PLENARY SECTION

PHD 2.0 – NEW AI CHALLENGES, NEW RULES, NEW ACTIONS

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Abstract. The rapid integration of AI in academic research represents both an opportunity for positive digital transformation and a significant challenge to the core principles of doctoral studies – authorship, originality and integrity. The unregulated use of AI risks undermining the main purpose of the doctoral degree: the formation of an independent-thinking researcher. With this study, we argue for a structured action plan including: First, a National Framework for Academic Integrity in the Use of AI, embedded in legislative texts and establishing minimum standards in all higher education institutions; Second, mandatory institutional regulations regulating doctoral programs and academic journals, directly linked to the university accreditation processes; Third, a National Registry of Declarations for the Use of AI – a centralized platform integrated with the national anti-plagiarism system to prevent the re-submission of manuscripts assisted by AI; and Fourth, a National Program for Training of PhD Students, Supervisors, and Academic Staff, delivered through doctoral schools and supported by funding from the Ministry of Education and Science. In addition to regulation, true prevention requires a transformed academic environment for conducting doctoral studies. Seven pedagogical and organizational measures are proposed: introductory training in research literacy in the field of artificial intelligence; structured, step-by-step reviews of dissertations; research journals and portfolios as evidence of authentic authorship; doctoral seminars with anonymous peer review; psychological support and management of academic pressure; shifting the focus of assessment from the final product to a documented process; and positive incentives for transparent and responsible use of AI. The goal is not to eliminate AI from doctoral research, but to cultivate researchers capable of engaging with it critically and ethically. Properly integrated, AI has the potential to accelerate doctoral doctoral degree within approximately 24 months. Thus, AI will be a jointly accepted third party that supports literature review, academic writing, and critical thinking.

Keywords: Artificial intelligence; Doctoral degree; Academic integrity; Research ethics; AI regulation; Responsible AI use

JEL Classification: A20, I23, O33, I28.

INTRODUCTION

Artificial intelligence is rapidly entering all spheres of modern society, and academia is no exception. Doctoral studies, as the highest form of scientific training, face an unprecedented challenge: how to integrate the capabilities of AI technologies without compromising their fundamental goals of forming an independent-thinking researcher with proven scientific competence. The question is no longer whether doctoral students use AI tools, but how, to what extent, and under what conditions this use remains ethical and academically honorable. The global spread of generative AI models such as ChatGPT, Gemini, and Claude has placed higher education institutions and scientific organizations in a regulatory vacuum. The lack of uniform standards creates inequality between institutions, blurs the line between authorship and assisted text generation, and threatens the

legitimacy of academic degrees and procedures for academic growth. In the context of national regulatory frameworks, the problem is particularly acute. National legislation and institutional policies are largely not yet adapted to the realities of AI-assisted scientific writing and research.

This report aims to analyze the risks and opportunities of the use of artificial intelligence in doctoral education and to propose specific regulatory and pedagogical measures to promote the responsible and transparent use of AI tools in scientific research. The initial hypothesis of the report is that the unethical and unregulated use of artificial intelligence in doctoral studies is not the result solely of a lack of will among doctoral students, but is a systemic problem caused by an institutional vacuum, insufficient AI literacy and a lack of a preventive environment for the training of young scientists. Therefore, an adequate response requires both regulation, training and a change in academic culture. Despite the growing academic interest in the topic, there is a significant gap in the scientific literature regarding integrated national models for the regulation of AI use specifically in doctoral education. Most existing research focuses on student plagiarism or general AI policy at the university level, without considering the specifics of doctoral studies as a research process with unique requirements for authorship and originality.

The report is structured in three main parts. The first part examines the risks of unethical use of AI in the context of doctoral education. The second part proposes seven pedagogical and organizational prevention measures aimed at building an environment that stimulates critical and responsible interaction with AI tools. The third part presents a four-point action plan at the national and institutional levels. The report concludes with conclusions and recommendations for the academic community and institutions in the field of higher education.

