AI tools: are they a challenge for academic integrity?

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Rezumat: *În perioada contemporană, asistăm la descoperiri incredibile odată cu apariția inteligenței artificiale (AI). Deși conceput cu rolul de a oferi sprijin și de a ajuta întreaga populație într-o mare varietate de domenii, fenomenul este însoțit de potențiale riscuri, în special întâlnite în domeniul educației și cercetării. La baza lucrării se regăsesc metode mixte de culegere și analiză a datelor, respectiv analize de ordin bibliometric, de conținut și a interviurilor, efectuate cu ajutorul programelor software Biblioshiny și Ligre v.6.5.1, pentru conturarea relației dintre AI și integritatea academică, cu accent pe mijloacele, metodele și tehnicile specifice utilizării AI, precum și pe cauzele și efectele favorabile și nefavorabile generate. Este dezvăluit parcursul recent început al acestor două concepte împreună, dar și viitorul lor promițător. Cel mai reprezentativ element al AI în mediul academic este ChatGPT, dezvoltat de compania OpenAI, care, alături de alte instrumente de acest fel, conduce la inovație educațională, îmbunătățirea gândirii critice, eficiența și eficacitatea activității, având parte totodată și de valențe nefavorabile precum riscul comiterii unor abaterilor academice, dependență, absența contactelor umane și a emoționalității.*

Cuvinte cheie: AI, integritate academică, chatgpt, analiză bibliometrică, analiză de conținut, interviu.

Abstract: *In the contemporary period, we assist incredible discoveries with the advent of artificial intelligence (AI). Although designed with the role of providing support and helping the entire population in a wide variety of fields, the phenomenon is accompanied by potential risks, especially encountered in the field of education and research. The work is based on mixed methods of data collection and analysis, namely bibliometric, content, and interview analyzes, carried out with the help of Biblioshiny and Ligre v.6.5.1 software programs, to outline the relationship between AI and academic integrity, with a focus on the means, methods, and techniques specific to the use of AI, as well as the causes and favorable and unfavorable effects generated. The recent journey of these two concepts together is revealed, as well as their promising future. The most representative element of AI in the academic environment is ChatGPT, developed by the company OpenAI, which, together with other tools of this type, leads to educational innovation, improvement of critical thinking, efficiency, and effectiveness of the activity, while also having adverse valences such as risk of committing academic misconduct, addiction, the absence of human contacts, and emotionality.*

Keywords: AI, academic integrity, chatgpt, bibliometric analysis, content analysis, interview.

JEL Classification: I230, I250, M140, O320, O330, O340.

1. Introduction

The impressive evolution of artificial intelligence (AI) in recent times has led to the emergence of important opportunities for many people and in a multitude of fields, but also unprecedented challenges in educational activity. There is an obvious concern of using AI chatbots to cheat in academia due to their high accessibility (Nguyen & Goto, 2024). Thus, in the contemporary period, the academic sphere intersects more and more often with situations of plagiarism, facilitated by the appearance of AI chatbots, especially by students in the processes of accomplishing various university tasks, such as semester projects, work assignments, and even scientific papers (Elkhatat, 2023).

Being among the main ways of academic integrity violation, plagiarism refers to taking or using the words, ideas, or work of another person who can be identified and legitimized in this sense, without attributing their source, to gain an advantage (Fishman, 2009). The act of plagiarism denotes a serious violation of academic conduct that threatens the formation and assessment of the skills of those who chose to use it. Acts of plagiarism encountered among students can start from partially paraphrasing the ideas of some authors by means of a few grammatical changes or using words with the same meaning and reformulation with the help of applications or software programs, reaching up to taking the entire information as it is presented by the legal author (Elkhatat, 2023).

In November 2022, OpenAI company launched the ChatGPT chatbot, an AI service that can be accessed with the help of the Internet network, which is designed to understand and respond quickly to the requirements and questions of those who use it (Črček & Patekar, 2023; OpenAI, 2024). Demonstrating huge potential from the start, the AI service is based on the concept of a "large language model" and uses three sources of information to achieve its goal, namely (OpenAI, 2024): (1) information found on the Internet, accessible to the general public; (2) information that comes from third parties and goes through a licensing process, and (3) information provided by individuals who are either users or trainers of the organization. Within two months of its launch, ChatGPT reached 100 million active users, making it the fastest growing consumer app ever launched (Gal, 2023).

