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REVIEW ARTICLE

Digital tools and their role in optimizing the detection of academic plagiarism

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ABSTRACT

Objective. This paper aims to delineate how digital tools have transformed the process of plagiarism detection within the academic context.

Design/Methodology/Approach. This study was conducted through a systematic review of the literature. The PRISMA methodology was employed for the search and selection of articles. The research was conducted using the Scopus and Web of Science databases, from which 20 articles addressed the subject matter between 2014 and 2024 were selected.

Results/Discussion. The findings demonstrated a notable advancement in the precision and effectiveness of these technologies. Ethical concerns about privacy and data utilization were also identified, necessitating their monitoring in subsequent investigations.

Conclusions. Considering the outcomes mentioned above, digital instruments have experienced a notable evolution in the domain of academic plagiarism detection. Tools based on artificial intelligence and developed algorithms offer high accuracy and the potential to identify complex plagiarism structures, such as paraphrasing and translations. Nevertheless, the implementation and efficacy of these tools exhibit considerable variability across institutions, contingent upon factors such as the availability of accessible resources and the extent of personal training.

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Originality/value. The research offered a revised perspective on the capacity of diverse technologies, including machine learning algorithms and artificial intelligence, to identify deceptive behaviors. The study considered the ethical and pedagogical implications of their use, thereby providing a solid basis for future developments in educational policy and the continuous improvement of these tools
Keywords: digital tools; academic plagiarism; anti-plagiarism; artificial intelligence; ethics; academic integrity.

1. INTRODUCTION

The digital revolution has profoundly impacted numerous facets of contemporary life, including the realm of education (Rodriguez, 2021). The vast quantity of information available and the ease with which it can be shared have ushered in an era of widely accessible knowledge. However, this has also given rise to significant challenges, including academic plagiarism (Delgado *et al.,* 2024). Plagiarism is defined as the misappropriation of another person's work without proper citation, and it represents a significant risk to academic honesty and the credibility of knowledge generated in educational institutions (Cebrián *et al.,* 2018). In this context, digital tools have emerged as a crucial component in identifying and preventing plagiarism and a vital instrument in promoting academic integrity and excellence in education.

In recent years, there has been a notable increase in the utilization of such tools. These tools, supported by advanced algorithms and artificial intelligence (AI) technologies, can examine significant volumes of text rapidly and efficiently, matching them with extensive databases encompassing scientific publications, books, websites, and other relevant sources (Cebrián *et al.,* 2023). This process enables the identification of textual similarities and writing patterns that may indicate instances of plagiarism, thereby facilitating the assessment of the originality of students' written work (Martínez, Barrón, & Martínez, 2019). Nevertheless, despite its gradual integration, some issues remain regarding its efficacy and limitations as well as its ethical and pedagogical scope.

Academic plagiarism is defined as deception in which an individual presents ideas, manuscripts, or other information as their original work without providing due recognition to the original author. This can occur in several ways, including reproducing a manuscript without citing its source, interpreting the text without mentioning the author, presenting a manuscript as one's own when it belongs to another person, or using a work without the authorization or citation of the author, which is known as self-plagiarism (Rodriguez, 2023). While academic plagiarism may vary in specifics, a common thread is the need for proper attribution to the original source. This lack of honesty and ethical conduct is particularly troubling in the academic and university setting.

The ramifications of academic plagiarism are far-reaching and affect not only the individual perpetrator but also the scholarly community at large. From an educational and corrective standpoint, students and researchers who engage in plagiarism may face significant consequences, including the reproval of their work, suspension or expulsion from the institution, and loss of trust and prestige. These corrective measures are essential to preserve academic ethics, as plagiarism affects both the approval of the work submitted and the trust in the formative process and the originality of knowledge production (Bianchi, 2016).

From an ethical standpoint, academic plagiarism represents a significant breach of the principles of integrity, equality, and consideration in the scientific and educational context. The original author is harmed, and the value of the scientific work is diminished when a work is attributed as one's own without the corresponding accreditation (Zamora, 2022). Furthermore, this lack of integrity can occur in the university context, where plagiarism can negatively impact an individual's professional standing, limiting their opportunities for employment, collaboration, and funding and affecting their credibility as a professional or academic.

From a legal standpoint, the ramifications of plagiarism are contingent upon the authority in question. Nevertheless, plagiarism can result in penalties for copyright infringement and economic repercussions, mainly when the

plagiarized material is of significant value or utilized for commercial purposes (Arias, 2020). This highlights the necessity of respecting intellectual property and ensuring the manuscript is created legally.