MAIN CONTENT

1. Risks of using AI in doctoral studies

The entry of generative artificial intelligence into the academic environment calls into question a number of enduring principles of scientific knowledge, mainly related to authorship, originality and academic integrity. Doctoral studies, as a process of forming a research identity, are particularly vulnerable to these transformations. The risks can be systematized into three main categories: risks to academic integrity, risks to research competence and risks at the systemic-institutional level. The most immediate risk is related to the blurring of the line between authorship and AI-assisted text generation. Modern generative models are capable of producing academic-sounding texts that pass standard anti-plagiarism checks, since they do not copy existing sources verbatim, but generate new text based on statistical models. This phenomenon, also known as "new generation academic fraud", has been documented in a number of studies (Perkins et al., 2023; Cotton et al., 2024). The problem is exacerbated by the fact that tools for detecting AI-generated content are still not reliable enough and give a significant percentage of false positives and false negatives (Liang *et al.*, 2023). In addition to text generation, there are documented cases of AI being used to fabricate bibliographic references. This is the so-called "hallucinations" of language models, in which the system generates non-existent sources with plausible-looking bibliographic identification and authors (Athaluri *et al.*, 2023). This poses a particularly serious risk in the context of a doctoral dissertation, the scientific value of which is inextricably linked to the correctness and verifiability of the sources used. A deeper, but more difficult to measure, risk is related to the impact of excessive AI use on the development of the doctoral student's research skills. Doctoral studies are primarily a learning process in which critical thinking, argumentation, literature synthesis and the formulation of an original contribution to

knowledge are developed. When these cognitive processes are delegated to AI systems, the doctoral student is deprived of the opportunity to develop them fully (Fyfe, 2023; Bender *et al.*, 2021). Research in the field of educational psychology shows that dependence on technological tools in the performance of complex cognitive tasks leads to the so-called "cognitive overload" with long-term negative effects on independent thinking (Gerlich, 2023). In the field of doctoral studies, this means that graduates may hold a formal academic degree without having developed the real research competence that it certifies. At the institutional and systemic level, the unregulated use of AI generates risks for the legitimacy of academic degrees and the trust in scientific publications. If the standards for AI use differ significantly between individual universities or national systems, this creates inequality and undermines the mutual recognition of scientific degrees and results (UNESCO, 2023; European Parliament & Council of the European Union, 2024). An additional institutional risk is associated with academic journals. A number of leading scientific journals have already registered cases of AI-generated manuscripts successfully passing the review process, which calls into question the reliability of the peer review system (Stokel-Walker & Van Noorden, 2023). Last but not least, there is a risk of deepening inequalities in access to quality doctoral education - doctoral students with better access to paid AI tools and higher AI literacy gain an informal competitive advantage, which contradicts the principles of academic justice (Holmes *et al.*, 2022).

The definition of the three categories and levels of manifestation of unethical use of AI in the doctoral degree should also address the impact of specific factors that increase the risk of AI misuse. Based on the review of objective academic processes and observations of the system by the author of this study, these factors should include:

- the presence of unclear expectations among doctoral students for permissible use of AI;
- the establishment of excessively long periods without feedback between the doctoral student and the scientific supervisor;
- the focus on assessing only the final product – the dissertation and the abstract, and not the process of training in the doctoral degree;
- the creation of a framework for excessive autonomy and individuality of training in the doctoral degree with the isolation of the doctoral student from the processes in the academic community;
- the objective presence of fear of failure and failure to cope with the requirements of the scientific supervisor and the high standard imposed by the teaching department;
- conservative conduct of public defenses of doctoral dissertations with limited verbal expression by doctoral students, at the expense of an extended expression by the chairman of the jury and reviewers;
- lack of a regulatory framework for recognition of ethical use of AI at the doctoral level and of written rules for achieving research goals through ethical use of AI.

2. Framework of new rules: Measures to prevent unethical use of AI in the doctoral degree

The current pedagogical and organizational measures are aimed at eliminating the root causes of the problem of unethical use of AI by doctoral students after enrollment in a doctoral degree. They aim to reduce pressure, increase engagement and build a research identity in which authorship is a value, not a burden, in conditions of possible acceleration of the accumulation of ECTS credits, according to the individual plan of the doctoral student.

First measure: Introductory training for research literacy with AI. The key principle of this measure is that training should present AI as a tool with clear boundaries, not as a threat. Doctoral students who understand the meaning behind the rules are significantly less likely to violate them. The measure is aimed at developing literacy for the use of AI and academic integrity and contains mandatory training after enrollment in the doctoral degree including:

- Introductory module (minimum 4 teaching hours) for each newly admitted doctoral student, including: the principles of academic integrity; specific examples of permitted and inadmissible use of AI; practical exercises with completion of the AI Declaration; discussion of case studies from the relevant scientific discipline.
- Annual refresher training (2 hours) for all doctoral students, reflecting innovations in technologies and regulations.
- Training for scientific supervisors on the application of the regulations and recognition of problematic cases.
- Online platform with resources, examples and updated guidelines, available to all doctoral students and supervisors.

