BLOOMING AI

Developing an AI-powered Open-Source Learning Platform based on Bloom's taxonomy

Work Package 2 – Activity 2.2

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Ethical Challenges in AI Integration

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Objective

This report outlines the ethical challenges, evaluation guidelines, and regulatory compliance considerations for Generative AI (GenAI) in educational and research settings. While it analyzes key challenges like bias, transparency, and data protection, the primary focus is on the main topics presented at the Blooming AI project's Athens meeting in May 2026: maintaining academic integrity, ensuring fair assessment, and achieving compliance.

Methodology

The findings in this report are derived from an analysis of three academic presentations focused on the integration of GenAI in higher education:

- Presentation by Ass. Prof. Marianthi Grizioti, mainly focused on the evaluation, which details ethical concerns, validity in research, and specific acceptable versus unacceptable usage policies for AI in student and research evalu ations.

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- Presentation by Postdoctoral Researcher Iason Spilios, on academic integrity, which explores the impacts on human skill retention, algorithmic bias, and proactive 'Ethics by Design' frameworks.
- Presentation by Research Scientist Carsten Ullrich, focused mostly on the frameworks of using AI in education, which outlines UNESCO risks, EU Commission ethics principles, regulatory considerations, and concrete compliance steps for the project.

The literature for this report was curated to provide a multidisciplinary analysis of the ethical implications of Artificial Intelligence (AI) with a particular focus on Generative AI (GenAI) on higher education, specifically regarding student cognition, academic integrity, and equity. The objective was to bridge ethical theory with real-world impacts, stakeholder perceptions, and mitigation strategies for risks to academic integrity, student cognition, and algorithmic bias. Sources were gathered using keywords such as "AI in education", "Ethics of AI", combined with "Generative AI", "algorithmic bias", "data privacy", and "policy frameworks", with a specific focus on sectors like higher education. Sources were gathered across academic databases including Scopus, Web of Science, and ERIC. Included works are recent, peer-reviewed studies that offer empirical data, such as large-scale stakeholder surveys and rigorous theoretical frameworks. The selection adhered to defined inclusion and exclusion criteria: included works were English-language publications after 2021, comprising peer-reviewed journal articles, systematic reviews, academic monographs, and scholarly preprints that contribute empirical findings, educational frameworks, or socio-ethical analyses. Works published in languages other than English, purely technical computer science papers lacking ethical or social analysis were intentionally excluded.

This specific corpus was chosen because it effectively demonstrates how AI uniquely reconfigures diverse fields. The heavy inclusion of educational literature highlights the asymmetrical tension between AI's envisioned, yet empirically unproven, promise of personalized learning and the immediate, tangible challenges it already poses to academic integrity and learner autonomy. Meanwhile, sources addressing healthcare and state intelligence illustrate the high-stakes, systemic risks of algorithmic bias and data harvesting,

showing how AI can challenge equitable care and human right. These findings serve as a vital benchmark for the present project, as the results of this review will directly inform WP3 in establishing safeguards for the development of ethical AI agents. Finally, papers focusing on national AI strategies, ethical theories such as "ethics by design" were selected to transition the analysis from simply identifying problems to proposing concrete, proactive solutions, ensuring a holistic understanding of AI ethics in the modern era.

Following selection, the corpus underwent a structured thematic analysis organized along four primary axes, risks, evaluation, governance frameworks and practical integration to systematically map both emerging vulnerabilities and actionable ethical safeguards.

Findings Summary

1. Ethical Risks and Academic Integrity

This section examines the foundational ethical risks and pedagogical vulnerabilities that emerge when artificial intelligence is integrated into academic and institutional settings. Specifically, it addresses both individual-level threats to academic integrity, such as cognitive offloading and the erosion of learner autonomy and broader systemic harms, including algorithmic bias, socioeconomic disparities, and opaque decision-making. Together, these points highlight how unregulated AI adoption can undermine educational equity, accountability, and regulatory compliance.

- Unstructured use of high-utility AI tools introduces severe cognitive risks; students may outsource critical thinking to algorithms, which degrades their academic self-efficacy and inquiry skills over time.
- Large Language Models (LLMs) are predisposed to algorithmic bias, often reinforcing traditional stereotypes based on imbalanced training datasets.
- The deployment of AI tools exacerbates the digital divide, widening the resource gap between marginalized and well-resourced institutions.

