

# The Artificial Intelligence (AI) approaches in university education and education sciences' scientific research

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**Abstract:** *This study examines the integration of Artificial Intelligence (AI) and Generative Artificial Intelligence (GAI) in higher education and scientific research, with a particular focus on a comparison between Finland, Romania, and the Republic of Moldova. In this context, the paper examines the degree of adoption of AI/GAI in education and research, identifying existing gaps and potential areas for growth in these countries. The analysis is based on case studies, international reports (DESI), and relevant national and institutional policies. The findings indicate that Finland, a leader in the integration of AI/GAI, has developed national and institutional policies. In contrast, Romania and the Republic of Moldova have yet to implement them cohesively. However, in Romania and the Republic of Moldova, we attest to initiatives at national, local, and institutional levels that are yet to be supported by a coherent legislative framework. The results of the study prove the existence of a consensus among governmental, economic, and academic actors on the importance of creating a favorable digital ecosystem. However, there are still significant challenges in implementing a comprehensive and sustainable framework for the use of AI/GAI in higher education and research. These findings provide a foundation for future research on the presence of AI/GAI in education and research, with implications for educational sciences and engineering sciences as well as broader fields.*

**Keywords:** Education, Research, Academia, Artificial Intelligence (AI), Finland, Romania, Republic of Moldova.

## 1. Introduction

Currently, Artificial Intelligence (AI) plays the role of an essential catalyst for transforming the fields of education and research. Although AI technologies offer new opportunities in personalizing the teaching process, optimizing resources, and automating educational management tasks, the integration of AI in the academic environment, that is, in university education and scientific research carried out in higher education institutions, involves a series of complex challenges that go beyond simple technological adoption.

In the given context, this research aims to investigate the state of affairs regarding the degree of integration of AI/GAI in education and research using the example of a descriptive-comparative analysis between Finland, Romania, and the Republic of Moldova. Therefore, the research problem consists of identifying and analyzing the existing gaps in the experience of integrating artificial intelligence

(AI / GAI) in the academic environment at the level of university education and research, using the example of Finland, Romania, and the Republic of Moldova.

Thus, the objectives of the research were formulated as follows:

(1). Thematic analysis of scientific research in the field of educational sciences on the integration of Artificial Intelligence (AI) in education, exemplified by case studies of Finland, Romania, and the Republic of Moldova.

(2). Descriptive and comparative analysis of the applied approaches of Artificial Intelligence (AI) and Generative Artificial Intelligence (GAI) in research and university education, but not only based on the cases of Finland, Romania, and the Republic of Moldova.

(3). Study of the DESI (Digital Economy and Society Index) reports for Finland and Romania, to achieve a conclusive synthesis and descriptive analysis, expressed through percentage reports and graphic illustration of the current situation in the analyzed countries.

(4). Analysis of the degree of integration of Artificial Intelligence (AI) in education and research in relation to the strategic visions of the Republic of Moldova. Descriptive presentation of the current situation in the Republic of Moldova, along with the country's experiences in scientific research on the application of AI/IAG in education, participation in international projects on topics related to AI/IAG in education, and information and training activities in the use of AI/IAG.

(5). Formulation of conclusions regarding the purposes of this research, as well as its prospects.

**Research methodology.** The paper is built on the analysis and synthesis of recent studies, including research articles reflecting various theoretical and praxiological aspects of the use of AI/IAG in education, as well as research in the field of educational sciences; institutional reports and press releases on various actions of actors interested in raising awareness among actors in education, as well as representatives from research towards the integration of AI/IAG.

## **2. Artificial Intelligence (AI) approaches in educational sciences research in Finland, Romania, and the Republic of Moldova**

For a descriptive-comparative study on the content and specificity of good practices for integrating AI/GAI in education and research, it was decided to report on the national contexts implemented in Finland, Romania, and the Republic of Moldova. We consider that the descriptive-comparative approach adopted by us, being based on the context of the countries reviewed, responds both to the need to highlight good practices and successful models and facilitates the identification of challenges specific to each implementation context, but also to the detection of subsequent solutions that would eliminate or reduce the existing discrepancies in the analysed countries in terms of integrating AI/GAI in education and research. Problems related to the use of AI in education are subjects of scientific interest to researchers worldwide.