This paper aims to outline the relationship between AI and academic integrity by obtaining answers to the following questions:

RQ1. From a conceptual point of view, what themes are addressed in the academic literature that participate in the construction of the topic?

RQ2. What are the authors' countries of origin who developed the subject and how did they proceed to establish collaborative relationships between geographic regions?

RQ3. What are the means, methods, and techniques, as well as the causes, positive, and negative effects of using AI tools in an academic environment?

The research degree of novelty is indicated by the methodological complexity through which the topic is approached, aiming at both the construction of a quantitative perspective as a result of the use of bibliometric analysis, and a qualitative perspective through content analysis and interviewing of university teaching staff in the purpose of substantiating the structure of means, methods, techniques, causes, positive effects and negative effects characteristic of the use of AI in the academic environment.

2. Research methodology

This paper aims to address a topic of great relevance nowadays, namely the connection between academic integrity and AI, the latter having the opportunity to represent an opportunity, but also a challenge in research activity. For this to be possible, in the paper, mixed methods of data collection and analysis were considered, respectively bibliometric analysis, content analysis and analysis based on interviews. Identification and selection of the most relevant data for the research process was carried out using the specific stages of the PRISMA methodology (Farrús, 2023), according to Figure 1.

To perform the bibliometric analysis, the Web of Science Core Collection database (Clarivate, 2024) was used, resulting from the search process based on the "Topic" filter and using keywords "artificial intelligence", "chatgpt", "chatbot" and "chatbots" at the intersection of "academic ethics", "academic dishonesty", "academic honesty", "academic plagiarism", "academic cheating" and "academic misconduct", a number of 156 publications. Of these, at the screening stage, ten were excluded because they either fell into a different category of documents compared to those targeted or were elaborated in another language than English. Thus, there remained 146 documents from the Article, Proceeding Paper, Review Article, and Early Access categories, which served as support for the bibliometric side of the construction of the present work, this process being facilitated using the Biblioshiny software program (K-Synth, 2024).

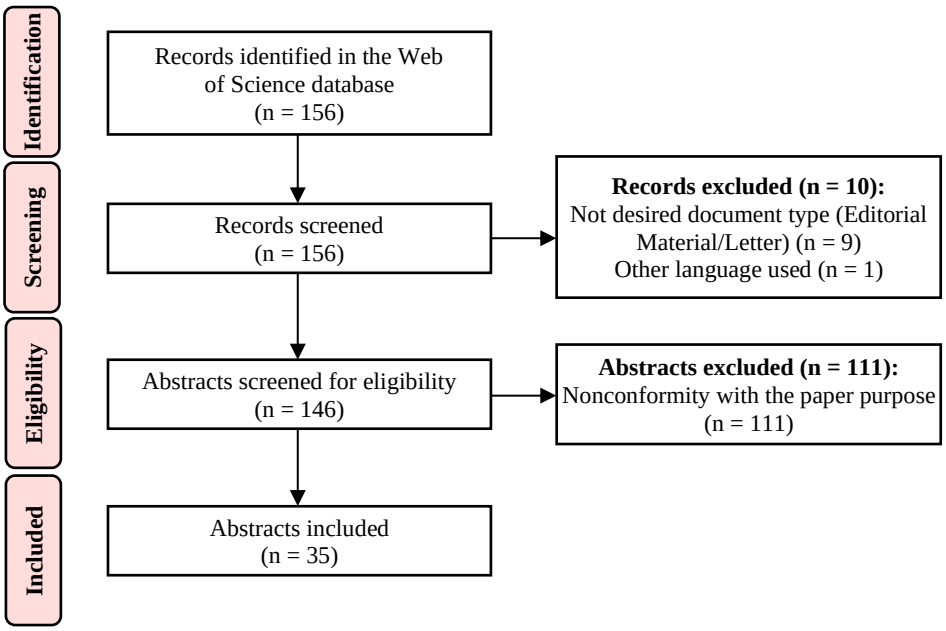

Figure 1. PRISMA diagram
Source: author's conception adapted from Page et al. (2021)

