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RESEARCH ARTICLE

Discourse analysis on academic integrity generative ai: perspectives from science and mathematics students in higher education

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ABSTRACT

Artificial Intelligence (AI) has significantly influenced the current educational system, offering various benefits to teachers and students. However, the integration of AI in education also poses challenges, particularly in maintaining academic integrity. This study investigates the perspectives of 24 science and mathematics students on the impact of Generative AI (GAI) on academic integrity, a core principle in higher education. Using an exploratory design, the findings reveal a dual perspective: GAI can enhance learning and research by providing advanced tools and resources, yet it also risks undermining ethical standards if misused. The study highlights the importance of balancing technological advancements with the maintenance of academic integrity, emphasizing the need for responsible AI usage and the development of policies to mitigate potential negative impacts. Further research is needed to explore the impact of GAI on academic integrity across different disciplines and educational contexts.

Keywords: academic integrity; artificial intelligence; science; mathematics; higher education

1. Introduction

The emergence of artificial intelligence (AI) and new technologies is poised to revolutionize the workforce. AI, in particular, has become a game-changer in numerous industries, including education. In developed nations, the advent of AI has drastically changed the way students learn and engage with information.

Higher education refers to education provided by universities, colleges, and other institutions that award academic degrees or professional certifications, typically following secondary education. This level of

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education is critical as it prepares students for advanced professional careers and promotes critical thinking, innovation, and research.

Artificial Intelligence generally refers to a series of machines utilized to imitate human intelligence[1]. It encompasses complex processes that enable a machine to function in various ways. Most functions of this technology involve information processing that deals with large amounts of data to analyze daily. The collected information is comprehended and used for various purposes, giving AI the capability to think like humans.

Putting honesty and credibility into academic tasks produces quality output. Honesty involves the responsible use of collecting information, usually done with the help of technology. Credibility involves assessing whether information is reliable or a carrier of fake details circulating on the Internet. These are all related to academic integrity, which encompasses values such as honesty and fairness. Despite the ideal principles of academic integrity that should be instilled among students, emerging concerns, including AI, can pose adverse effects on it[2].

Within AI is a special form called Generative AI, which refers to language models that can generate texts, images, and other digital forms of information found on the Internet. Initially, it functioned as a way to imitate human language and conversation, but it has advanced to produce digital information beyond human capabilities[3-5].

The purpose of this study is to seek an understanding of academic integrity and Generative AI from the perspective of science and mathematics students in higher education. Higher Education Institutions (HEIs) continue to provide quality education, with careful emphasis on developing students to be responsible in their academic lives. Along with this responsibility is the analysis of how they seek help from technology when accomplishing difficult tasks and how it affects the quality of their output and reflects their character as moral persons.

Over the years, the proliferation of AI is evident in HEIs, particularly in research and the teaching and learning process[6]. Given the widespread utilization of technology in most countries, students are being prepared for this change for lifelong learning and global competency[7].

The continuous influence of AI has given positive benefits[8,9] such as improvement of self-learning[10], mastery of repetitive tasks[11], and advancements in administrative processes[12]. Moreover, AI has brought unusual benefits such as the ability to pass medical exams and Master of Business Administration (MBA) examinations[13,14].

However, AI can have deteriorating effects, such as a decrease in students' critical thinking skills, leading to academic failure[15]. Additionally, content generated by AI may not always be as accurate as human work. These effects lead to discouraging students from using these platforms to complete their work[16-18].

This study seeks to provide further narrative about academic integrity and Generative AI, given that these concepts are still being explored. Furthermore, most respondents selected in previous studies are teachers who are undeniably part of the workforce utilizing technology for enrichment and engagement among students. However, this study focuses on the perspectives of students who specialize in science and mathematics.

2. Literature

Academic integrity is a crucial disposition for students entering a university. They should embody values that reflect morality and ethics, such as honesty and fairness. Academic dishonesty arises when these values are not met, leading to academic and ethical issues.

