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Exploring the impact of AI threats on originality and critical thinking in academic writing

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Abstract: This research aims to provide an in-depth understanding of the impact of AI in academic writing on critical thinking ability, originality of scientific work, intellectual integrity in academia, and AI dependency leading to no improvement in individual thinking ability. Using a qualitative research design focusing on case studies and employing semi-structured interviews, seven undergraduate students in Indonesia were purposively selected to be sampled. The research findings revealed First, AI can threaten the development of individual critical thinking ability, as dependency on this technology reduces active engagement in the process of thinking and reflection, and inhibits creativity. Second, AI has the potential to reduce the originality of academic work, trigger plagiarism, and reduce the analytical quality and creativity of writers. Third, AI can undermine intellectual integrity in academic settings by leading to violations of ethical codes. Fourth, reliance on AI inhibits the improvement of individual thinking skills, as cognitive processes that should be done independently are reduced. Future research could consider more objective measures such as observation or psychometric tests, and investigate more intensive threats in the use of AI in the academic writing environment.

Keywords: *AI in academic writing, Critical thinking, Effect of AI dependency, Originality.*

1. Introduction

The era of artificial intelligence (AI) has brought great changes in various aspects of human life, including in the world of education and academic research (Kamalov et al., 2023). AI technology offers convenience and efficiency in solving complex tasks, one of which is text writing and analysis (Alam, 2022). In the academic context, AI-based tools such as ChatGPT are capable of automatically generating texts, assisting writers in structuring arguments, and simplifying complex concepts. However, these advancements also pose new challenges, especially concerning critical thinking skills, originality of scientific work, and intellectual integrity. Critical thinking is a very important skill in academia. It involves in-depth analysis, evaluation of evidence, and thoughtful reflection to generate new ideas. However, with the advent of AI technology, there are concerns that this critical thinking ability could be eroded (Nguyen et al., 2023). AI's ability to process information quickly and generate text with certain patterns often tempts users to accept the results without further reflection or evaluation. This potentially reduces the individual's role in deep intellectual processes, which should be at the core of academic writing (Marzuki et al., 2023).

In addition to critical thinking, another challenge that arises is the threat to the originality of scientific work. In academic research, originality is a key cornerstone that determines the quality and contribution of a work to existing knowledge. However, AI often produces texts by reworking existing information without actually creating new ideas (Kasneci et al., 2023). The resulting text may appear original, but in reality, it is often just a re-combination of already available information. As a result, there is a risk that scientific work produced with the help of AI loses its essence as a product of innovative human thought. Intellectual integrity is also an important issue in the use of AI in academia.

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When someone uses the results of an AI tool such as ChatGPT without giving clear attribution, it can be considered plagiarism. In many cases, users do not realize that the AI-generated text may be very similar to other sources, thus potentially violating the principles of academic ethics. These violations are not only detrimental to the individual, but can also undermine confidence in the integrity of the academic community as a whole.

Furthermore, reliance on AI can create distance between the author and the intellectual process that should occur during academic writing. AI-involved writing tends to reduce direct interaction between writers and the material they are covering (Kooli, 2023). As a result, writers may lose the opportunity to develop analytical skills and a deep understanding of the topic being written about. This affects not only the quality of the work produced but also the intellectual development of the writers themselves (Bundhwar et al., 2023). On the other hand, the use of AI in academic writing also raises questions about copyright and contribution recognition. In cases where a large portion of the text is generated by AI, it is difficult to determine the extent of the human author's role in creating the work. This ambiguity can fuel debates about who should be recognized as the "author" in the context of the use of this technology. This is an important issue, given that intellectual recognition is one of the key principles in academia.

Not only that, but the arrival of AI technologies like ChatGPT can also create an access gap in the academic world. Students and researchers in developing countries or institutions with limited resources may not have the same access to these tools as their counterparts in developed countries. This inequality can exacerbate disparities in the production and publication of scholarly work, thus creating new challenges in achieving global equity in academia. However, there is no denying that AI has great potential to assist in the academic process if used wisely (Grassini, 2023). It can speed up the writing process, inspire new ideas, and simplify administrative tasks. However, these benefits can only be achieved if users have a deep understanding of how AI technology works and its limitations. The use of AI must be based on a strong ethical awareness so as not to violate established academic principles.