Among those concerned with the aspects of integrating AI / IAG in education and research, there are scholars from various scientific branches both in the field of exact and applied sciences, such as technologies and engineering sciences, as well as those absorbed by the social-human fields, in particular, those in educational sciences and, namely: vocational pedagogy (Eriona, Narasimha & Dr. Philip, 2024; Zary & Zary, 2025); technological pedagogy (edtech) (Feldman-Maggor et al., 2025; Burlacu, 2023b); educational management (Burlacu, 2024b; Burlacu, 2025); university pedagogy (Burlacu, 2023; Burlacu & Cozlovschi, 2025) and private didactics (Burlacu & Cozlovschi, 2024a; Liu, Bao & Chen, 2025; Tan, Cheng & Ling, 2025), etc.

The respective panel of researchers also includes experts from the countries analysed in this study, although in Finland, Romania, and the Republic of Moldova, scientific works of a descriptive and/or critical nature are developed, as well as conceptual constructivist analyses of the AI/IAG phenomenon and other particular perspectives of its educational applicability.

Thus, in **Finland**, the following are investigated: (1.) the praxiological aspects of the use of AI in experimental research in the field of education (López-Pernas et al., 2025; López-Pernas, Song & Saqr 2026); (2.) The applicability of AI/GAI in particular didactics and, specifically, on the dimension of personalized learning (Mertala, Fagerlund & Calderon, 2022); (3.) collaborative and experiential learning (Laru, 2024).

The researchers from **Romania** show interest in topics such as (1.) general aspects of integrating AI in education (Adăscăliței, 2025); (2.) the implementation of AI in universities (Adăscăliței, 2025c; Bran & Grosseck, 2024b); (3.) the practical use of AI in STEAM education (Adăscăliței, 2025b); (4.) the integration of artificial intelligence in the teaching and learning of engineering sciences (Adăscăliței, 2024); (5.) the use of AI in teaching (Ivanova, Grosseck & Holotescu, 2024); and (6.) AI in language education (Bran & Grosseck, 2024a).

Along with the dimensions of digitalization of education (Burlacu, 2021a; Burlacu, 2021b), researchers from the **Republic of Moldova** study dimensions related to AI/GAI in education and research, such as (1.) assessment of learning outcomes (Burlacu, 2024b); (2.) integrity of didactic assessment (Burlacu, 2023a; Burlacu, 2024a); and (3.) adaptability and flexibility of the didactic process (Burlacu & Cozlovschi, 2024b; Beldiga & Bragaru, 2025).

### 3. Applied approaches to AI/GAI in higher education

#### 3.1. The case of Finland: descriptive aspects

Finland, considered a model of excellence in education and being recognized for its strategies focused on inclusion, equity, and adaptability, demonstrates the integration of AI into higher education in an accessible and participatory way by implementing the national project Elements of AI [<https://www.elementsofai.com/>].

The aforementioned project represents a set of free courses created by the collaborative team of MinnaLearn and the University of Helsinki, offered online to

those interested in familiarizing themselves with AI, both at the user level and as potential professionals.

**Among the measures implemented in Finnish universities are the following:**

- **Scientific research on the application of AI/IAG in education.**
- **Development and promotion of institutional policies on the use of AI, addressed to students,** such as those developed by the University of Eastern Finland (University of Eastern Finland, 2025). The present press release mentions the AI policy for students, setting out in general terms the circumstances in which the student may use generative AI as a learning support. The documents expressly state that AI/GAI may be applied by students except in cases where the teacher prohibits the use of AI. The institutional documents also state that the student must expressly declare in writing in the content of the paper, usually in the introductory and concluding parts of the paper, that he/she has used IAG. The same regulation stipulates that if AI is used against the teacher's instructions or if the use of AI is not mentioned, the matter will be investigated in accordance with the university's institutional process for combating academic fraud.
- **Promotion of national policies, as well as methodological elaborations/guides for actors involved in education** ("legislation and recommendations"). Such are the regulations and methodologies developed by the National Agency for Education and the Ministry of Education. They outline the general framework for education, including university education, coming up with a set of suggestions and recommendations for the appropriate use of AI/GAI from the perspective of personal data protection. (Finnish National Agency for Education (EDUFI), no date; Ministry of Education and Culture, 2023), but also (Raukko, 2023) by separate academic entities.
- **Information and dissemination activities on the integration of AI / GAI in education.** Among the other actions dedicated to the literacy of educational actors in the matter of implementing AI/GAI are events with a scientific focus: thematic conferences oriented towards employees in the national education system, for example, the Interactive Technology in Education Conference 2025 [<https://itk-konferensi.fi/>]; round tables targeting the operation with IAG, such as the one with the generic The Future of Learning and Skills in the Age of Artificial Intelligence (The Finnish National Board of Education is organizing the event in collaboration with the ITK organization, 2025).
- **Academic research on the implementation of AI and IAG at the university level** is materialized in master's theses (Riega Cayetano, 2025); some particular disciplines for the II-th and/or III-th cycle programs are initiated, as well as other IAG tangential aspects in doctoral research; and descriptive and critical analyses of the processes of transposition of national directives into concrete policies within university education are carried out. A relevant example of such a product is the work *AI Policy Implementation in Finnish Universities: Challenges and Implications*. This work turns out to be an analytical study on