The use of AI tools in assessments poses concerns observed by teachers and students[19]. One of these concerns is the context of cheating in higher education, where students rely solely on AI platforms to complete tasks without ensuring the content is original and reliable. Moreover, students have raised concerns that excessive dependence on AI might stifle creativity and impede their ability to think critically and solve problems[20]. The concept of cheating has become a "culture" that undermines academic integrity[21]. Given its normalization among students, they believe it is required to pass courses and practice it along with others[22].

This concept relates to another concern: plagiarism and the massive creation of unoriginal content[23]. In the Philippines, plagiarism is a significant problem in universities, especially in formal writings such as research[24]. It can be detected through texts generated by AI, which poses a concern for students who frequently use this technology[25]. These concerns produce biases and skepticism about the results from plagiarized works, thereby affecting students' academic performance[26].

The aforementioned concerns create discrimination within the academic community[27]. Students involved in illicit behavior in creating academic papers often face criticism from their peers, affecting their self-esteem.

According to Social Cognitive Theory, developed by Albert Bandura[28], behavior is learned through observational learning and direct experience. This theory emphasizes the role of social influences and personal experiences in shaping how individuals acquire and maintain behaviors, including those related to ethical conduct.

Chavez[29] provides compelling evidence for the applicability of Social Cognitive Theory in understanding students' attitudes and behaviors regarding academic integrity in the context of emerging technologies like generative AI.

Chavez[29] aligns with Social Cognitive Theory by demonstrating that students' attitudes and behaviors regarding academic integrity were influenced by their observations and experiences with technology. He argues that students' perceptions of GAI's potential to enhance learning or undermine academic integrity are likely shaped by their interactions with the technology and their observations of others' use of it. This aligns with Bandura[28] central tenet that individuals learn by observing and modeling the behaviors of others, particularly those they perceive as credible or influential.

Chavez[29] further supports Social Cognitive Theory by highlighting the role of social norms and institutional context in shaping student behavior. His research suggests that students are more likely to engage in dishonest practices if they perceive that cheating is prevalent and tolerated within their academic community. This finding underscores the importance of social norms in influencing individual behavior, as outlined by Social Cognitive Theory.

Moreover, Chavez[29] explores the impact of teacher and supervisor traits on student behavior. The study suggests that students are more likely to adopt ethical behavior if they perceive their instructors as positive role models who demonstrate honesty and integrity. This aligns with Social Cognitive Theory's notion that individuals learn by observing and imitating role models, particularly those they perceive as credible or influential.

Generative AI has many functions in society, including investigating how it can enhance the teaching and learning process in universities[30]. Lancaster[31] pointed out the danger of utilizing these platforms, as it raises questions about the authenticity of students' work—whether the output is AI-generated or human-created. Furthermore, students who use AI to achieve better academic ratings often face negative consequences, such as insecurities in their future workplaces[32].

3. Research objectives

This study explores how academic integrity and Generative AI are perceived by science and mathematics students in higher education. It seeks to understand how respondents define academic integrity and how utilizing Generative AI affects their studies. The main objective of this study is:

Determine the stance of science and mathematics students in higher education on Generative Artificial Intelligence's (GAI) effects on academic integrity.

4. Methods

4.1. Research design

This study utilizes exploratory research to determine the stance of science and mathematics students on the effects of GAI on academic integrity. Exploratory research involves a divergent approach to collecting information, wherein subjects or respondents are free to express their thoughts naturally. This method allows for the gathering of data that can be analyzed by forming themes, providing a deeper understanding of the responses[20,33-35].

The study aims to determine if the respondents are affirmative or disagree with the idea of utilizing Generative AI in universities and its potential impact on academic integrity. The findings will help determine the best approach to use the platform, particularly in educational institutions, considering that the data collected from this investigation focuses on the core of the teaching and learning process: the students.