The second part of the research focused on content analysis development, a method aimed at examining the content of a variety of data in order to build defined categories, an aspect that supports the data interpretation process (Harwood & Garry, 2003), the main objective being identifying the means, methods, and techniques specific to the use of AI in the academic sphere, as well as the positive and negative effects produced. Thus, starting from the abstracts of the 146 documents exported from WoS (Clarivate, 2024), in the eligibility stage, 111 of them were excluded as they would not have been in correlation with the purpose of the paper, presenting other information than necessary for going through the chosen structure, such as means, methods, and techniques, positive effects and negative effects. Therefore, in performing the content analysis, the information provided by the remaining 35 abstracts was taken into account, these being processed with the help of the Ligre v.6.5.1 software program (Logiciels Ex-l-tec, 2024). Later, the method of research interviews was chosen to complete the qualitative analysis previously initiated, offering the opportunity to discover another perspective, namely that of some university teaching staff. Therefore, the semi-structured interview was used, conducted by email, grounded on knowledge acquired with the help of bibliometric and content analysis, and an interview guide based on the structure of causes, positive effects and negative effects of AI using by students in the achievement of university tasks (Kallio et al., 2016).

3. Data analysis from a bibliometric perspective

The section specific to the bibliometric analysis of the data focuses on exposing the main coordinates of the database used, outlining the strategic side by means of a thematic map and the themes found within it, but also on highlighting the geographical perspective of the development of the subject addressed and the way in which collaborative relationships were established between the authors from the countries most involved in this process.

3.1 Main information about the database used

Figure 2 shows the main information characteristic of the database exported from the Web of Science Core Collection (Clarivate, 2024), the works to be analyzed being published very recently, in the time frame 2020 - 2024, the average age of a document reaching the threshold of

only 0.884 years. The 146 papers come from a number of 102 scientific journals, with an annual exponential growth of 137.84%. Also, 387 authors are associated with them, only 34 of them publishing individually, the collaboration rate between authors per document being 2.89 people. The scientific articles analyzed stand out for a high degree of documentation of academic literature, all of them based on 5177 bibliographic references, the authors using 408 keywords to describe their content. Furthermore, there appears to be considerable interest in the topic discussed, as the average citation per document is 7.452 citations.

Figure 2. The main indicators of the database

Source: author's processing with the help of Biblioshiny (K-Synth, 2024)

3.2 Strategic map of the research area

The next part of the data analysis concerns the creation of a two-dimensional thematic map, according to Figure 3, within which the most relevant domains associated with the topic of discussion were framed, based on the keywords stated (Bretas & Alon, 2021). At the base of the strategic diagram are two coordinates, respectively: (1) centrality, which quantifies the impact of the theme in the entire research field, this nuances the importance of the external links of a topic with other themes, and (2) density, which shows the effective development of the chosen theme, measuring the intensity of internal links between keywords (Ampah et al., 2021).

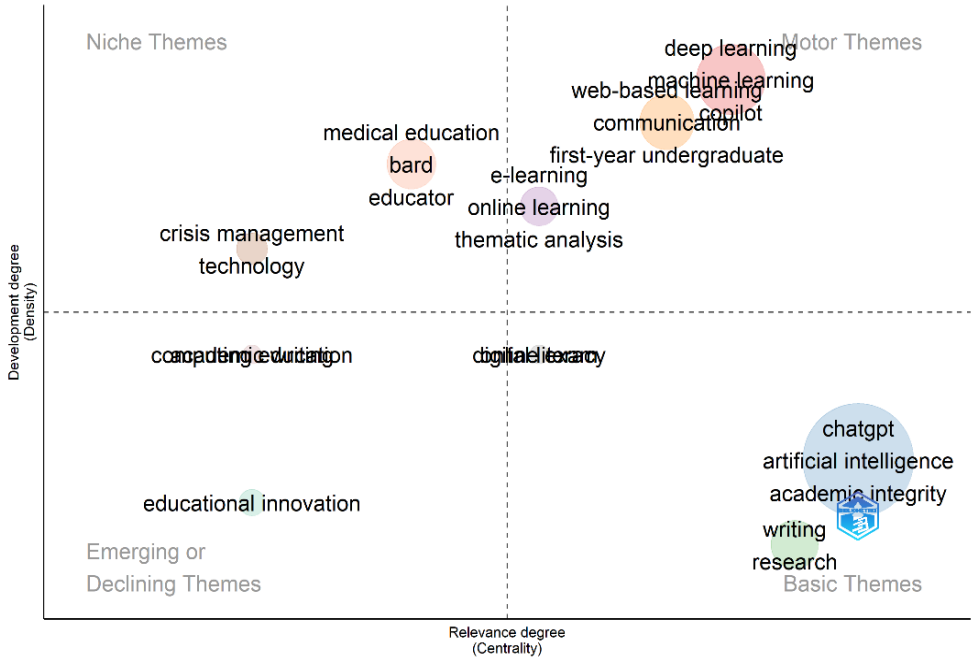

Figure 3. Conceptual map

Source: author's processing with the help of Biblioshiny (K-Synth, 2024)