In this context, it is important to highlight the role of education in helping individuals develop critical thinking skills in the AI era (Hwang & Chien, 2022). Educational institutions should ensure that students and researchers not only rely on technology but are also able to evaluate and utilize AI-generated results responsibly. In this way, AI can serve as a support tool rather than a substitute for human intellectual processes. This paper will explore the dangers of using AI impact on critical thinking ability, originality of scientific work, and intellectual integrity in the academic world and how AI dependency leads to no improvement in individual thinking ability. By understanding these challenges, it is hoped that the academic community can develop a wiser and more responsible approach to utilizing AI technology.

2. Literature Review

2.1. Conceptualization of Critical Thinking

Various studies (such as by Abrami et al., 2015; Alsaleh, 2020; Bezanilla et al., 2019; Slavin et al. al., 2021) have attempted to define and break down the elements that make up critical thinking, often resulting in diverse and profound views. For example, Abrami et al. (2015) in their meta-analysis argue that critical thinking is not a single skill, but rather a spectrum of abilities that include evaluation, analysis, synthesis, and problem-solving. This view is in line with the research of Bezanilla et al. (2019), who investigated how critical thinking skills can be developed through various educational approaches. Evaluation of evidence, and drawing rational conclusions. A deeper perspective reveals that critical thinking is essentially related to efforts to understand established norms and accepted wisdom. This view is further strengthened by Alsaleh (2020), who considers the pedagogical approach of action to analyze the status quo not only as a by-product but as an integral component of critical thinking. This second view is united in the understanding that skepticism, rigor, and the ability to ask proactive questions are essential to the development of knowledge and understanding. Emphasizes analysis and methodological rigor, but also recognizes the importance of questions as a fundamental element of critical thinking.

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2.2. Dangers of Artificial Intelligence on Thinking Patterns

Artificial Intelligence (AI) is now increasingly considered a very effective tool, but it also has the potential to be a threat if used excessively. On the one hand, AI provides significant benefits in supporting the improvement of critical thinking skills, especially in the context of education. One of the main applications of AI is in academic research, where this technology, through sophisticated algorithms, can understand and manipulate human language, making it possible to conduct broader and deeper literature reviews. AI can identify key themes, emerging trends, and gaps in existing literature, which can significantly facilitate the process of formulating and refining research questions. With its ability to process and interpret complex language patterns, AI can speed up the entire research process, increase accuracy, and deepen literature analysis, making it a very valuable tool in the academic environment. Raharjana et al. (2021) underline these benefits, but they also warn of the potential dangers that arise if AI is used excessively. This is further reinforced by Duman and Akdemir (2021), who argue that reliance on AI in research can be addictive, as AI automates time-consuming and repetitive tasks, such as literature review and problem identification, which ultimately reduces the researcher's active involvement in the critical thinking process. The long-term impact of this is the development of a more passive and static mindset, leading to a decline in the quality of critical thinking. This view is also echoed by Spector and Ma (2019), who warn that the use of AI in academia must be done with caution, to avoid ethical violations and negative impacts on the quality of thinking. Furthermore, the findings of Heimerl et al. (2022) highlight the limitations and negative impacts of AI related to the phenomenon of "cognitive offloading", which explains that excessive reliance on AI in the research process can lead to a decline in individuals' critical thinking skills, as they rely more on the results provided by AI rather than conducting in-depth analysis independently.

2.3. The Impact of AI on Threats to the Authenticity of Works

Some research studies have collectively revealed a new trend that highlights the threat of the role of Artificial Intelligence (AI) to the authenticity of works. The use of Artificial Intelligence (AI) in academia can pose serious threats to the authenticity of works, especially in the fields of writing and research. One of the main dangers is the potential for increased plagiarism or the creation of works that are not entirely original. Studies by Hapsari and Wu (2022) and Muthmainnah et al. (2022) sometimes with their automatic ability to generate text, they can compose essays, articles, or research reports based on existing data without giving proper attribution to the source. Reaffirmed in a study by Xiao and Zhi (2023), which underlines This creates a risk that the academic work produced may not truly reflect the intellectual effort or creativity of the author, as most of the text may simply be the result of algorithmic processing. The use of AI in writing can also result in the resulting work not containing in-depth critical thinking because AI only combines existing information without the ability to evaluate or add new insights (Bahufite et al., 2023). In this context, AI can produce work that seems generic, reduces the originality and quality of the research produced, and has the potential to damage academic integrity. This is certainly a major problem for educational institutions and the academic world that value authenticity and originality as one of the main pillars in assessing scientific work. In addition, excessive reliance on AI can reduce a person's critical thinking skills and analytical abilities. If researchers or students rely more on AI to construct arguments or find solutions, they may become less actively involved in the research and analysis process. AI can provide quick answers or recommendations but is unable to dig into the depth, context, or impact of the information presented. As a result, the use of AI can lead to the development of passive thinking habits, where individuals accept the results provided by the machine without further questioning or criticizing. In addition, AI cannot always capture the nuances or complexities involved in topics that require deep understanding or creative thinking.