Digital tools encompass software applications and online platforms that facilitate various activities by applying emerging technologies, including artificial intelligence, machine learning, and natural language processing (Ramos, 2021). In education, such tools have become invaluable for effectively detecting academic plagiarism, which has become a pervasive issue in the university and scientific communities (Díaz, 2023a).

To address this challenge, digital tools for identifying plagiarism have been developed. These tools compare the text to be evaluated with an extensive database comprising scientific articles, books, online publications, and other materials. Modern algorithms enable these tools to detect exact similarities in text and structures that may indicate a lack of originality. Such similarities may include using similar sentences without citation or inadequate interpretation. The capacity to swiftly and accurately examine vast quantities of writing enables educational institutions and instructors to assess the originality of student's written work with greater precision and efficiency than traditional methods (Diaz, 2024).

The role of these digital tools extends beyond the conventional identification of plagiarism. They also function as a formative element, facilitating students' comprehension of the significance of academic integrity and the accurate attribution of sources. Providing prompt feedback on the correct utilization of information enables students to enhance their writing proficiency and become more conscious of copyright and intellectual property (Diaz, 2023b). Similarly, using these tools encourages a culture of integrity and accountability in academic productivity. It motivates students to create their manuscripts, an essential benefit to advancing knowledge.

It is imperative to address academic plagiarism to safeguard the integrity of the educational system and the advancement of knowledge production. Avoiding plagiarism not only protects the integrity of authors and ensures that they receive due recognition for their contributions but also fosters a genuine and meaningful learning environment. Students, aware that their work will be subjected to rigorous scrutiny, are motivated to produce work of genuine critical insight and to engage more intensively with their learning methods.

The use of digital tools in identifying academic plagiarism has prompted significant interest within the teaching community, leading to many investigations examining this phenomenon across diverse educational settings. A case in point is the study conducted by Céspedes (2020), which revealed a high degree of inexperience and restricted use of anti-plagiarism software among the teachers analyzed. It is therefore considered an area in which urgent action is required at the institutional level in educational centers to implement measures that combine preventive and detection strategies together with formative and regulatory approaches.

A noteworthy study was conducted by Martinez (2024), which examined students' perceptions of methods for addressing plagiarism. The study underscored the significance of fostering secure investigative abilities within the educational setting. The study's findings emphasize the influence of multiple factors on the prevalence of plagiarism, encompassing institutional elements, aspects of the teaching and learning process, external factors, personal characteristics, and technological aspects. These factors must be addressed to prevent and reduce academic plagiarism in scientific research.

In contrast, the study by Morais *et al.* (2012) concentrated on quantifying the prevalence of plagiarism in higher education. To this end, they collated recent data on Portuguese students and proposed avenues for extending this discourse to halt this unscrupulous practice. It is suggested that the combination of diverse indicators facilitates a more comprehensive assessment of plagiarism prevalence. To effectively prevent this academic dishonesty, allocating more significant resources toward training on the appropriate utilization and accurate attribution of sources is imperative.

A noteworthy contribution is that of Boillos (2020), whose study concentrated on assessing the manuscripts produced by 100 first-year elementary school students. A qualitative analysis of reports generated by plagiarism detection software applied to some conference proceedings revealed how students utilize information in ways that could be perceived as plagiarism.

However, these behaviors are often a result of a lack of knowledge about appropriate information management strategies. This analysis facilitated the development of a taxonomy of cases of unconscious plagiarism. In this context, it is essential to examine the role of digital tools in plagiarism detection, considering both their benefits and limitations. This study aims to describe the impact of digital tools on the detection of plagiarism in academic contexts, evaluating their accuracy, their influence on student behavior, and their contribution to maintaining academic integrity. The objective is to comprehensively understand the role of digital tools in the fight against academic plagiarism and recommend advances that will increase their effectiveness in the future.

This article is developed in terms of three fundamental aspects: (i) a review of the progress of digital tools for the identification of plagiarism, analyzing their technological advances and their implementation in educational centers; (ii) case studies that present successes and failures in the application of these tools are explored, providing a critical perspective of their practical implementation; and (iii) ethical and pedagogical considerations about their use are argued, reflecting on how their emergence is shaping the rules and perspectives in the academic environment.