- The ‘black-box’ nature of AI obscures decision-making processes, complicating theauditing of outcomes and making accountability difficult.
- Rapid technological deployment consistently outpaces national laws and institutionalpolicies, creating significant regulatory gaps in oversight and legal accountability
- Widespread data harvesting for model training and deployment often occurs withoutexplicit user consent, undermining data privacy and individual autonomy
- Because AI systems lack true semantic understanding, their unverified use risks polluting academic and informational outputs with fabricated or superficial content

2. GenAI in Educational and Research Evaluation

- Current AI-detection tools are insufficient, necessitating alternative student assessment methods that evaluate the learning process rather than just the final outcome.
- Recommended alternative assessments include student portfolios, project work, and mutual assessment where AI acts as a ‘fellow student’.
- In student evaluation, accepted AI usage includes administrative support, learning analytics, and language or feedback drafting.
- Unacceptable educational AI usage includes fully autonomous grading without human oversight, hidden AI use, and the uploading of sensitive data.
- In research evaluation, GenAI is accepted for generating visualizations, transcriptions, and organizing metadata for large-scale data relationships.
- Unacceptable research AI usage includes delegating peer review decisions, utilizing AI for finding interpretation, and uploading unpublished research data.
- All evaluation processes require a ‘human in the loop’ approach, with strict transparency regarding AI involvement and adherence to students' rights to challenge decisions.

3. Regulatory Frameworks and Compliance Integration

- The deployment of AI in education must navigate stringent regulatory landscapes, notably the AI Act (which may classify educational AI as high-risk systems), the GDPR for data protection, and copyright laws for intellectual property.
- The EU Commission emphasizes guiding ethical principles for educators, including fairness, human dignity, academic integrity, trustworthiness, and justified choice.
- To mitigate systemic bias and safeguard human autonomy, the BloomingAI project proposes an 'Ethics by Design' approach, which hardwires value-sensitive design into the technological architecture rather than treating it as an afterthought.
- This architectural design balances Utilitarianism (mass efficiency and societal well-being), Deontology (strict algorithmic transparency), and Virtue Ethics (protecting critical thought).
- Immediate compliance steps for the BloomingAI project include reviewing existing university AI guidelines to identify common themes, defining specific ethical use guidelines based on the system's scope, and conducting ongoing legal assessments in parallel with development.

Ethical Challenges of AI: A Review of Issues

By the following list of references, it turns out that the integration of Generative AI and related AI technologies in a range of fields, including education, is accompanied by profound ethical and other social issues, which require immediate attention.

A primary ethical challenge in AI integration is the perpetuation and, frequently, amplification of existing social inequalities. This happens through several related and potentially reinforcing mechanisms. AI models, particularly Large Language Models, are frequently configured based on imbalanced datasets, leading to skewed outputs that reinforce societal stereotypes. For example, studies demonstrate that, due to their design, the use of these models is heavily predisposed and biased towards associating occupations

with traditional gender stereotypes, often rationalizing these predispositions/biases with factually inaccurate explanations. Design biases, from data to algorithmic ones, can result in unequal access to resources as well as in discriminatory practices. AI-aided categorization is often overly reductive. This categorization also threatens to widen the digital divide, creating a growing gap between well-resourced institutions and marginalized communities. Data privacy and security represent another ethical challenge. The data requirements of AI systems pose significant threats to individual confidentiality. In the intelligence community, the mass collection of open-source social media data routinely bypasses citizen consent and autonomy (Al-kfairy et al. 2024; Coeckelbergh 2019; Boddington 2023; Radanliev 2025).

In educational and healthcare settings, the handling of sensitive student or patient data by third-party AI chatbots frequently clashes with established data protection regulations. Furthermore, the extraction of private information to train AI models without proper attribution or compensation raises ongoing copyright and ownership disputes, violations that are already underway (Al-Zahrani and Alasmari 2024; Marín et al. 2025).

Compounding these issues is the lack of transparency and accountability inherent in many of these technologies. The opaque, black-box nature of AI systems obscures their decision-making processes, making it difficult to audit outcomes or hold people and systems accountable for errors, hallucinations, or discriminatory decisions. This lack of transparency has sparked a growing legal discourse around whether AI systems should be recognized as legal entities to provide mechanisms for compensation in cases of privacy breaches or institutional harm. In educational settings, this lack of transparency directly impacts academic integrity and learner autonomy. The ability of generative AI to produce high-quality text blurs the lines between AI-assisted and student-authored content. While AI can undoubtedly enhance self-regulated learning, students face the distinct danger of over-reliance, potentially outsourcing their critical thinking to algorithms and degrading their academic self-efficacy and problem-solving skills (Weiner et al. 2025; Coeckelbergh 2019; Radanliev 2025).