According to these two dimensions, the themes outlined by the authors' keywords are distributed in four quadrants. *The first of these*, peripheral and developed, refers to niche themes, in our case including two clusters characterized by a high level of specificity, one referring to education and management in the medical field, and the other to technology and crisis management. *The second quadrant*, central and developed, aims at motor themes and contains three clusters of significant sizes that address: (1) an area dedicated to the concepts of deep learning and machine learning, which also includes aspects such as introductory programming, computer programming, neural networks, code generation, and writing; (2) an area related to web-based learning associated with university education and the communication process; (3) the concept of e-learning associated with thematic analysis. *Quadrant number three*, central and undeveloped, focuses on basic and transversal themes, including three clusters, one of significant size regarding artificial intelligence, chatgpt, and academic integrity, and two, smaller ones, about research and writing processes (which directly links to the previous cluster) as well as digital literacy. *Quadrant four*, peripheral and undeveloped, considers emerging or declining themes and outlines the existence of two relatively small clusters about educational innovation and computer education (Ampah et al., 2021; Singh & Ravi, 2023).

3.3 The social structure of research based on the most relevant countries

The option of establishing collaborative relationships between authors from the 20 most relevant countries to develop publications on the topic of AI and academic integrity is presented in figure 4. The first of the most involved countries in addressing this topic are United States of America, Australia, China, United Kingdom, but also Canada, noting that they, in addition to desiring to work with their peers, also preferred to collaborate with authors from other regions of the globe. Most likely, one of the reasons behind these collaborative relationships, with reference to United States, Australia, United Kingdom, and Canada, is the fact that they represent the core states of the Anglosphere, linking them with a whole history and having English as the primary language, this being also the language of international circulation, which facilitates the processes of oral and written communication, but also the development of scientific works by their population. After these, there is Ireland, which ranks tenth, where more than 95% of the entire population speaks English, followed by New Zealand, ranked 11th and following the pattern of the group it belongs to (Aloson, 2023; University of Huddersfield, 2020).

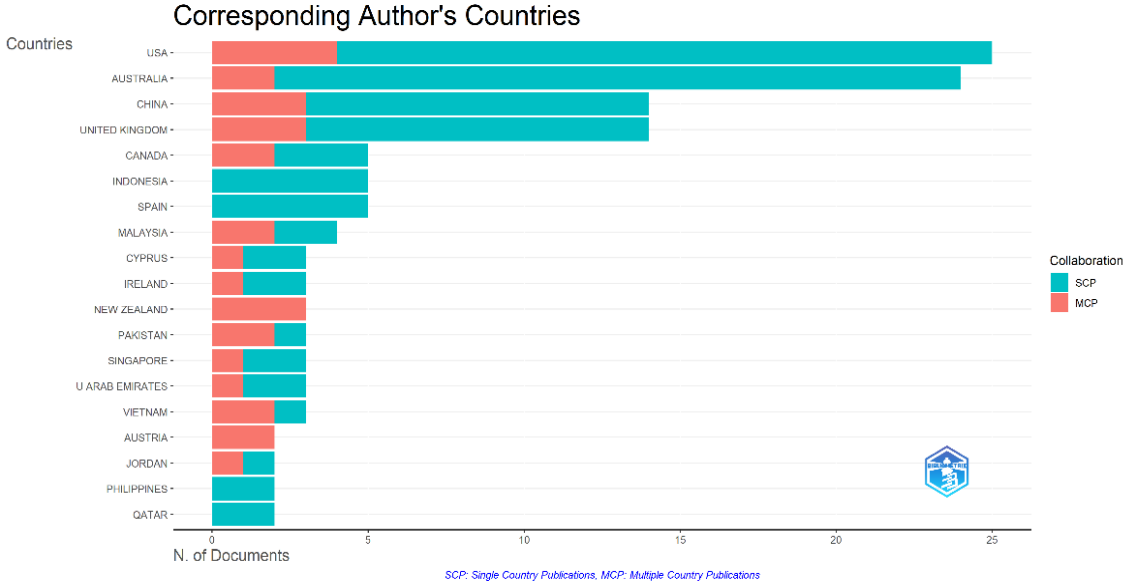

Figure 4. The most relevant countries in the development of the subject
Source: author's processing with the help of Biblioshiny (K-Synth, 2024)