4.2. Participants

The participants in this study comprised 24 science and mathematics students in higher education who utilize Generative AI. This sample size was selected to achieve data saturation, ensuring comprehensive insights into participants' perspectives without seeking statistical generalizability. Qualitative in nature, the study prioritized depth of understanding over breadth of sampling, aiming to capture nuanced views on how Generative AI influences academic integrity within targeted academic disciplines. Purposive and convenience sampling techniques were employed to select students from diverse educational backgrounds, maximizing the acquisition of varied viewpoints essential to understanding the role of Generative AI in academic integrity[36-38]. These techniques ensured that the study gathered sufficient data to determine the respondents' viewpoints on Generative AI's effect on their academic integrity. The sample size of 24 was deemed adequate for achieving data saturation, where no new themes or insights were emerging from additional interviews, thus justifying the depth and reliability of the findings.

The participants in this study comprised of 24 science and mathematics students engaged in studying scientific disciplines such as biology, chemistry, physics, earth sciences, and mathematics, including subjects like algebra, calculus, and statistics in higher education who utilizes Generative AI. In selecting the given respondents, the study employed purposive sampling and convenience sampling techniques. Purposive sampling techniques was used to select students from different educational institutions with diverse backgrounds[36,37]. Additionally, convenience sampling technique was also used to determine respondents that are convenient to locate[38]. These techniques maximize the needed data to acquire from the participants

in determining their viewpoints of Generative AI that can affect their academic integrity. This will also reveal substantial information that will contribute to better understanding of the role of Generative AI and its effect on the academic integrity of students.

4.3. Instruments

The instrument utilized in this study consists of open-ended questions that allow respondents to provide their stance and elaborate on the reasons behind their position. These reasons can be based on personal experiences or other factors influencing their decisions. This instrument aligns with the exploratory research design, as it delves into human thoughts on a specific concept that is relevant and applicable to the daily lives of students.

4.4. Research procedure

The respondents were initially contacted via internet platforms such as their email addresses. They were provided with an overview of the study, including its objectives and their significant contribution to the development of knowledge on the concepts explored in this investigation. Security measures were emphasized, highlighting their privacy and seeking their consent to participate in the study. Interviews were scheduled at times convenient for the respondents and conducted in private areas to ensure a favorable communication environment.

In the actual interviews, open-ended questions served as the foundation for data collection. To ensure accurate data acquisition from each respondent, the researcher used audio recording with the respondents' permission. After the interviews, the audio recordings were transcribed verbatim, capturing each piece of information to determine consolidated answers and form a synthesis. The researchers confirmed the information with the respondents, ensuring accuracy and transparency throughout the interview process.

4.5. Data analysis

This study employed thematic analysis to examine qualitative data gathered from interviews with 24 science and mathematics students regarding Generative AI's influence on academic integrity. Thematic analysis involves a systematic way of grouping responses, organizing them into categories, and forming themes. This method is commonly used in qualitative research to enrich the data gathered and provide a deeper understanding of the concept from various perspectives. The process began with the verbatim transcription of audio-recorded interviews, followed by systematic coding to identify recurring themes and patterns in the participants' responses. Themes were developed through consensus among researchers, supported by excerpts from participant interviews to illustrate key findings. Rigorous validation measures, including independent coding by multiple researchers and consensus discussions, ensured the reliability and trustworthiness of the analysis.

In analyzing the data, thematic analysis was used as it involves a systematic way of grouping responses, organizing them according to category, and forming themes. This is one of the common methods used in the field to enrich the data gathered and better understand the concept from other perspectives.

The method was initially conducted through a coding process, which refers to the selection of transcribed data and further analysis to determine if the responses were aligned with the questions asked of the respondents. The selection was identified into codes, which involve a set of words organized according to what they represent or to which category they belong. After that, codes were formed into themes, representing the overall idea of the responses.

The created themes were still in the process of analysis as they were reviewed and refined to ensure alignment and appropriateness with the questions asked of the respondents.

Once the final themes are formed, a detailed explanation will be provided, highlighting excerpts from the actual responses to support the statements. This will enrich the data collected by providing an organized and substantial outcome from the selected respondents.

5. Results

Question 1. Do you use generative AI in your science-oriented subjects? Enumerate and explain each purpose in using generative AI.