the application of AI from the perspective of multilevel governance (Reivo, 2024).

### 3.2. The Romanian case: descriptive aspects

The analysis of the situation regarding the use of AI/GAI in Romanian university education allows us to state that currently, the institutions offering study programs in various professional fields are becoming increasingly sensitive to the acceptance of AI/GAI; there is a variety of action directions are initiated here, such as:

- **Scientific research on the application of AI/GAI in education.**
- **Launching international projects dedicated to the development of ecosystems for research, innovation, and technological transfer in the field of artificial intelligence.** Such is the experience of several universities in Romania, including the same UVT, which is one of the participants in the Romanian Artificial Intelligence HUB – HRIA project. The project unifies under its umbrella seven universities in the country (The West University of Timișoara, 2025b), with the project leader being the National University of Science and Technology Politehnica Bucharest.

The HRIA project is co-financed by the European Regional Development Fund (ERDF), within the Smart Growth, Digitalization, and Financial Instruments Programme 2021-2027 (PoCIDIF). The general objective of the project is to create and operationalize the Romanian Center for Artificial Intelligence by developing a competitive research, development, and innovation ecosystem that brings together the resources of the academic and economic environment to generate original and cutting-edge scientific research, develop new products and services based on artificial intelligence, transfer the results to industry and society, and create a national knowledge core integrated into the European Research Area.

The HRIA project consortium, in addition to the seven Romanian universities, also brings together eight innovative technology and research companies as private sector partners: BEIA Consult International (BEIA), IT Center for Science and Technology (CITST), GreenSoft (Green), Neural Grader (Neural), Safetech Innovations (SafeTech), SoftTehnica (SoftTeh), Technology Systems and Services International (TSSI), and Terrasigna (Terra) [ibidem].

- **Establishing national technical and technological networks that would support the development of the field of artificial intelligence in Romania.** This category includes the RO AI Factory project developed by the National Institute for Research and Development in Informatics (ICI Bucharest) in partnership with the Politehnica University of Bucharest. The project envisages the construction of a supercomputing infrastructure, optimized for AI needs, accessible to the academic and/or university environment (ICI Bucharest, 2025).
- **Education and training programs.** Several universities in Romania offer training courses in the field of technologies and familiarization with AI, their beneficiaries being students, pre-university/university teachers, and auxiliary teaching staff. Such initiatives have been attested by institutions such as "Victor Babeș" University of Medicine and Pharmacy Timișoara (UMFVB

Timișoara), University of Bucharest (UB) + National School of Political and Administrative Studies (SNSPA) + "Alexandru Ioan Cuza" University of Iași (UAIC), "Alexandru Ioan Cuza" University of Iași (UAIC), and Politehnica University of Timișoara (UPT).

- **Initiation of new academic disciplines for familiarization with AI/GAI.** This is the initiative of the West University of Timișoara (UVT), which, starting with the academic year 2025-2026, introduced two disciplines with complementary status (The West University of Timișoara, 2025a), such as "Neuroscience and Artificial Intelligence" and "Applied Generative Artificial Intelligence," for its students. These disciplines are accessible to all 2nd- and 3rd-year students of the bachelor's degree cycle, regardless of the chosen program.

### 3.3. Current state of the research problem: comparative synthesis on the example of Finland and Romania

In this research, we aimed to conduct a comparative analysis between Finland and Romania of the degree of use of AI, based on the digitalization process in the given countries. In this context, annual EU reports were analyzed regarding the current state of technologies in the digital economy and society in the aforementioned countries. The content of the reports is developed based on the DESI index (Digital Economy and Society Index), which was designed by the European Commission as a tool to measure the digital progress and competitiveness of EU member states.