Likewise, the place of these countries in the top ranking is justified because United States, China, United Kingdom, and Canada are among the top five countries in the world as leaders in the research and development of technologies based on artificial intelligence in the year 2024 (Keary, 2024). Additionally, Malaysia, Cyprus, Pakistan, Singapore, United Arab Emirates, Vietnam, Austria, and Jordan manage to align with international standards by working with other regions to develop the topic, while Indonesia, Spain, Philippines, and Qatar, despite important scientific impact, choose to work only with researchers from the same country of the paper origin, probably because it is more convenient and comfortable to do so.

4. Content analysis

Given that the previously presented bibliometric analysis facilitated the process of conducting the content analysis, it brings to light the main conceptual directions previously exposed and also proposes a new structure that best highlights the relationship between AI and academic integrity, based on the methods, means, and techniques that make possible AI use in the educational sector, as well as on the positive effects and negative effects generated, as presented in figure 5.

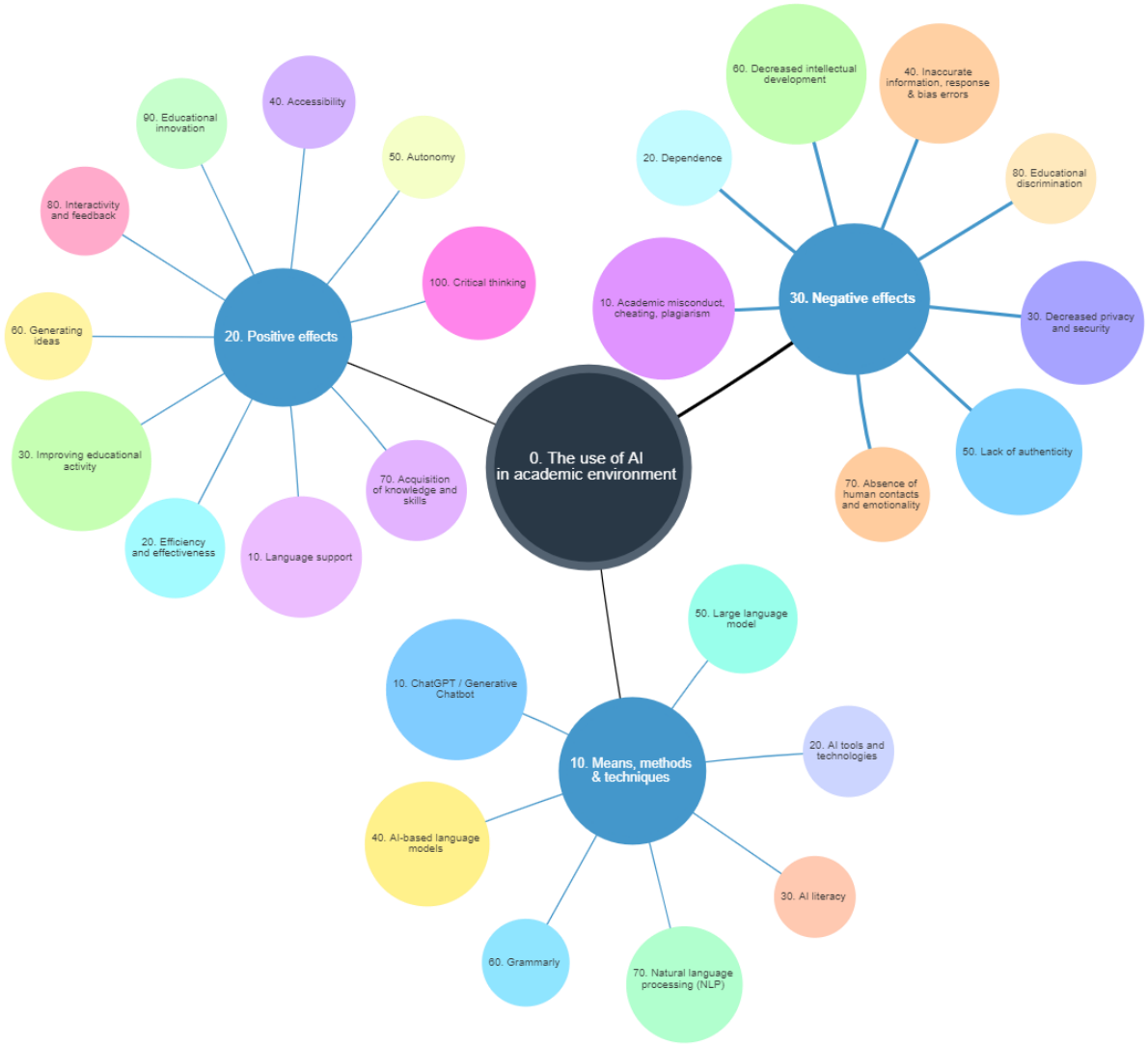

Figure 5. Content analysis coding tree
Source: author's processing with the help of Ligre v.6.5.1 (Logiciels Ex-l-tec, 2024)

Regarding the **means, methods, and techniques** in the field of AI, content analysis highlighted the element with the highest degree of representativeness of AI tools in education,

being, as expected, *ChatGPT, a natural language processing system (NLP)* developed by OpenAI to support conversations similar to human beings, holding in its portfolio considerable benefits for users (Deng & Lin, 2022). It is part of an entire army of *generative chatbots* located at the cutting edge of AI technologies today, alongside Google Bard, Microsoft Copilot, Lama 2 and Claude (Marr, 2024). Equally, another central element of the study is represented by students' willingness to use software programs such as *Grammarly*, which support the writing process. The study conducted by Johnston et al. (2024) notes that more than half of the participating students support the use of applications such as Grammarly due to increasing their confidence in writing papers and avoiding accidental acts of plagiarism. Easily observing the global trend towards the use of AI-specific technologies, it is predicted that *AI literacy* and the development of some skills in this regard will designate an important strength for obtaining the desired job, which means that part of the responsibility of specialization in this direction falls on the human resource from education (Krammer, 2023).