All twenty-four participants agreed that AI usage in science-oriented subjects revealed its application for multiple purposes. Primarily, respondents use AI to gather information and develop perspectives that aid in understanding unfamiliar tasks. Generative AI significantly enhances research and data analysis by processing large datasets, identifying patterns, and generating hypotheses. It plays a crucial role in creating complex simulations and models, such as climate models and molecular dynamics simulations, which help predict experimental outcomes. Additionally, AI automates repetitive tasks like data entry and basic calculations, thereby freeing up time for more complex analyses. In the educational sphere, AI is utilized to develop interactive learning modules and virtual labs, providing a deeper understanding of intricate scientific concepts. Furthermore, generative AI assists in idea generation, problem-solving, and offering step-by-step solutions for complex scientific problems. It also identifies relevant literature, summarizes articles, and highlights key points, streamlining the research process and ensuring comprehensive topic coverage. These applications collectively enhance understanding, improve efficiency, and foster innovation in scientific research and education.

> "Yes, but just to gather information, a perspective that will give me the knowledge of how to do things that I do not know."

> "Generative AI is widely used in science-oriented subjects for multiple purposes. It enhances research and data analysis by processing large datasets, identifying patterns, and generating hypotheses. "

Question 2. What do you understand about academic integrity? Explain your thoughts about this.

Participants generally described academic integrity as the adherence to honesty, originality, and ethical behavior in academic activities. They emphasized that it involves producing one's own work, correctly citing sources, and avoiding plagiarism to uphold the credibility of academic institutions and ensure the validity of student achievements. Ten (10) respondents articulated that academic integrity means valuing the learning process, being truthful about one's abilities, and respecting others' intellectual contributions. In addition, six (6) other respondents echoed the importance of moral behavior and original work, highlighting that academic integrity involves commitment to honest and ethical practices.

> "Academic Integrity is about being honest to yourself, as a student, doing things that are based on what you learned, and to practice being fair, honest to yourself, to others because in the field of work that is some of the things that you need."

> "For me, academic integrity means valuing the learning process, being truthful about my own abilities, and respecting the intellectual contributions of others."

> "Academic integrity is the commitment to and demonstration of honest and moral behavior in an academic setting."

Furthermore, additional eight (8) participants also supported these core principles, underscoring the significance of personal growth and the credibility of the educational system. It involves maintaining honesty and fairness in academic work by producing original research and assignments, acknowledging the contributions and ideas of others through proper citations, and avoiding cheating or plagiarism. Upholding academic integrity is essential for fostering a culture of trust and respect among students, educators, and researchers.

> "To uphold academic integrity, one must produce original work and avoid any form of dishonesty in their research and assignments."

Question 3. Should students taking science-based courses be allowed to use generative AI? Enumerate and explain each reason.

The majority of participants, eleven out of twenty-four, supported the use of generative AI in science-based courses, citing several benefits. They noted that AI can enhance learning by providing personalized tutoring and tailored explanations, improve efficiency in tasks such as data analysis, and foster the development of skills relevant to AI technologies.

> "Yes… Generative AI enhances learning by providing additional resources and explanations that deepen students' understanding of complex concepts."

> "Yes…It enhances learning by providing personalized explanations and resources, improves efficiency in data analysis and problem-solving."

Conversely, thirteen (13) respondents expressed concerns about the use of AI. They stated that students might become overly reliant on AI, potentially bypassing genuine learning experiences. The skepticism reflects worries that AI might undermine educational efforts if not used responsibly.

> "AI is undoubtedly affecting the Academic Integrity of Students, where students used AI to their school work and learned nothing at all, and that is unfortunate to happen."

Question 4. What is your stand on the issue that generative AI can affect academic integrity of students? Explain your stand based on your experience.

The impact of generative AI on academic integrity presents a nuanced situation. While AI can support academic integrity by detecting plagiarism and encouraging proper citation practices, it also poses risks if misused. There is concern that students might overly rely on AI-generated content, potentially bypassing genuine learning efforts. The emphasis should not be on solely blaming AI, as it is a human-made tool that requires responsible use. Instead, the focus should be on raising awareness and taking action to mitigate negative impacts. This involves promoting responsible and transparent AI usage, coupled with comprehensive education on its ethical implications. It is crucial for educational institutions to establish clear guidelines for AI usage, emphasize the importance of original work, and integrate AI literacy into the curriculum to ensure that academic integrity is upheld while harnessing the benefits of generative AI for learning and research.