In terms of impact, this study will offer an in-depth understanding of how digital tools can optimize plagiarism detection and provide a solid foundation for implementing educational and technological strategies that promote academic honesty. By identifying both the strengths and areas for improvement of these tools, the findings of this systematic review will prove valuable to educational administrators, teachers, technology developers, and policymakers interested in improving the quality of education and maintaining academic integrity in the digital age.

The necessity for practical digital tools for plagiarism detection is becoming increasingly apparent in the contemporary educational context, characterized by unparalleled access to information and mounting pressure to uphold academic integrity. This study aims to examine the current state of such tools and offer evidence-based practical recommendations for their continuous improvement. By addressing the research thrusts raised, we will make a significant contribution to the field of study of academic plagiarism detection and encourage a more reflective and critical approach to the use of digital technologies in education.

2. MATERIAL AND METHODS

This bibliographic research examines and studies the available literature on a given topic. The principal objective is to identify, synthesize, and analyze the information pertinent to this topic (Vilanova, 2012). It is a systematic review, which entails a comprehensive and orderly exploration of the significant literature in scientific databases and other sources. Subsequently, the selected studies are critically evaluated using previously established inclusion and exclusion criteria (Linares *et al.,* 2018). The PRISMA methodology was employed to identify the articles that constituted the study sample.

Resources such as the Scopus and Web of Science (WoS) databases were employed in preparing this article. In order to search, a set of keywords was used, comprising terms in both Spanish and English. The search terms employed were “herramientas digitales,” “plagio académico,” and “detección de plagio académico” (translated as “digital tools,” “academic plagiarism,” and “academic plagiarism detection,” respectively). The “AND” and “OR” connectors combined keywords effectively, and searches were conducted in the title, abstract, and keyword fields.

The period between 2014 and 2024 was considered, encompassing articles published in Spanish and English. Articles that did not provide access to the full text were duplicates or did not align with the study’s objective were excluded. Furthermore, reflection articles, discussion articles, and letters to the editor were excluded because they do not constitute empirical studies or systematic information investigations, which is crucial for this study. While they offer valuable perspectives, they need to adhere to sufficient methodological principles to guarantee the consistency and scientific rigor of the study.

The PRISMA methodology was employed to direct the process of searching, identifying, and selecting studies. The preliminary search in Scopus and WoS resulted in 161 publications. Following the application of the inclusion criteria, 129 publications were selected, with 97

being excluded because they were not aligned with the study's objectives. Ultimately, following the application of the specified criteria for filtering, the final sample consisted of 20 articles.

3. RESULTS

After applying the article selection procedure, 20 publications deemed pertinent to the study were identified. A comprehensive analysis of the identified publications was conducted, and a detailed table was constructed to present critical information, including author, year of publication, title, country, methodology, and database (see Table 1).

3.1. Transformation of digital tools for the detection of academic plagiarism

The findings of this systematic review study demonstrate the impact of digital tools on the detection of plagiarism in academic settings. The analysis assesses the accuracy of these tools, their influence on student behavior, and their role in maintaining academic integrity. The 20 selected investigations revealed significant preferences in the acceptance and effectiveness of these tools in educational institutions worldwide.

In terms of accuracy, digital tools have proven instrumental in plagiarism detection. They employ advanced algorithms and AI techniques to identify direct textual matches and detect paraphrases, minor textual changes, and misuse of sources. In particular, Alsabhan's (2023) research, which employed machine learning and LSTM (long short-term memory) methods, demonstrated that AI-based models can achieve a high degree of accuracy in identifying instances of academic plagiarism among students, thus providing a more comprehensive and reliable assessment of such cases. Similarly, the study by Lee *et al.* (2023) reviews research on code similarity and plagiarism identification, emphasizing the relevance of novel methodologies for detecting plagiarism in situations where novel interpretations and writing can circumvent traditional checks.

Nevertheless, despite these technological developments, research continues to highlight specific challenges about the accuracy of these tools. For instance, Jambi, Khan, and Siddiqui (2022) suggested that the efficacy of these systems may be constrained by the nature of the text and the degree of plagiarism and advised that every tool is only partially secure. Similarly, Hu and Sun (2016) observed that English teachers demonstrated limited awareness of the capabilities and limitations of these digital tools, which may impede their effective integration.