2.4. Theoretical Framework

This proposed framework, based on the work of Abrami et al. (2015) and Bezanilla et al. (2019), conceptualizes critical thinking as a multidimensional set of skills that incorporates various cognitive abilities such as analysis, understanding context, and evaluating evidence. In line with contemporary educational theory, this view expands our understanding of critical thinking beyond the traditional

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definition. Recognizing the increasingly important role of technology in education and the potential threat of artificial intelligence (AI), this framework also acknowledges the role of AI and digital tools in addressing these challenges. Drawing on research by Raharjana et al. (2021) and Duman and Akdemir (2021), this framework explores the use of AI in the context of literature review, experimental design, and data analysis, particularly with students learning English as a foreign language (EFL). However, it also considers the challenges that arise in the intellectual integration of AI in education. In response to the concerns expressed by Janssen et al. (2020) and Sasahara et al. (2019), we call for a balanced approach to the use of AI, ensuring that these technologies do not replace the assessment and analysis roles that should be performed by humans.

3. Research Method

3.1. Research Design

To answer the research questions, a qualitative research paradigm was applied, focusing on a case study framework. This method, which often involves interviews and observations, allows the researcher to identify important variables that emerge during its flexible design (Yin, 2009). By applying this framework, we gained detailed insights into students' attitudes towards AI threats to the dangers of originality of work and intellectual integrity in academia. This method also allowed us to ascertain participants' views on the potential impact of AI in academic writing.

3.2. Research Participants

This research aims to gather a rich range of perspectives from EFL students who are enrolled in an academic writing course at a university in Indonesia. The main focus of the study was to explore critical thinking in an academic context, as well as their views on the potential threats posed by AI to the authenticity of work and intellectual integrity in academia. The selection of participants was done strategically, taking into account their direct experience of using AI tools in academic settings, their level of accessibility, as well as their willingness to participate in the study. A total of seven people were selected as participants, and each interview participant was identified using initial codes A1 to A7 to maintain their confidentiality and anonymity. All participants had at least one year of experience in actively using various AI tools in an academic context. To ensure compliance with research ethical standards, each potential participant was provided with a consent form that had to be read, understood, and signed before participation. This careful recruitment process was undertaken to uphold the ethical principles of research while ensuring that the study included a diverse range of experiences and perspectives relevant to the topic under study.

3.3. Instrument

In this study, semi-structured interviews were used as the main instrument to collect in-depth and nuanced data. Based on a review of credible literature, including the works of Muthmainnah et al. (2022), Nguyen et al. (2023), Ray (2023), and Spector and Ma (2019), the interview was carefully designed to include a series of open-ended questions. These questions were structured with the strategic aim of eliciting substantial and thorough responses, which allowed us to explore deeper perspectives on the topic. The semi-structured format provided the flexibility to ask follow-up questions based on the answers provided by the participants, allowing for a more in-depth exploration of relevant issues. Before the interviews, participants were briefed on the purpose of the study, and informed consent was obtained to ensure that the research procedures complied with applicable ethical standards. The use of semi-structured interviews was well suited to the qualitative approach in this study, as it allowed for the collection of rich and layered data from EFL students enrolled in an undergraduate academic writing course at one of the universities in Indonesia. Specifically, the interviews focused on several key areas, such as the participants' understanding of the threats posed by AI to the authenticity of their work and intellectual integrity.

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3.4. Data Collection Procedure

After carefully designing the interview protocol, the main focus of this study fell into three main areas students' conceptual understanding of critical thinking, their views on the threat of originality, and the impact of AI on their intellectual integration. In conducting the interviews, the researcher organized the entire process by coordinating the participation of each participant. The interview schedule was arranged by considering the convenience and time availability of each participant. Before the interviews began, participants were given a detailed briefing on the purpose of the study, the interview procedures to be followed, and the steps we took to maintain data confidentiality and protect their personal information. By transparently providing information, we ensured informed consent and emphasized participants' ethical rights, including the right to withdraw from the study at any time without any consequences.