DESI is applicable for measuring and comparing the progress of European countries in terms of digitalization, covering aspects such as: **(A.) connectivity**, access to fast internet, and digital infrastructures; **(B.) human capital**, digital skills of the population; **(C.) internet use**, level of use of online services; **(D.) integration of digital technologies in business**, the way in which companies adopt and use digital technologies; **(E.) digital public services**, the digitalization of public administration and government services.

For both countries, Finland (European Commission, 2024b) and Romania (European Commission, 2024a), data on the following parameters were extracted from the respective reports:

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|--|--|
| (1.) DESI index for calendar year 2023;                            | (5.) DESI index for calendar year 2023;                            |
| (2.) DESI index for calendar year 2023;                            | (6.) DESI index for calendar year 2023;                            |
| (3.) Annual progress;  | (7.) Annual progress;  |
| (4.) National trajectory per country, measured at the end of 2024; | (8.) National trajectory per country, measured at the end of 2024; |

The respective data were selected, processed, assembled, and represented in consecutive diagrams. For Finland, see Figure 1; for Romania, see Figure 2.

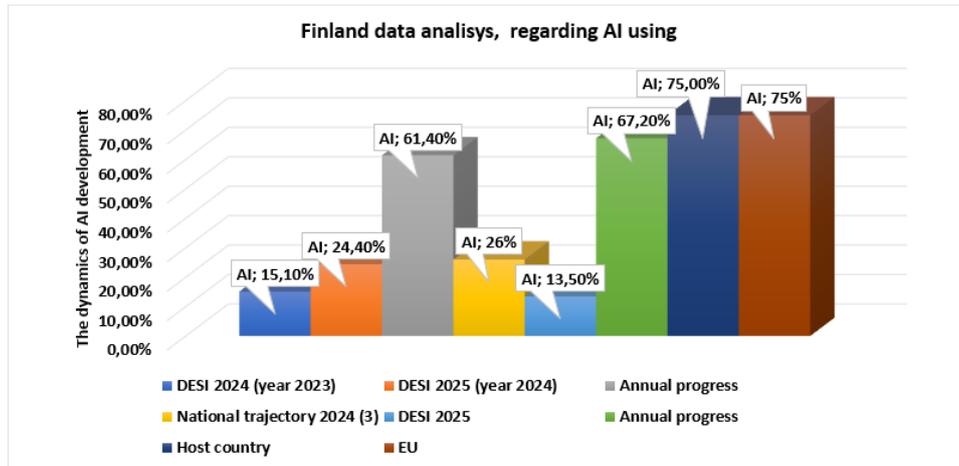


Figure 1. The data analysis related to AI use in Finland

The comparative analysis of the DESI index for Finland and Romania showed the following:

- Finland surpasses Romania in absolutely all the parameters reviewed.
- The exception is the values for the progress achieved by the respective countries in the period 2023-2024. Finland has achieved a progress of 61.40%, while Romania has achieved a progress of 103.30%, indicating a significant potential for digital progress in Romania.
- At the end of 2024, Romania did not submit data to the EC regarding the national trajectory; in the respective diagram, the value for this parameter is zero (0), see Figure 2.

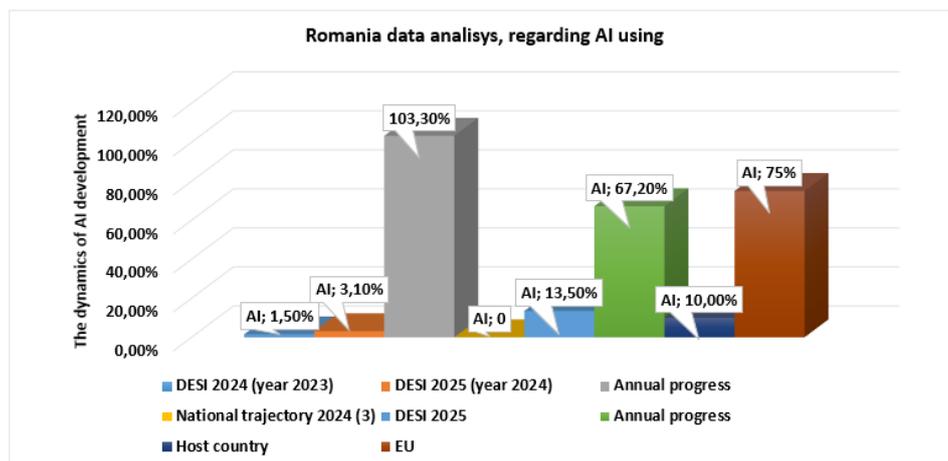


Figure 2. The data analysis related to AI use in Romania

The data relating to the comparison between the state of affairs in the host countries (Host Country) and that in the EU, where for Finland and the EU the

same value (75.00%) is present in Figure 2, and for Romania it is only 10.00% (see Figure 2), denotes the following: Romania, having the DESI value = 10%:

**A DESI of 10%** suggests that Romania is in a very weak position in terms of digitalization compared to the EU average, but also to Finland. It means that Romania has limited access to advanced digital infrastructures, a low level of digital skills among the population, a weak integration of digital technologies in business, and less developed public services. This value highlights a significant gap compared to the European and Finnish averages. It highlights an urgent need for investment in digital infrastructure, digital education, and the adoption of technology in key economic sectors.

**A DESI = 75% for the European Union and Finland**, which indicates an EU and Finnish average of 75%, marking significant progress in the adoption of digital technologies. In the EU, as well as in Finland, countries are well-connected and have a wide use of the internet, as well as a significant integration of digital technologies into various socio-economic areas. However, it is important to note that there are also disparities between EU member states—some member countries are much more advanced than others in this area.

**Finland, in this sense**, is an example of a country that is aligning with European standards in terms of digitalization and the use of AI. Not in vain, Finland is considered a top country in the field of digitalization, boasting a highly digitalized public sector, an extremely high-performance internet infrastructure, and, more recently, a higher degree of AI acceptance. These three components are signs of the obvious and continuous success of the government policy in the field of digital education, as well as the development of an ecosystem favorable to innovation and emerging technologies. Based on the analysis carried out on the state of affairs in Finland and Romania, the following comparative relationships regarding the subject of this research should be mentioned:

- **Romania vs. EU:** Romania is well below the European average in terms of digitalization, with a DESI of only 10%. This can be attributed to several factors: **limited digital infrastructure, insufficient digital skills, and limited adoption of technologies in business and administration.**
- **Finland vs. EU:** Finland aligns with the EU average, but, in reality, the Nordic country has a considerably better performance in many areas, having an extremely advanced digitalized sector. The country is renowned for **innovation in digital education, with Finland being particularly notable for its adoption of innovations across all socio-economic levels.** Finland boasts a robust digital infrastructure, universal access to high-speed internet, excellent digital services, and a digitized public administration. **Support for businesses and start-ups:** Finland has a very friendly ecosystem for start-ups in the field of technology and digital innovation.

### 3.4. The case of the Republic of Moldova

Although there are certain stereotypes (in our opinion, false) regarding the Republic of Moldova, which indicate that it is not a country with a high level of

development, in the context of education and research, Artificial Intelligence (AI) is one of the key aspects highlighted in the Digital Transformation Strategy of the Republic of Moldova 2023–2030.

The document (Government & MEDD of the Republic of Moldova, 2023) emphasizes the need to develop cybersecurity skills, essential in the training of human resources, regardless of the sector in which they operate. In this context, special emphasis is placed on the security of the use of Artificial Intelligence (AI) in order to protect critical public and private infrastructures and personal data, including for the development of innovative solutions in the prevention, detection, and response to cyber threats. The document also highlights the lack of an adequate legislative framework for emerging technologies such as AI, blockchain, IoT, and big data, and the insufficient adaptability of legislation to new digital business models represents a major obstacle. In this regard, it is proposed to develop security guides to exchange good practices for a rapid and standardized implementation of cybersecurity solutions, including for the use of AI.

Local universities also come to combat existing stereotypes on the degree of digitalization of the country; they are involved in strategic projects that provide for the digitalization of various socio-economic areas and, if not yet the integration of AI, the acceptance of AI in education and research. The truth is that at the moment, the use of AI in everyday education and research (national and/or internal institutional policies related to the fields of education and research, courses, didactic assessments, etc.) seems to be less documented and/or systematized, and/or accessible to the general public.