Concerning the effect on student conduct, implementing plagiarism detection tools has resulted in notable shifts in how students engage with their academic pursuits. A study by Malik, Mahroof, and Ashraf (2021) revealed that students demonstrated a reduced inclination to engage in deliberate plagiarism when they were aware of the availability of plagiarism detection tools. This suggests that such tools foster a culture of academic integrity among students by enhancing their understanding of and preparedness to adhere to appropriate citation and paraphrasing regulations. This result is corroborated by the findings of Yavich and Davidovitch (2024), who employed a mixed methodology to demonstrate that early exposure to plagiarism identification tools can foster a culture of scientific integrity and personal commitment among university students.

Nevertheless, some research suggests that the overuse of such tools may have adverse effects. For example, in a case study, McIntire, Calvert, and Ashcraft (2024) in the United States argue that using plagiarism detection tools can foster a culture of distrust, whereby students perceive that they are treated with suspicion rather than guided towards ethical writing practices. This phenomenon has the potential to result in an educational environment that is more punitive than formative, which could impede genuine learning and creativity.

Regarding the advancement of academic integrity, these instruments serve a pivotal function in elevating standards and reinforcing academic integrity policies within educational institutions. As evidenced by research such as that of Rumanovská *et al.* (2024), these tools have facilitated the implementation of more reasonable and equitable policies to address plagiarism at academic institutions. Similarly, Cebrián *et al.* (2023) found in Spain that incorporating digital tools increased the detection of plagiarism and promoted a culture of transparency and academic accountability.

Title	Author / Year	Country	Methodology	Database
Plagiarism in the Academic Environment	Rumanovská *et al.* (2024)	Slovakia	Descriptiva	Scopus
Evaluation of Different Plagiarism Detection Methods: A Fuzzy MCDM Perspective	Jambi, Khan, & Siddiqui (2022)	Saudi Arabia	Revisión de literatura	Scopus
Review of Code Similarity and Plagiarism Detection Research Studies	Lee *et al.* (2023)	South Korea	Revisión de literatura	Scopus
The Perception of Academic Plagiarism in Industrial Engineering Students at a Public University in Lima	Dávila (2022)	Peru	Descriptiva	Scopus
Plagiarism through Paraphrasing Tools – The Story of One Plagiarized Text	Ansorge, Ansorgeová, & Sixsmith (2021)	Czech Republic	Descriptiva	Scopus
Plagiarism among Higher Education Students	Yavich & Davidovitch (2024)	Israel	Mixto	Scopus
Online Judging Platform Utilizing Dynamic Plagiarism Detection Facilities	Iffath *et al.* (2021)	Australia	Experimental	Scopus
Online University Students' Perceptions on the Awareness of, Reasons for, and Solutions to Plagiarism in Higher Education: The Development of the AS&P Model to Combat Plagiarism	Malik, Mahroof, & Ashraf (2021)	Pakistan	Descriptiva	Scopus
Student Cheating Detection in Higher Education by Implementing Machine Learning and LSTM Techniques	Alsabhan (2023)	Saudi Arabia	Experimental	Scopus
Pressure to Plagiarize and the Choice to Cheat: Toward a Pragmatic Reframing of the Ethics of Academic Integrity	McIntire, Calvert, & Ashcraft (2024)	United States	Estudio de caso	Scopus
Impact of Digital Contexts in the Training of University Education Students	Cebrián *et al.* (2023)	Spain	Descriptiva	Web of Science
La integridad científica ante los plagios fabricados con el ChatGPT	Rivera (2023)	Mexico	Revisión de literatura	Web of Science
Medidas para combatir el plagio en los procesos de aprendizaje	Muñoz, Espiñeira, & Pérez (2021)	Spain	Descriptiva	Web of Science
Using Artificial Intelligence to Predict Class Loyalty and Plagiarism in Students in an Online Blended Programming Course during the COVID-19 Pandemic	Wu *et al.* (2021)	Taiwan	Experimental	Web of Science
Fluent but Not Factual: A Comparative Analysis of ChatGPT and Other AI Chatbots' Proficiency and Originality in Scientific Writing for Humanities	Lozić & Štular (2023)	Slovenia	Mixto	Web of Science
Ethical Dilemmas in Using AI for Academic Writing and an Example Framework for Peer Review in Nephrology Academia: A Narrative Review	Miao *et al.* (2023)	United States	Revisión narrativa	Web of Science
Challenges and Opportunities of Generative AI for Higher Education as Explained by ChatGPT	Michel *et al.* (2023)	United Kingdom	Etnográfico	Web of Science
Plagiarism and academic integrity in Germany	Ruipérez & García (2016)	Spain	Documental	Web of Science
Chinese university EFL teachers' knowledge of and stance on plagiarism	Hu y Sun (2016)	Singapur	Mixto	Web of Science
The impact of activity design in Internet plagiarism in Higher Education	Gómez, Francisco, & Moreno (2016)	Spain	Experimental	Web of Science

Table 1. Summary of articles chosen for the study.