The interviews were designed to systematically explore each aspect of the research question, creating an atmosphere that supported open and honest discussion. The interview process began with a series of open-ended questions focused on EFL students' perceptions of critical thinking and how they see the threat that AI might pose in the context of an academic writing class. This approach was important to explore their views that were not influenced by standard ideas or definitions and allowed us to gain a deeper understanding of their perspectives on critical thinking in their academic journey. During the interviews, we also explored how they saw the impact of AI on their critical thinking skills, the originality of their work, and intellectual integrity. This segment provided valuable information regarding the perceived impact of using AI in education. All interviews were recorded with permission from participants to ensure accuracy, and additional notes were taken to document key points as well as direct observations. Once the interviews were completed, careful transcription of the conversations was done to ensure the accuracy of the data, which would be used for further analysis. All interview materials were stored securely, maintaining the confidentiality of the data and ensuring efficient management for the upcoming analysis and reporting process.

3.5. Data Analysis

In this research, we applied a thematic case study approach to analyze the qualitative data, following the procedure described by Braun and Clarke (2006). This method involves five systematic stages to identify recurring patterns and relationships among themes emerging from the data, which in turn support the achievement of our research objectives. The first stage involved a process of deepening the data through repeated readings of the interview transcripts, intending to gain a deeper understanding of the participant's responses. The next step was initial coding, where we categorized terms and phrases that were relevant to our research objectives. After careful analysis, these initial codes were then organized into broader categories, which allowed us to identify emerging relationships and patterns between the categories. This process provided a clear structure to our analysis, making it easier for us to answer our research questions.

4. Findings

The research findings are organized into three main sets: first, the concept of critical thinking in the era of AI. Second, the dangers of originality of work, and the dangers of AI to intellectual integrity in academia.

4.1. AI Threats to Critical Thinking in Academic Writing Environments

Following the findings, the interview results showed that the participants expressed various views on critical thinking regarding the threat of AI in the academic writing environment. A1 and A5, for example, emphasized the serious threat of excessive AI in the academic environment that needs to be considered. A1 interpreted that the threat of artificial intelligence (AI) to students' critical thinking skills in academic writing is increasingly felt along with the development of AI tools that facilitate the writing process. With the convenience offered, such as automatic plagiarism checkers, students may rely more on this technology to produce written work without doing in-depth thinking or research that supports their arguments and the real impact is that awareness of critical thinking is very low due to the

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impact of AI addiction. In the same view, A5 views critically that excessive use of AI can cause students to become less trained in analyzing problems critically and developing and formulating strong arguments. Therefore, although AI can be a useful tool, excessive dependence can hinder the development of students' critical thinking skills in academic writing. The following are excerpts from the responses of interviewees with the initials A1 and A5:

A1: *"In my opinion, the main danger of using AI in an academic context is the potential for reducing students' critical thinking skills. When students rely too much on AI tools to compose essays or search for information, they may lose the opportunity to engage in deep thinking processes. For example, if they use AI tools to write or summarize material, they tend to skip important stages in academic writing such as analyzing various sources, critiquing existing arguments, or even formulating their ideas..."*

A5: *"When AI is used to generate ideas or even write essays, students may be tempted to rely on ready-made results without thinking about the process involved in finding answers or compiling arguments. This can make them accustomed to accepting information without criticizing or questioning its sources. In my opinion, this is a real obstacle in reducing their critical thinking..."*

From these results, it can be concluded that the serious threat of AI in the academic environment affects the critical thinking process of each individual. This is because of the individual's dependence on the features presented by AI so the individual's critical spirit only refers to AI without thinking deeply.