We attest to the lack of visible policies, clear regulations of good practices, and sanctions at the institutional governance level regarding the use of generative AI. However, actions are being taken in the Republic of Moldova aimed at contributing to the elimination of these gaps. These are the following:

- **Scientific research on the application of AI/GAI in education** reflects the interest of representatives of the academic environment of the Republic of Moldova, engaged in teaching and research activities in universities in the country, in the ethical (Dariu & Beldiga, 2023; Beldiga & Bragaru, 2025; Burlacu, 2024a) and constructive (Burlacu, 2023c) use of AI/GAI products by actors involved in education—teachers, pupils/learners/students, and representatives of management teams in educational institutions. Thus, there are a series of works that either formulate questions or answer some of them regarding the dimensions of implementing AI/GAI in terms of verifying the originality of works written by actors from the academic environment and managing the contingent of learners, in particular, during the teaching process/act, to support the process of didactic assessment of learning outcomes. Here, both the possibilities of AI/GAI for generating and classifying the items to be assessed, as well as the verification, measurement, and grading mechanisms assisted by these tools, are being researched.
- **Expanding the digital infrastructure capable of contributing to the development of the field of artificial intelligence in the Republic of**

**Moldova.** A proof of the efforts to create an ecosystem capable of supporting digitalization, as well as the integration of AI/GAI, including in education, is the initiative to launch the Moldova AI Hub. It is to be established (UNFPA in Moldova, 2025) as a result of the collaboration of members of an extended consortium that includes 13 legal entities from fields such as public, private, and academic, including the Technical University of Moldova.

- **Launching international projects with tangential topics of AI/GAI in education.** Events, such as (National Erasmus+ Office in Moldova, 2024), the National Seminar Embedding Artificial Intelligence in Education: New Programs, Disciplines, and Methods, funded by Erasmus+ and organized by UTM in 2024.
- **Information and training activities on the use of AI/GAI.**

The "Artificial Intelligence in Education" training (Ministry of Education and Research of the Republic of Moldova, 2025) is expected to last 8 hours. It is organized by the "Class of the Future" center under the "Ion CREANGĂ" State Pedagogical University of Chisinau. The courses are designed to meet the training needs of teaching and managerial staff in educational institutions in the Republic of Moldova. AI literacy training program for civil servants, held in 2025, under the auspices of the Electronic Governance Agency, ATIC, and Google (Moldova e-Governance Agency, 2025), in which about 500 civil servants participated. The program is based on theoretical benchmarks and practical applications related to the use of AI in administrative activities and public services.

#### 4. Conclusions

*Motto: "The secret of change is to focus all of your energy, not on fighting the old, but on building the new" (Socrates).*

The connection points for AI/GAI with the fields of education and research, in the countries targeted by this research, in general, cover directions such as: scientific research on the application of AI/GAI in education; development and promotion of institutional policies for the use of AI by actors involved in university education; promotion of national policies for the inclusion of AI in education; information and dissemination activities on the integration of AI/GAI in education; education and training programs; initiation of new academic disciplines for familiarization with AI/GAI; development of methodological support on the application of AI/IAG in education, intended for actors involved in education; academic research on the implementation of AI and IAG at university level; development of digital infrastructure based on the potential of AI/GAI for technological development, education and research; creating a favorable environment for the development of ecosystems for research, innovation and technological transfer in the field of artificial intelligence.

As a result of the scientific investigation into the aspects of integrating AI/GAI in education and research, as well as their analysis, carried out in this

study, we have arrived at the following findings. Finland is the country best positioned in terms of preparing the fields of education and research for interaction with AI/GAI. This fact is also confirmed by national and institutional policies. At the same time, Romania and the Republic of Moldova have more modest preparations, and policies and/or regulatory mechanisms are practically nonexistent. Whilst Romania, compared to the Republic of Moldova, can be characterized as a country with an average level of growth in the acceptance and access of representatives from the field of education and research to AI/GAI, we find that in the Republic of Moldova, support for the use of AI/GAI is more evident at the level of strategy and/or sporadic local initiative.

On the other hand, we attest to a series of actions that can be qualified as evidence—the opening of hubs, the organization of formative seminars, and the cooperation between public and private entities—which confirm the existence of a consensus between the government and representatives of the economic environment, but also representatives of education and research, on the need to develop a digital ecosystem favorable to the development of the field of artificial intelligence in the Republic of Moldova, a point on which work is being done. Based on the content of this study, given that we live in the AI era, we believe that in the coming years we will witness substantial paradigmatic transformations in education and research.

The topics addressed in this study will serve as guidelines for further research on various theoretical and praxiological aspects of the valorization of AI/GAI in fields such as educational sciences and engineering sciences, forming an area of scientific interest for an extensive community of professionals.

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