Notwithstanding the advantages, some studies indicate that some aspects warrant further scrutiny to optimize the efficacy of these instruments. Rivera (2023) addressed the challenges posed by using AI tools, such as ChatGPT, which can further complicate plagiarism detection by generating coherent text that is not necessarily original. Moreover, Michel *et al.* (2023) highlight ethical concerns regarding the invasion of privacy and the potential criminalization of inadvertent plagiarism by students.

In conclusion, the findings of this study demonstrate that digital tools have markedly transformed the process of identifying plagiarism in academic settings. While these tools have enhanced the precision of plagiarism detection and fostered positive outcomes regarding students' awareness and conduct, they also present deontological and pedagogical challenges that warrant examination. The effective integration of these tools in the educational environment necessitates not only the utilization of advanced technology but also a comprehensive understanding of their inherent limitations and the fostering of an academic integrity culture predicated upon students' education and ethical development.

3.2. Evolution of digital tools in plagiarism detection

With the technological advancement of plagiarism detection tools, there has been a noteworthy progression in recent years. These tools have evolved beyond the confines of basic textual matching algorithms, progressing towards more sophisticated systems that integrate artificial intelligence (AI) and machine learning. As Iffath *et al.* (2021) reported, an online assessment platform that utilizes active plagiarism identification infrastructures has been implemented. In addition to collating writing, these tools can identify similarities in programming code, thereby providing broader and more flexible guidance for detecting various types of plagiarism.

Conversely, Lee *et al.*'s (2023) research addressed the issue of code similarity and plagiarism identification, emphasizing the advancement of more sophisticated algorithms for detecting patterns in writing and code that are not identified by traditional tools. These developments indicate a growing capacity for more precise identification and a promising potential for differentiating between deliberate plagiarism and inadvertent writing deficiencies.

In terms of the influence of these tools in academic settings, the deployment of digital tools has been particularly pivotal in the educational sphere, where academic integrity is paramount. As Rumanovská *et al.* (2024) have observed, many academic institutions have adopted plagiarism identification tools intending to reinforce their ethical guidelines for research. Such requirements are designed to prevent students from plagiarism and foster a culture of academic integrity and originality. This perspective is corroborated by Cebrián *et al.* (2023), who demonstrated that the digital domain has positively influenced the training of university students, fostering a heightened commitment to the significance of originality and scientific integrity.

As shown by Malik, Mahroof, and Ashraf (2021), implementing these tools has also enhanced students' comprehension of the ramifications of plagiarism and facilitated the instruction of proper citation and interpretation techniques. However, not all educational institutions have been equally effective in adopting these tools. In a case study, McIntire, Calvert, and Ashcraft (2024) demonstrated that an overreliance on plagiarism detection tools in some universities can foster an environment of distrust, which has a detrimental impact on the relationship between students and faculty.

In consideration of the challenges and constraints associated with implementing digital tools, despite the advantages they offer, the review also identifies several challenges inherent to deploying digital plagiarism detection tools. A noteworthy conclusion from the study conducted by Jambi, Khan, and Siddiqui (2022) in Saudi Arabia is that digital tools are practical in numerous instances; they must be equipped to identify specific forms of plagiarism, such as idea plagiarism and close paraphrasing. This prompts whether these tools can address all aspects of academic plagiarism.

Rivera (2023) underscores the secondary difficulties of utilizing generative AI tools, such as ChatGPT, which may ostensibly generate original writing but must meet the requisite scientific standards of originality and intellectual

property. This indicates the potential for creating more sophisticated tools to address these evolving challenges and adapt to new forms of academic misconduct. The prospects for these tools are that they will continue to be developed and refined. Wu *et al.* (2021) posit that these tools will not only detect plagiarism after it has occurred but will also be capable of anticipating and preventing academic dishonesty. Similarly, Lozic and Štular (2023) propose the utilization of AI chatbots not only for identifying plagiarism but also as pedagogical instruments to facilitate students' comprehension of the principles governing citation and interpretation.