Ethical Challenges in AI Integration in Education: A Review of Issues

Empirical evidence highlights a deep tension between the recognition of AI's utility and profound anxieties and lack of skills regarding its deployment. A study involving hundreds of university students and faculty members across higher education institutions in Peru found that roughly half of all respondents explicitly expressed concern regarding data privacy and security, with an even larger majority identifying a critical lack of transparency in AI systems. A large-scale survey in Saudi Arabia mirrored these findings, revealing that while stakeholders recognize AI's potential to streamline administration, they heavily emphasize the imperative need to address privacy, security, and bias. Furthermore, research indicates a critical gap between the skills students possess and those required for ethical AI use; while students favor hands-on applications, they frequently lack awareness of prompt engineering and bias detection. Disturbingly, surveys of leading AI researchers and analyses of global policy strategies suggest that key decision-makers and educators are often not formally trained to tackle these emerging ethical questions, and the specific ethical implications of AI in education remain largely absent from global policy discourse (Marín et al. 2025; Al-Zahrani and Alasmari 2024; Krause et al. 2025; Holmes et al. 2022; Schiff 2022).

Addressing the ethical challenges of AI requires moving beyond abstract principles to first understand the challenges before it would be possible to design and implement concrete, multidisciplinary solutions. The solution could be clear, enforceable governance frameworks that prioritize human rights, fairness, and transparency, including strict data protocols to protect sensitive information. Developers could take into consideration diverse, representative datasets and implement continuous algorithmic auditing to detect and mitigate biases. Educational institutions should simultaneously pivot toward teaching AI literacy, instructing users on how to critically evaluate AI outputs and navigate the ethical landscape. To combat academic dishonesty and ensure accuracy, organizations should adopt hybrid evaluation models that combine the efficiency of AI with critical human oversight, ensuring that technologists, ethicists, educators, and policymakers collaborate closely throughout the AI lifecycle. (Radanliev 2025; Al-kfairy et al. 2024; Marín et al. 2025).

To effectively address these systemic risks, the conversation must move beyond reactive troubleshooting and ground AI development in a pluralistic philosophical framework: utilizing Utilitarianism to balance mass efficiency against harms to vulnerable populations, Deontology to enforce strict consent and algorithmic transparency, Virtue Ethics to safeguard human critical thinking, and Distributive Justice to prevent the exacerbation of the digital divide.

A utilitarian lens evaluates AI deployment by weighing aggregate institutional efficiency against potential harms to vulnerable student populations. Rather than accepting productivity gains at face value, it requires auditing whether automated grading or predictive analytics disproportionately penalize minority groups through imbalanced training datasets.

Grounded in duty-based ethics and respect for moral autonomy, deontology establishes non-negotiable boundaries around informed user consent, data privacy, and algorithmic transparency. It directly counters the "black-box" opacity of AI systems by mandating explainable architectures and strict data protocols regardless of computational convenience.

Focusing on the cultivation of intellectual character and human flourishing, virtue ethics seeks to safeguard critical thinking and learner self-efficacy. In higher education, it guides the design of pedagogical AI agents that scaffold student inquiry rather than encouraging cognitive offloading and passive reliance.

Centered on the fair allocation of resources and opportunities, distributive justice addresses how high-utility AI tools can exacerbate the digital divide. It demands institutional and national policies that ensure equitable access across both marginalized and well-resourced educational environments.

The most practical mechanism to translate these classical moral imperatives into the modern digital landscape is *ethics by design*, a paradigm shift that fundamentally rejects the tech industry's move fast and break things ethos. The aim of proactively embedding value-sensitive design, bias mitigation, interdisciplinary collaboration, and explainability directly into the engineering lifecycle, would be to hardwire deontological respect and Rawlsian fairness into the architecture of the technology, ensuring that AI systems prioritize human rights and

ethical responsibility from the very first line of code (Boddington 2023; Bircan and Özbilgin 2025; Stahl et al. 2023; Radanliev 2025; Al-kfairy et al. 2024).

This synthesis moves our project from problem identification to proactive operationalization across our upcoming activities. The systemic risks and governance gaps mapped across this corpus will directly inform WP3, serving as ethical guardrails and evaluation metrics for the development of our tool. By integrating deontological data protections, algorithmic auditing, and virtue-oriented pedagogical frameworks into our system design, our project ensures that its technological outputs actively support learner autonomy, academic integrity, and institutional equity.

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Ethical Challenges in AI Integration

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