4.2. Impact of AI on Authenticity in Academic Environments

From the findings in the field, A2, A4, and A7 have the same view on the phenomenon of AI threats to the originality of works. A2 has the view that AI works by analyzing and processing data from various existing sources, and then producing text based on the patterns found. This makes the resulting text often not a new idea, but a recombination of available information. With the same nuance, A4 is of the view that in an academic environment, originality is the main foundation of the quality of scientific work, and excessive use of AI can lead to a decrease in innovation and creativity. Writers who rely on AI may tend to skip the process of exploring ideas and in-depth analysis that should be the core of academic writing. AI can produce text that is very similar to previously published work without providing appropriate attribution. A7 has the same view that the tendency of AI can lead to plagiarism, both intentionally and unintentionally. Writers who use text from AI without proper verification and attribution risk violating academic ethics. Although AI does not directly copy text, the patterns or ideas it produces often have significant similarities to existing works, blurring the line between plagiarism and originality. Excessive use of AI in academic writing can reduce the involvement of writers in the creative process. AI takes over most of the tasks, from constructing arguments to completing complete texts, which can ultimately make writers less actively involved in generating new ideas. This not only impacts the quality of the work produced but also the development of the writer's critical and creative thinking skills, which are important elements in the academic world. The following are excerpts from interviews with the initials A2, A4, and A7:

A2: *"In my opinion, the impact of AI on the originality of work in the academic environment can have positive and negative sides. On the one hand, AI can speed up the writing and research process, help process data more efficiently, and provide initial ideas that can inspire writers. This is certainly useful in increasing academic productivity. However, on the other hand, if AI is used excessively or without proper supervision, there is a risk that the work produced is less original, and can even lead to unintentional plagiarism because AI can produce content that is similar to existing sources."*

A4: *"AI can easily access and compile information from various sources, but it cannot always distinguish between what is truly valid and what is not. This can lead to errors or misinformation hidden in academic work, which ultimately damages its quality and credibility. Therefore, although AI offers convenience, academics need to continue to verify the information generated by AI, and ensure that the work produced still reflects in-depth thinking and research."*

A7: *"I think the impact of AI on the authenticity of academic work can also be seen in the aspects of plagiarism and decreased analytical skills. AI, with its ability to generate text and ideas quickly, has the potential to make it easier for individuals to copy or produce work that is very similar to existing sources without deep understanding."*

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From the results above, it can be concluded that The impact of artificial intelligence (AI) on the authenticity of academic work has a complex impact. On the one hand, if used excessively, AI has the potential to reduce the originality of work, cause plagiarism, and reduce the analytical skills and creativity of writers. Therefore, although AI can be a useful tool, it is important to use it wisely and maintain integrity and originality in academic work.

4.3. The Dangers of AI to Intellectual Integrity in the Academic Writing Environment

Based on the findings, A1, A3, and A6 have the same view regarding the impact of AI on intellectual integrity. Interviewee initial A1 stated that the dangers of AI to intellectual integrity in academic writing environments can appear in several forms. One of them is excessive dependence on AI to generate ideas and writing, which can reduce individual creativity and intellectual contribution. A3 has the same nuance that the use of AI in writing can cause the resulting work to be less original because AI often processes existing data or text, leading to repetition or imitation of previously existing ideas. The impact is that this violates the ethics of writing in academic writing environments. A6 highlighted that AI can be a threat to the creation of teachers and students in academic environments because the convenience provided is an attraction to writing only instantly. Therefore, this can threaten the authenticity and credibility of academic work, as well as damage ethics and integrity in the world of education for both teachers and students. The following is an excerpt from an interview with the initials A1, A3, and A6:

A1: *"The impact of AI on intellectual integrity in academic environments can bring serious challenges. One of the main impacts is the risk of plagiarism, both intentional and unintentional…"*

A3: *"In my opinion, the real impact when AI has become an overused part of the academic writing world is the emergence of a lazy soul to create new ideas, loss of creativity, the emergence of instant happiness. Moreover, this utilization tends to violate the code of ethics in the academic writing world because it creates works with a copy and paste system without knowing the clear source."*

A6: *"So far the negative side of AI on intellectual integrity is very complex, this is due to the instant mindset of individuals who only want to create written works in a few minutes without thinking about the authenticity of the source.."*

From the results above, it can be concluded that the impact of AI on intellectual integrity in the academic environment can pose various serious challenges. This often violates the academic code of ethics, because the work produced is mostly from the copy-paste process without clearly understanding the source. Overall, the unwise use of AI can threaten the originality and intellectual integrity of academic writing.