In conclusion, the advancement of digital tools for the identification of plagiarism in academic contexts underscores the necessity for further refinement and enhancement of these tools, as well as the integration of more comprehensive pedagogical strategies that not only deter plagiarism but also educate students about the significance of integrity and originality in academic writing.

3.3. Successes and failures in the application of digital tools in plagiarism detection

The review includes several case studies demonstrating the efficacy of digital tools for plagiarism detection, particularly in contexts where technology has been fully integrated into institutional policy. To illustrate, the study by Iffath *et al.* (2021) outlines an online assessment platform that employs dynamic plagiarism detection capabilities. Such tools not only enhance the detection of textual plagiarism but also facilitate the identification of similarities in programming code. This multifaceted approach not only reduced plagiarism cases but also fostered greater sensitivity and understanding of academic integrity among students.

Similarly, the research by Wu *et al.* (2021) demonstrated a high degree of accuracy in identifying instances of plagiarism, which enabled educators to engage more effectively and at an earlier stage in the learning process. These findings underscore the importance of leveraging contemporary technologies not only for detecting plagiarism but also for predicting potential unethical conduct, thereby enabling a more adaptive approach to educational practice. Nevertheless, not all initiatives implementing plagiarism identification tools have yielded the anticipated outcomes. As evidenced by the research conducted by McIntire, Calvert, and Ashcraft (2024), there have been instances where the implementation of policies based on such tools has yet to yield the desired outcomes. The study indicated that an overreliance on such tools can foster an environment of suspicion among students and educators, which can ultimately impact the quality of the educational partnership. The students in question perceived that they were treated more as potential offenders than as learners, which resulted in a notable decrease in motivation and defensiveness towards the educational process.

Another example of failure is illustrated by the study conducted by Ansorge, Ansorgeová, and Sixsmith (2021), which examines how students utilize paraphrasing tools to circumvent plagiarism detection. Despite the institution's utilization of contemporary plagiarism identification tools, these tools proved incapable of accurately detecting paraphrased content. This example illustrates a significant limitation of modern tools and underscores the necessity for subsequent technological advancements to identify replication and more nuanced attempts at scientific dishonesty.

Rivera's (2023) research examines the ethical and practical challenges of using generative AI, such as ChatGPT, in an educational setting. This research concludes that, although tools for identifying plagiarism have improved in accuracy, they still need to be improved to avoid the challenges posed by AI-produced texts that appear genuine but do not meet academic standards. Malik, Mahroof, and Ashraf (2021) highlight the relevance of integrating digital tools with broader educational strategies that promote a culture of scientific ethics. The authors emphasize that relying on plagiarism detection tools in isolation can be counterproductive if not accompanied by comprehensive training on academic integrity and good writing practices.

Analyzing successes and failures demonstrates the significant role that digital plagiarism detection tools play in higher education, scientific research, and other fields. However, their effectiveness is contingent upon how they are implemented and utilized. It is of the utmost importance that educational institutions

adopt these tools and integrate them into a comprehensive framework of educational policies and practices that holistically promote academic integrity.

The research findings indicate a necessity for a more balanced and flexible approach to adopting digital tools. It is recommended that institutions consider the school community's specific requirements and particularities and strategies accordingly. In particular, using modern technologies, such as AI, is more appropriate in environments where plagiarism is more complex and difficult to identify (Alsabhan, 2023).

The evidence mentioned above indicates that while digital tools for plagiarism detection have proven to be highly beneficial for educational institutions, their implementation is challenging. To optimize their efficacy, these tools must be utilized with ethical education and transparent institutional policies that foster a culture of academic integrity. As technology continues to evolve, the strategies for implementation must evolve as well, ensuring that they are fair, effective, and aligned with core educational values.

3.4. Ethical and pedagogical implications of using plagiarism tools

One of the most pertinent ethical implications addressed in the existing literature is the impact of these tools on the relationship between students and educators. McIntire, Calvert, and Ashcraft's (2024) research reflects on how the perception of a surveillance environment can engender a climate of skepticism and distress in the classroom. The disproportionate adoption of plagiarism detection tools can engender a perception among students that they are presumed to be offenders before they have been proven guilty. This can have adverse effects on their learning behavior and motivation. This finding is consistent with the conclusions of Yavich and Davidovitch (2014), who posit that the suspicion generated by these tools can impede the development of a collaborative and supportive formative environment.