Second measure: Structured phased reviews of the work of doctoral candidates. When the research process is visible and documented, misuse is more difficult, and the doctoral student receives timely support. Phased reviews reduce pressure at the end of the doctoral program, when the predominant percentage of cases of AI misuse are identified. The measure monitors the research process, not just the final product, and includes:

- Mandatory regular meetings between the doctoral student and scientific supervisor: at least once a month for full-time students; at least once every two months for part-time students.
- Presentation by the doctoral student at these meetings of specific progress: written sections, analyzed data, read literature, which is to be confirmed in writing and defended verbally.
- Documentation of progress by the supervisor and quarterly attestation assessment of progress with digital storage of the versions and structural components of the dissertation work.
- Public preliminary defenses before the primary unit of the dissertation work of the theoretical framework with the literature review and the empirical research with the presentation of the contributions.
- Documentation of all described activities with signed protocols by the doctoral student and the supervisor.

Third measure: Research diary and research portfolio. Authorship is a documented process in which:

- Each doctoral student maintains a research diary: weekly entries on literature read, decisions made, difficulties encountered and ways to overcome them.
- The diary is a personal document shared with the supervisor upon request in search of support, not for evaluation.
- The research portfolio includes: drafts, file versions, data, program codes, correspondence with the supervisor and abstracts from research meetings.

- The portfolio serves as natural proof of authorship and significantly reduces the incentive to use AI to generate text.
- The digital documentation of the completion of the research diary is organized in a secure cloud environment, to the doctoral student's institutional email address.

Fourth measure: Doctoral seminars and anonymous peer review. When a doctoral student regularly defends his ideas orally in front of colleagues, the construction of his own scientific identity becomes a natural process. This is the most effective long-term prevention against abuse. The goal is to build an environment in which authorship is socially and digitally visible through the ResearchGate open science platform and using the nomenclature for sharing the stages of abstract, preprint, presentation (in scientific forums and reports) and final author's product (report, article, studies, abstract or dissertation). The measure includes:

- Regular doctoral seminars (at least once a semester) with oral presentation of progress to colleagues and supervisors.
- Structured peer review at the inter-doctoral level: each doctoral student reviews and receives a review from a colleague according to a pre-set algorithm.
- Roundtables for discussion of methodological issues, quantitative and qualitative research methods with the creation of an environment in which the recognition of uncertainty is the norm, not a weakness.
- Annual doctoral scientific conference with public presentation of research results from the doctoral curriculum and digital publication of the Almanac with scientific research of doctoral students.
- Doctoral mentoring program, including the engagement of postdoctoral students as mentors for newly enrolled doctoral students.

Fifth measure: Psychological support and management of academic pressure. The measure is aimed at institutional support for the success of doctoral students, combined with reducing pressure as a major risk factor, which should include:

- Access to basic level consulting and training for writing academic output in a finished form - scientific report, article and studies.
- With a leading role for the scientific supervisors who train doctoral students, normalizing the iterative nature of the research process, in which drafts, mistakes and revisions are a normal part of science.
- Setting clear and realistic deadlines, discussed and accepted by the doctoral student, and not imposed unilaterally through an individual plan with standard deadlines.
- Early identification of doctoral students at risk who are lagging behind in the implementation of the tasks of the individual plan and demonstrate reservations in future public defense with an established long-term lack of progress and isolation, requiring proactive support.
- Training supervisors to recognize symptoms of burnout, with tools to interrupt training for a certain period and continue training after catching up.

Sixth measure: Change the design of assessment formats. Assessment formats determine what doctoral students consider important. If the assessment is based solely on a final written product, the incentive for AI abuse is maximum. Changing the design of assessment formats radically reduces this incentive and includes:

- Including a mandatory oral presentation and defense of the methodology before the final defense. AI abuse is easily recognizable in oral presentations: the doctoral student cannot defend ideas that he or she did not understand.
- Assess the process, documented through the research diary and portfolio as a formal component of the attestation. The research portfolio documents the real contribution and makes AI-generated content visibly incompatible.
- Defense of analytical and methodological decisions in concrete terms with public justification of the choice of a specific methodology instead of an alternative methodology, with assessments of the stationarity of the studied databases. AI cannot explain individual research choices that have a subjective foundation.
- Seminar format of the doctoral program with public presentation of the completed chapters of the dissertation before the primary unit. The publicity of the presentation builds responsibility and identity.
- Setting problem-oriented tasks for the doctoral student, requiring local data or a specific context unknown to AI. AI systems do not have access to specific regional/national context, field data and unique observations.