Emerging themes of the generative AI can affect academic integrity in the student in terms of the following:

Theme 1: Integrity

Fourteen (14) individuals expressed the complex impact of generative AI on academic integrity, highlighting its potential to both bolster and undermine ethical practices in education. While AI can facilitate integrity by detecting plagiarism and promoting originality through proper citation, its misuse risks students' dependency on AI-generated content, hindering genuine learning experiences. The narrative underscores the importance of responsible AI use, coupled with comprehensive education on its ethical implications, to mitigate these risks and uphold academic integrity. Ultimately, it advocates for collective action to raise awareness and promote conscientious AI utilization to safeguard the integrity of the educational process.

> "AI is undoubtedly affecting the Academic Integrity of Students, where students used AI to their school work and learned nothing at all, and that is unfortunate to happen."

> "The impact of generative AI on academic integrity is complex. On one hand, AI can support integrity by detecting plagiarism and ensuring proper citation, thereby promoting originality and ethical practices."

Theme 2: Responsibility

The perspective shared by three (3) participants underscores the dual nature of generative AI's influence on academic integrity. On one hand, AI emerges as a valuable educational asset, aiding students in grasping intricate concepts and navigating complex problem-solving scenarios. However, this positive aspect must be tempered with a sense of responsibility, ensuring that AI's potential benefits are harnessed ethically and transparently. Thus, while celebrating AI's capacity to enhance learning outcomes, it becomes essential to promote its conscientious utilization, thereby upholding the integrity of academic endeavors.

> "My stand on the issue is that generative AI can have both positive and negative impacts on academic integrity. On the positive side, AI serves as an educational tool that can assist students in understanding complex concepts and solving problems."

Theme 3: Education

The viewpoint shared by eighteen (18) participants highlights that the influence of generative AI on academic integrity is profound, exhibiting both positive and negative ramifications. Through my experiences, they have discerned that with meticulous guidance and ethical application, AI emerges as a formidable ally, enriching learning experiences and furnishing invaluable educational support. However, the absence of adequate oversight can precipitate detrimental outcomes, fostering reliance on AI and compromising academic integrity. Hence, educational institutions must proactively establish lucid protocols governing the ethical utilization of AI, while concurrently instilling the imperative of originality in scholarly pursuits and integrating AI literacy into educational curricula. By adhering to these principles, generative AI can evolve into a potent catalyst for fostering profound comprehension and fostering innovation within educational environments.

> "Generative AI can indeed affect academic integrity both positively and negatively. My experience indicates that with proper guidance and ethical use, AI can enhance learning and provide valuable educational support."

> "My experience shows that AI can enhance education when used responsibly, promoting deeper understanding and innovation."

Question 5. Do you think generative AI and academic Integrity co-exist? Justify your stand based on your experience.

Seventeen (17) individuals affirmed that generative AI and academic integrity can co-exist, provided that its use is governed by clear ethical guidelines and responsible practices. They highlighted that AI has the potential to enhance learning and research by offering innovative solutions and insights. Participants emphasized the importance of establishing transparent guidelines for AI use, which would help maintain academic integrity while allowing students to benefit from AI's capabilities. They advocated for promoting AI as a supplementary tool that supports rather than substitutes genuine effort and learning.

> "Yes, generative AI and academic integrity can co-exist. Based on my experience, the coexistence hinges on clear ethical guidelines and robust educational frameworks."

> "Yes, I believe that generative AI and academic integrity can not only co-exist but also complement each other to enhance the educational experience."

However, seven (7) participants expressed skepticism about the ability of AI and academic integrity to co-exist seamlessly. They voice concerns about the potential misuse of AI and the need for stronger oversight.

> "AI is a tool that somehow the students abuse and not use it in a proper way."

> "My stand on the issue is that generative AI can have both positive and negative impacts on academic integrity. On the positive side, AI serves as an educational tool that can assist students in understanding complex concepts and solving problems."