Rivera (2023) highlights the increasing reliance on digital tools, which gives rise to significant concerns regarding the integrity and confidentiality of students and the utilization of information. It is incumbent upon institutions that implement such technologies to ensure that information security and protection guidelines are secure and transparent and that students are aware of the circumstances under which they are used in their academic activities. The study by Michel *et al.* (2023) underscores the necessity of aligning the imperative to uphold scientific ethics with the obligation to safeguard individual rights. This ethical problem merits further scrutiny and discourse within the scientific community.

From a pedagogical standpoint, implementing plagiarism detection tools has also precipitated substantial teaching and learning methodologies shifts. A study exploring the perception of plagiarism among industrial engineering students (Davila, 2022) found that the introduction of detection tools has prompted educators to rethink their teaching approaches, with a greater emphasis placed on education about academic integrity and research ethics. This shift has prompted a change in focus from a punitive to a preventative approach. It has led to an increased emphasis on teaching writing skills and understanding plagiarism beyond simple detection.

The studies conducted by Malik, Mahroof, and Ashraf (2021) in Pakistan and Muñoz, Espiñeira, and Pérez (2021) in Spain concur that the implementation of these tools is prompting educational institutions to implement more comprehensive programs on academic ethics. These concepts encompass workshops and training programs that instruct students on how to prevent plagiarism and evaluate the originality and scientific soundness of their manuscripts. Nevertheless, this research indicates that the mere presence of such tools is insufficient, necessitating a comprehensive approach that integrates technological solutions with ethical training to foster a culture of scientific ethics.

Furthermore, the research underscores the ethical complexities inherent in utilizing cutting-edge technologies, such as AI, to detect plagiarism. For example, Alsabhan (2023) raises questions regarding the fairness and accuracy of such technologies. While AI-based tools may facilitate more agile and rigorous identification, they may also be susceptible to distortions and flaws that could result in erroneous plagiarism detections, which would have unjustifiable consequences for students, particularly

if they lack the opportunity to claim or clarify their work. Lozic and Štular (2023) also identify ethical concerns regarding using AI for plagiarism detection. They argue that while AI is effective at identifying suspicious writing patterns, it cannot always comprehend the context or intent of the text. This presents a substantial ethical challenge, as plagiarism is not merely about copying and pasting; it can also encompass more intricate matters of attribution and knowledge representation.

Furthermore, the growing prevalence of digital tools for detecting plagiarism influences the norms and expectations within the academic community. As detailed in the study by Ruipérez and García (2016), using technology to detect plagiarism is becoming standard practice in many educational institutions, influencing expectations regarding the originality of student work. This transformation is prompting institutions to develop more rigorous and transparent policies regarding plagiarism, which are implemented consistently and fairly. Specific research, such as that of Hu and Sun (2016), indicates that these variations may ultimately result in unfavorable outcomes, such as fostering an environment of apprehension and submission rather than facilitating a genuine understanding of scientific integrity. While maintaining high academic standards is crucial, the authors posit that policies must be balanced and not impede critical thinking and innovation.

The findings of this review demonstrate that for digital plagiarism detection tools to be practical, they must be implemented within a well-defined ethical and pedagogical framework. Educational institutions must consider not only the advantages of these tools but also their limitations and the potential unintended consequences of their use. First and foremost, academic institutions must foster a culture of scientific ethics that extends beyond the mere identification of plagiarism. This encompasses the instruction of students in the significance of scientific integrity and the provision of the requisite competencies for producing authentic and meritorious manuscripts. Secondly, educational institutions must ensure transparency regarding using plagiarism detection tools and guarantee that students are adequately informed about the rationale behind deploying these technologies. This encompasses explicit communication regarding privacy policies and data management and established protocols for appeals in disputes.

Institutions must adopt an equitable approach that integrates technology with pedagogy. As specified by Michel *et al.* (2023) and Gómez, Francisco, and Moreno (2016), digital tools should complement training, not a substitute. By integrating the tools with concrete formative strategies, institutions can foster a learning environment prioritizing honesty, originality, and scientific demand. In conclusion, while digital tools for plagiarism identification influence training considerably, their deployment gives rise to ethical and pedagogical concerns that must be addressed. As these technologies evolve, an equitable and prudent approach that upholds scientific ethics and educational equity must be integrated into the academic milieu.