The use of specific AI tools in educational activities has multiple facets, favorable and unfavorable, which generate **positive and negative effects** on the activity of users. On the positive side, AI tools like ChatGPT often offer *language support*, having the ability to help learn foreign languages, responding to user needs and increasing writing coherence, as well as improving vocabulary, grammar, and organization. Therefore, such a chatbot can be considered a tutor or assistant that provides real-time feedback on students' writing performance, eliminating the need for teacher intervention (Nugroho et al., 2024).

In terms of *efficiency and effectiveness*, AI technologies prove their usefulness, managing to generate an important decrease in the volume and time allocated to teaching and learning tasks, as well as the costs involved, by automating the tasks, the educational system thus becoming more efficient in its entirety (Ansari, Ahmad & Bhutta, 2023; Bin-Nashwan, Sadallah & Bouteraa, 2023; Williams, 2024). *Accessibility, generating ideas, the level of interactivity*, but also *the ability to provide feedback* make a product like ChatGPT a valuable educational tool. Such technology allows modeling the relationships between the words of a sentence, preserving the context and generating coherent and relevant responses in real time, being an adaptive conversational agent as a result of its ability to learn from its experiences of interaction with people. Easy to understand the information it displays as a result of being based on a passage entered by the user, it makes each learning experience a personalized one (Sharma & Yadav, 2022; Farrokhnia et al., 2023; Sağın et al., 2024; Zohouri, Sabzali & Golmohammadi, 2024).

In their study, Hyde, Busby and Bonner (2024) highlight that generative AI can be used to enhance student *autonomy* as it provides the resources and methods needed for independent exploration of desired topics. Technology that is increasingly present in everyday educational life supports students to continue with a progressive learning framework, with generative AI having the potential to *improve the entire educational activity*, from teaching to learning, helping to *acquire knowledge and learning skills* with a positive impact on academic outcomes (Hyde, Busby & Bonner, 2024; Salinas-Navarro et al., 2024; Song, 2024). Just as it is presented as an emerging theme in the strategy map made earlier, generative AI actively participates in strengthening the concept of *educational innovation*, supporting asynchronous communication, distance learning and online assessments (Krammer, 2023) and leading to the growth of *critical thinking* (Sağın et al., 2024).