Question 6. Are there aspects of generative AI that can strengthen academic integrity? Explain how.

Twenty-one (21) respondents stated that the essence of Academic Integrity transcends the capabilities of AI. It rests upon the conscious actions of individual students. However, generative AI serves as a valuable aid in guiding students towards ethical conduct and scholarly excellence. By incorporating various features, AI can reinforce academic integrity in multifaceted ways. Firstly, it can detect plagiarism, ensuring that students submit original work and adhere to ethical standards. Additionally, AI tools assist students in managing references accurately, mitigating the risk of unintentional plagiarism. Moreover, AI provides tutorials on proper research practices and ethical standards, fostering a culture of integrity within academic settings. Through personalized feedback and time management assistance, AI aids students in genuine learning and reduces the temptation to engage in dishonest practices. Thus, generative AI emerges as a potent ally in promoting and upholding academic integrity, complimenting students' conscientious efforts towards ethical scholarship.

> "Yes, generative AI can strengthen academic integrity. It can detect plagiarism, ensure originality in student work, and verify sources and citations, promoting accurate and honest research."

> "To be able to have Academic Integrity is not bided by the AI, but it is a conscious action of every student and AI has been a helping tool to the students in a way where they can know and do what is right and what is not."

> "Generative AI can play a significant role in promoting and upholding academic integrity."

Question 7. Are there features of AI that can be improve for it to co-exist better with academic integrity. Explain which features do you want to suggest or improve.

Academic Integrity serves as the cornerstone of every student's journey, guiding them to fairness, honesty, and responsibility in their academic endeavors. While AI offers valuable resources and perspectives, it should not dictate students' conduct. To align AI with academic integrity, improvements can be made. AI tools must transparently indicate their contributions, focusing on aiding learning rather than task completion. Enhancing AI's ability to detect plagiarism and promoting original thinking are vital steps. Educational institutions should implement policies and curriculum components to educate students on ethical AI usage. By prioritizing responsible AI integration, academic integrity can be upheld effectively.

Theme 1: Honesty

The viewpoint shared by ten (10) participants highlights the relationship between academic integrity and the integration of AI in education. It emphasizes the enduring importance of integrity as the bedrock of student conduct, advocating for fairness, honesty, and responsibility in academic pursuits. While AI offers invaluable resources and perspectives, it should supplement traditional learning methods rather than replace them entirely. To align AI with academic integrity, the analysis suggests enhancing transparency in AI-generated contributions and prioritizing educational customization for deeper comprehension. By upholding these principles, educational institutions can leverage AI to enrich learning experiences while safeguarding the integrity of academic pursuits.

> "The features of AI in academics are to give the students the information, some learning materials, and a different perspective, but it will never be their basis of how they will be in their schools."

> "AI tools should be designed to provide transparency about their contributions, making it clear what part of the work was generated by AI."

Theme 2: Responsibility

The perspective shared by six (6) participants underscores that academic integrity serves as the cornerstone of every student's journey, guiding them to fairness, honesty, and responsibility in their academic endeavors. While AI offers valuable resources and perspectives, it should not dictate students' conduct. To align AI with academic integrity, improvements can be made. AI tools must transparently indicate their contributions, focusing on aiding learning rather than task completion. Enhancing AI's ability to detect plagiarism and promoting original thinking are vital steps. Educational institutions should implement policies and curriculum components to educate students on ethical AI usage. By prioritizing responsible AI integration, academic integrity can be upheld effectively.

> "AI can be more effectively integrated into the educational system in a way that supports and enhances academic integrity by improving several features."

Theme 3: Transparency

Nineteen (19) individuals answered that institutions must prioritize policies that advocate for ethical AI utilization and integrate comprehensive AI education into their curricula. This ensures that students possess the necessary understanding to wield these tools responsibly. To harmonize AI with academic integrity, enhancements in AI technology are imperative. This includes bolstering ethical usage monitoring mechanisms to identify and mitigate potential misuse, as well as enhancing transparency in algorithms to foster trust among stakeholders. Additionally, integrating educational modules on ethical AI usage equips students with the knowledge and awareness required for responsible and honest application of AI in academic settings, thus fostering a conducive environment for academic integrity to thrive.

