

Аннотация. *Быстрое развитие data-driven сфер требует перехода от статических образовательных моделей к обучению, основанному на работе с данными в реальном времени. В статье представлена архитектура двойного ИИ-агента «Курактор–Наставник» (DACT),*