Even if the use of AI technologies in the education sector is characterized by multiple positive valences, there are still some negative effects that make their presence felt, the most important unfavorable aspect regarding AI in education being represented by the *possibility of plagiarism and generating misconducts*, thus risking *academic integrity* and at the same time *intellectual development* (Meniado, 2023; Sağın et al., 2024). Thus, used in an erroneous way, they can determine undeserved academic results, encouraging *educational discrimination* (Lancaster, 2023). Moreover, teachers are reluctant to use AI in the classroom for fear of creating a *dependency* on it (Hyde, Busby & Bonner, 2024).

Another challenge that pervades the present discussion concerns the possibility that tools such as ChatGPT generate *inaccurate information, response and bias errors*, as they are not actually capable of a deep understanding of the words and concepts behind them, but only of recognize certain patterns and give plausible answers to users, while also demonstrating a *lack of authenticity* (Farrokhnia et al., 2023; Wang, Wang & Su, 2024; Zohouri, Sabzali & Golmohammadi, 2024). Furthermore, these instruments do not have the ability to connect emotionally with the one who integrates them in his activity, not having an identity of their own, which denotes the *absence of human contacts and emotionality*. Existing concerns about *data privacy and security* are justified by the fact that such a chatbot collects personal information from the passages entered to improve the system (Meniado, 2023).

5. Interview analysis

As part of the research process, five teaching staff from the Bucharest Academy of Economic Studies, who work in the management and teaching personnel training departments, with an average professional experience of more than 17 years, were interviewed. Regarding the teaching activity, four of them declared themselves followers of the integration of digital tools in it, while one does not proceed similarly, but prefers to use only public guides and methodologies. At the same time, only one of the five interviewed has a friendly attitude towards the use of AI in the teaching activity, as it inspires various games and case studies. The responses of academic staff made it possible to create a coding tree based on the cause - favorable effects - unfavorable effects structure, according to figure 6, which highlighted their opinions regarding the use of AI by students in the current learning activity.

Figure 6. Interview analysis coding tree
Source: author's processing with the help of Ligre v.6.5.1 (Logiciels Ex-l-tec, 2024)

In the opinion of the academic personnel, the **causes** behind the decision to use AI tools in carrying out the educational activities take into consideration, first of all, the *comfort and efficiency* with which university tasks can be fulfilled, thus avoiding the efforts and sometimes the costs involved, at the same time, this reason being the one that reveals the large volume of tasks assigned to students. The *high access* to such tools is what facilitates this kind of practices, but also the *difficulty of understanding the received requirements*, which can sometimes be imprecise and perceived even in an erroneous version. Likewise, the interviewees believe that AI emphasizes the temptation of students to include in their research *surprising or new elements* that they do not have the patience to subject to documentation and validation efforts. Unsurprisingly, *dependence on technology* is among the main causal elements, along with *students' lack of analytical and synthesis capabilities*, *lack of interest*, *inefficient time management*, and the *absence of regulations for the use of AI*, which causes the non-consideration of potential limits and rules specific to the such practices recourse.

The **positive effects** noted by the teaching staff refer to the *facilitation and support of learning processes* as a result of understanding the concepts addressed and formulating arguments regarding them. The following effects are considered: (1) the *new and opportunity information* that AI software can make available, representing a source of inspiration that makes it possible to discover and approach new perspectives; (2) *accessibility*; (3) *motivating and driving students* through new knowledge that they can study deeply and apply in their work; (4) *reduction of redundant tasks*, it is no longer necessary to go through the same steps in the performance of different routine tasks; (5) *saving time*, documentation no longer presupposing accessing multiple databases and scientific sources, the information being presented in one place; (6) *providing fast connections*, which students may not have initially noticed; (7) *leveraging the existing resources* as a result of collecting and presenting information from multiple sources in one place.

The perspective on the **negative effects** associated with the use of AI technologies by students takes into account, in the first stage, the *damage to academic integrity* as a result of the increasing possibility of committing acts of plagiarism. Equally, *students' capacities to analyze, synthesize, and contextualize* can be affected if they take the information as it is presented to them without making changes to it, which inhibits critical thinking and lowers intellectual demand. Similarly, the *lack of information filtering* is an unfavorable valence in the present case, as there is a possibility that some of the data and information presented by the software may not be useful or representative of the subject in question. The *decline of scientific rigor* is a continuation of the previous trend, academic tasks are no longer, in general, approached in their entirety, respecting the specific stages of their performance. Students can be introduced to *adjacent domains and* even *false information* that is not consistent with the requirements, which may lead them far from the ideas and theories essential to the topics covered. Looking at the pedagogical side, the *teacher-student relationship* is experiencing *a deterioration*, a result of the reconsideration of the teaching staff role in education, who is no longer apparently necessary to take part in the supervision and providing feedback to the students' activity in the new circumstances. Last but not least, students may face *inhibition of creativity* as well as *increased dependence* on such tools, which, while they may provide help initially, their integration throughout the scientific path generates a significant opportunity cost.