> "Institutions should focus on policies promoting ethical AI use and incorporate AI education into their curricula to ensure students understand how to use these tools responsibly."
>
> "To better co-exist with academic integrity, AI could improve by enhancing ethical usage monitoring to flag potential misuse, increasing transparency in algorithms to build trust, and integrating educational modules on ethical AI use for students."

6. Discussion

The unprecedented changes in society brought about by technology have significantly influenced various domains, including education and research. Technology has facilitated the interdependence of global systems, expedited processes, and transformed our way of life in recent years. While these advancements offer numerous benefits, they also pose risks when not managed appropriately. One of the primary concerns is how technology, particularly generative AI, can impact personal attributes and intrinsic values, such as academic integrity.

In this study, all science and mathematics students revealed that they are utilizing Generative AI for multiple purposes. One student stated that they use it mainly to gather information, especially about concepts with which they are not familiar. According to Duhaylungsod and Chavez[20], AI can assist students in conceptualizing their ideas and incorporating fresh perspectives, thereby enriching their innovative and creative endeavors. Given that Generative AI is a special form of technology that can reproduce data in various digital forms, such as text and images, it is useful for students discovering information with the help of this platform[3-5]. Another student noted, "Generative AI is widely used in science-oriented subjects for multiple purposes. It enhances research and data analysis by processing large datasets, identifying patterns, and generating hypotheses." AI is efficiently used in science as it facilitates the seamless generation of large datasets, yielding results with less user effort.

Along with the utilization of Generative AI, most students provided their interpretations of academic integrity, which they believe coexists with AI. One student defined academic integrity as, "...being honest with yourself as a student, doing things based on what you learned, and practicing fairness and honesty with yourself and others, as these are crucial in the field of work." These attributes encompass the values a person should possess to adhere to the principle of integrity. This core principle coexists with Generative AI, as one student stated, "Generative AI and academic integrity can not only coexist but also complement each other to enhance the educational experience." To balance the two concepts, students revealed that honesty, responsibility, and transparency are necessary.

Finally, students indicated that Generative AI's effect on academic integrity can have both positive and negative impacts. On the positive side, one student stated, "AI can support integrity by detecting plagiarism and ensuring proper citation, thereby promoting originality and ethical practices." AI has become a tool for publishing educational research with authenticity and credibility, improving learning[10]. On the negative side, one student noted, "AI is undoubtedly affecting the academic integrity of students, where students use AI for their schoolwork and learn nothing at all, which is unfortunate." In some cases, AI is misused by students, who depend solely on the technology without learning the concepts themselves. Additionally, copying information from digital sources without proper citation can be classified as plagiarism[24]. (Roman, 2018).

7. Conclusion

The results of the study revealed that Generative AI's effects on academic integrity have benefits and risks in terms of utilization in the scientific field and research. The concept has two sides to consider, leading to no single stance among students and other stakeholders in higher education.

The benefits and risks brought by AI, affecting moral values, consist of complex details that can be argued depending on individual perceptions drawn from personal experiences. This calls for careful deliberation and consideration in terms of proper AI usage by the users themselves. Moreover, there is a need for heightened awareness about how AI influences lives and the responsibility to avoid potential dangers posed by the platforms.

This study provides an in-depth understanding of forms of Artificial Intelligence in the Fourth Industrial Revolution, where imitation of human thinking and functioning is evident and can be used for easier functions but may cause destruction if not carefully used. Along with AI comes the concept of academic integrity, which this study seeks to connect and explore its mutual impact. AI and academic integrity are interlinked, each with positive and negative effects.

The study specifically targeted students in science and mathematics, which might limit the applicability of the findings to students in other fields of the study. Different disciplines may interact with GAI in unique ways that were not captured in this study. Further research is needed to explore the impact of GAI on academic integrity across different disciplines and educational contexts. Further studies should consider larger and more diverse samples, employ mixed-method approaches, and investigate the long-term effects of GAI on learning outcomes and ethical behavior.

Conflict of interest

The authors declare no conflict of interest.

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