4. DISCUSSION AND FINAL CONSIDERATIONS

A systematic analysis of digital tools for detecting academic plagiarism reveals several vital implications and considerations that educational institutions must address. This study has identified both the benefits and limitations of these tools and highlighted the necessity for a balanced approach that combines technology and pedagogy. As evidenced by the findings of the reviewed studies, digital plagiarism detection tools offer significant advantages for detecting plagiarism in an educational setting. These tools facilitate the expeditious and efficacious identification of plagiarism processes, enabling educators to uphold scientific ethics and foster originality in generating knowledge. This finding is consistent with the results of Morais *et al.* (2022), who found that students perceive plagiarism identification programs as an effective deterrent to plagiarism. Moreover, digital tools facilitate the examination of extensive collections of academic manuscripts, a valuable capability in the university setting.

Nevertheless, the limitations and difficulties presented by these instruments must be considered. As Céspedes (2020) notes, educators often lack the knowledge and skills to effectively utilize these software tools, which can impede their efficacy. This observation aligns with the findings of our study, which also indicated

the critical need for educators to receive training and capacity building in the use of these technologies. Moreover, several reviewed studies, including the one by Boillos (2020), have highlighted the prevalence of unconscious plagiarism, which digital tools often cannot detect effectively. This is because digital tools primarily focus on identifying duplicated textual content without considering the context or intention behind the texts. The results also indicate that digital tools for plagiarism identification have the potential to enhance academic integrity, and their use carries significant deontological and pedagogical implications. The study by Martínez (2024) underscores the necessity for transparent and concrete regulations to accompany adopting these tools, delineating their use, and managing student information. It is crucial to guarantee that the strategy for identifying plagiarism is not merely preventive but also formative, fostering an appreciation for academic integrity and originality in students.

The extensive use of these instruments may lead to a corrective methodology rather than an educational approach to plagiarism. Integrating these technologies should be complemented by pedagogical strategies that encompass the instruction of academic writing skills and an understanding of research ethics. This approach is essential to address not only intentional plagiarism but also unconscious plagiarism, a phenomenon that has been discussed less in academic literature but is nevertheless of equal importance.

Educational institutions must consider several pivotal factors in their implementation to enhance the advantages of digital plagiarism detection tools while mitigating their limitations. First and foremost, providing educators with comprehensive and ongoing training on effectively utilizing these tools is imperative. Inadequate knowledge and proficiency in using identification programs may result in diminished efficacy and potential for misuse. Secondly, a comprehensive approach that integrates technology with pedagogy must be implemented. As Michel *et al.* (2023) have observed, digital tools should be regarded as an additional instrument to facilitate instruction rather than replace conventional training methodologies. Integrating technology with effective educational strategies can facilitate the creation of a learning environment that fosters originality, integrity, and academic rigor.

It is of the utmost importance that anti-plagiarism policies are explicit and accessible and encompass fair and impartial procedures for reviewing and appealing plagiarism cases. It is incumbent upon academic institutions to ensure that their students are fully cognizant of the guidelines and procedures about plagiarism and the ramifications of such actions. Such measures will not only prevent plagiarism but also foster a sense of equality and fairness in the identification process. Furthermore, it is essential to underscore the influence of these tools on the dynamics between students and educators. The perception of a surveillance environment has the potential to engender suspicion and to affect classroom dynamics negatively. Therefore, schools must deploy these tools in a manner that fosters clarity, reliability, and mutual consideration.

In conclusion, using digital tools to detect plagiarism presents a significant opportunity to promote scientific integrity and enhance the assessment of academic manuscripts. Nevertheless, their implementation should be cautiously approached to address the ethical and pedagogical implications. Educational institutions must implement an equitable approach that integrates technology and pedagogy, promotes teacher education and training, and ensures precise and balanced regulations for plagiarism identification. Only through this approach can the potential of these tools be fully realized while simultaneously reducing their limitations and fostering an educational environment that values originality, integrity, and ethical conduct.

It is recommended that future research concentrate on a detailed analysis of the perceptions and behaviors of students and teachers about these tools. Furthermore, the deployment of innovative technologies that can effectively address plagiarism's complexities, including unintentional plagiarism and limitations on text-only identification, should be considered. As digital tools continue to evolve, the educational community must maintain a reflective and adaptive stance, ensuring that the technologies deployed deter plagiarism and educate and empower students to become critical thinkers and ethical researchers.

Conflict of interests

The authors declare that there is no conflict of interest.

Contribution statement

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Statement of data consent

The data generated during the development of this study has been included in the manuscript. ●

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