Returning to the main topic of the paper, namely academic integrity, the interviewees offered a series of recommendations in order to mitigate the effects of deviations from this value, such as: (1) continuing intellectual efforts on the principles of classical scientific research, while maintaining interest in AI; (2) the integration of academic ethics components within the disciplines; (3) the clear regulation of the AI utilization in university activity; (4) guiding students in use; (5) presenting the risks faced by the entire academic activity; (6) correct sanctioning acts of plagiarism; (7) combining assessment strategies (oral, written, based on the products of the activity, assessment of teamwork, carrying out projects, etc.); (8) conducting workshops and thematic activities; (9) assigning a smaller number of students per teaching staff in order to have more time available for getting to know, coordinating, monitoring the students' activities.

6. Discussion and conclusions

The present study led to the profiling of the relationship between artificial intelligence and academic integrity, the mixed methods of data collection and analysis managing to combine quantitative and qualitative aspects, facilitating the transition from a general, globally outlined perspective to the subject of AI and academic integrity, to a detailed picture regarding the elements that make possible the integration of AI in education, accompanied by the resulting effects and consequences. Thus, the field of AI and academic integrity stands out as a topic of intense interest among the world's biggest powers, such as the United States of America, the historical leader in AI research, with the largest number of publications in this field in the last 20 years, but also China, which between 2016 and 2019, managed to generate more papers on AI than any other country on the globe (Savage, 2020), the two being in a constant battle to become technological superpowers (Blomquist & McBride, 2024). At the same time, the subject is not indifferent to the underdeveloped states or those in the development process, as it risks directly threatening their economic situation. New technologies can deepen the gap between developed and poor countries as a result of the transfer of investment predominantly to advanced economies that already have the automation part integrated. Furthermore, developing countries may experience difficulties in terms of jobs, as technologies tend to replace rather than complement the workforce (Alonso, Kothari & Rehman, 2020).

In university practice, the use of AI tools and technologies, such as generative chatbots like ChatGPT, turns out to be both a source of opportunities and benefits, as well as challenges, as this paper demonstrates through the previously presented analyzes. Therefore, integrating a tool like ChatGPT into teaching-learning processes strengthens its role as a support point through accessibility, personalized experience, real-time feedback, efficiency, flexibility, the possibility of learning in an adaptive manner, help in writing and data analysis, innovation in evaluation, but loses points of trust as a result of possible violations of ethics and academic integrity, concerns of the nature of security and confidentiality, the absence of emotional aspects, the degree of dependency created, response errors and possible misconceptions (Oranga, 2023; Rasul et al., 2023).

Regarding theoretical implications, the research focused on the area of intersection between the field of AI and academic integrity, highlighting the importance of increasing global contribution to the development of the theme, but also the impact it has on the academic environment. In terms of practical implications, the present study can help academic institutions to build a normative framework regarding the artificial intelligence use, but also organizations that develop artificial intelligence services in order to understand the importance of integrating certain rules, norms and ethical principles into the structure of applications, aspects that can materialize into healthy barriers for users, especially when they come from the educational area.

The limits of the research consider the use of data exclusively from the WoS Core Collection for the bibliometric analysis, the absence of information related to the effects causes of the AI use in the publications abstracts which prevented highlighting a cause-effect relationship in the case of content analysis, the degree of subjectivism and the unique provenance institutional of teachers in terms of interview analysis. Likewise, since it is a topic that appeared very recently, most of its valences could not yet be fully addressed in the academic literature, an aspect that explains the multitude of results with a high degree of generality, as they have not yet been explored contextually.

Future research directions may consider analyzing the substantiation of AI normative frameworks in academic activities, how different ethical concepts are integrated into the practices of organizations developing AI services, and what factors may determine different geographic regions to form a network to work together for the development of this theme. In addition, considering that only the opinion of the teaching staff was investigated, a questionnaire or a series of interviews can be carried out to observe what students think about the integration of AI in

educational activities and how they consider that this aspect influences their acquisition of knowledge and skills, academic results, and the future career.

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