Seventh measure: Positive incentives for responsible use of AI. In addition to prevention through restrictions, the institution can actively encourage and recognize the responsible use of AI, through listed positive incentives:

- Public recognition for doctoral students demonstrating exemplary declaration and responsible use of AI.
- Inclusion of the topic of AI and research integrity as a problem area for discussion in doctoral seminars and for scientific publications.
- Support for doctoral students developing methodologies that include AI tools in a transparent manner.
- Inclusion in the attestation of competencies for critical and responsible use of AI.
- Awards and distinctions for scientific creativity demonstrating exemplary transparent declaration of ethical use of AI.

The proposed seven measures with specific actions towards them are open-ended and can be enriched and profiled depending on the scientific field and professional direction of the doctoral studies.

3. Action plan

The dynamic penetration of AI into the academic environment confronts higher education institutions with the need for an urgent, coordinated and multi-layered institutional response. The existing regulatory framework in European countries, incl. Bulgaria, still does not contain specific provisions governing the use of AI tools in research and doctoral training. This regulatory vacuum creates prerequisites for inequality between institutions, dilutes the standards of academic integrity and questions the legitimacy of the acquired scientific degrees. The European framework, outlined in Regulation (EU) 2024/1689 on artificial intelligence (European Parliament & Council of the European Union, 2024), sets the horizon of regulation at the European level, but does not provide solutions relevant to ERA & EHEA, which makes national action not only justified, but also mandatory. International experience shows that institutions that have adopted clear policies for the use of AI (here we can distinguish the Massachusetts Institute of Technology, the University of

Edinburgh, Uppsala University, etc.) register a higher degree of academic integrity and greater trust from the scientific community in the degrees they issue. The lack of a national policy risks turning regulation into a mosaic of contradictory institutional solutions, which is particularly problematic in the context of the mutual recognition of scientific degrees within the European Research Area (ERA). On this basis and in accordance with the principles of preventive academic risk management, at the end of this prospective study I take the liberty of proposing a structured action plan (Zahariev, 2026a), organized into four interconnected and consistently built priorities, covering the normative, institutional, administrative and educational dimensions of the problem.

First of all, we put the drafting of a national framework for academic integrity when using AI. It is necessary to prepare a Working Committee under the Ministry of Education and Science and subsequently adopt a national regulatory framework with standards for the ethical use of AI in science and higher education. This framework should be integrated into the current laws and regulations thereto. The framework should define the minimum requirements applicable to all higher education institutions and scientific organizations and create the legal basis for the development of institutional regulations.

Secondly, we emphasize the importance of discussing and adopting institutional regulations for the ethical use of AI in higher education institutions. The Ministry of Education and Science should introduce a requirement for higher education institutions and scientific organizations to adopt regulations for the ethical use of AI, covering the doctoral degree, procedures for academic positions and the scientific periodicals of the respective institution. The requirement to adopt such regulations should be included in the criteria system of the National Agency for Assessment and Accreditation, making it a condition for institutional accreditation.

Thirdly, we draw attention to the importance of documenting the process by creating a national register of declarations for the use of AI in scientific works. A centralized platform for storing declarations for the use of AI, linked to the national plagiarism checking system, should be created at the Ministry of Education and Science. The platform should ensure interoperability between institutions and prevent the re-submission of the same AI-assisted work in different higher education institutions.

Finally, we place the launch of a National Training Program in fourth place. With funding from the relevant ministry, a national program for training doctoral students, scientific supervisors and members of the academic staff in the critical and responsible use of AI should be launched. The program should be integrated into doctoral schools and include annual scientific forums for sharing good practices between institutions.

CONCLUSIONS

PhD studies are a process of forming a research identity. When a PhD student understands the meaning of his/her own work, has support and receives recognition, he/she turns AI into a tool, not a temptation. No detection technology can replace an environment of trust, clear expectations and a real academic community (Zahariev, 2026b). Preventive pedagogical measures are the long-term investment with the highest return on academic integrity. The goal is not zero use of AI. The goal is to train PhD students who have developed skills to use AI critically, transparently and in the service of their own thinking.

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