4.4. AI Dependency Leads to no Improvement in Individual Thinking Ability

Based on the findings in the field, interviewees with the initials A5, A6, and A7 have views on the impact of AI on individual thinking ability. A1 highlighted that excessive dependence on AI can hinder the improvement of individual thinking ability, especially in an academic context. When someone relies too much on AI to generate ideas, solve problems, or even write academic papers, they tend not to be actively involved in the critical and creative thinking process. A6 highlighted that AI is very efficient and able to process existing data and provide solutions based on existing patterns, while the deep human thinking process involves more complex creativity, reasoning, and reflection. As a result, individuals may lose the skills to develop independent thinking, analyze problems in depth, and find innovative solutions. On the same continent, A7 is of the view that in the long term, this can reduce individual intellectual abilities and hinder the development of critical thinking skills that are very much needed in the academic and professional world. Here are excerpts from interviews with interviewees with the initials A5, A6, and A7:

A5: *"In my opinion, excessive dependence on AI can lead to no improvement in individual thinking abilities, because AI often replaces cognitive processes that should be carried out by humans. For example, in writing or problem-solving, if someone relies too much on AI to generate ideas or solutions, they tend not to be directly involved in the critical and creative thinking process. AI can provide quick answers or results, but it*

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does not involve the deep understanding or personal reflection needed to develop more complex thinking skills."

A6: *"In my opinion, over time the use of AI makes the mindset stuck and can make individuals more passive and reduce their ability to think independently, analyze, and find solutions creatively. The thinking process that involves research, experimentation, and in-depth investigation is very important for intellectual development. If you rely too much on AI, the ability to question, formulate arguments, and seek new insights may be hampered, which of course has an impact on the quality of the individual's thinking and innovation itself."*

A7: *"So far, the phenomenon of dependence on AI has become an obstacle to individual creativity because they only rely on AI which is not necessarily clear in its source."*

From the results above, it can be concluded that excessive dependence on AI can hinder the improvement of individual thinking abilities. The use of AI which too often replaces human cognitive processes, such as in writing or problem-solving, can make individuals less involved in critical and creative thinking. Over time, this can lead to stagnant thinking patterns and make individuals more passive, reducing their ability to think independently, analyze, and find innovative solutions.

5. Discussions

The purpose of this study is to explore the threat of AI to critical thinking in academic writing, the dangers of AI to the authenticity of writing works, the dangers of AI to intellectual integrity in the academic writing environment, and how AI dependency leads to no improvement in individual thinking ability. The findings of this study are organized into four main layers: first, exploring the threat of AI to critical thinking in academic writing; second, knowing the danger of AI to the authenticity of writing works; third, knowing the danger of AI to intellectual integrity in academic writing environment; fourth, AI dependency leads to no improvement in individual thinking ability.

In line with the first layer of the finding, the interviewee with initials (A1 & A5) emphasized the threat of AI in critical thinking due to excessive dependency that can hinder the development of student's critical thinking skills in academic writing. This concept is in line with research conducted by Alasadi & Baiz (2023) which states that the impact of AI can make an individual's psyche more passive. In addition, the impact given by AI on individuals can make individual creative abilities become stagnant, as well as no significant changes. The existence of AI technology is strongly recommended to be used wisely, and critically, and to limit dependence.

The second layer of our findings aligns with research showing the Impact of AI on Authenticity in Academic Environments. Participants (A2, A4, & A7) described that AI has the potential to reduce the originality of the work, cause plagiarism, and decrease the analytical ability and creativity of the author. Therefore, while AI can be a useful tool, it is important to use it wisely and maintain integrity and originality in academic work. This is in line with previous research on the widespread application of AI in academic research, a point also noted by (Raharjana et al., (2021).

The third layer of our findings aligns with the research showing the dangers of AI to intellectual integrity in the academic writing environment. Participants with initials (A1, A3, & A6) shared similar views regarding the impact of AI on intellectual integrity. The impact of AI on intellectual integrity in the academic environment can pose serious challenges. It often violates the academic code of ethics, as the work produced is mostly derived from the copy-paste process without clearly understanding the source. Overall, the unwise use of AI can threaten originality and intellectual integrity in academic writing. This is in line with (Baidoo-Anu & Ansah, 2023) who stated that AI in authorship should be utilized wisely to prevent harm to intellectual integrity.

The fourth layer of our findings aligns with research that suggests AI dependency leads to no improvement in individual thinking ability. Participants (A5, A6, & A7) had views on the impact of AI on individual thinking ability. A1 highlighted that over-reliance on AI may hinder the improvement of individual thinking ability, especially in academic contexts. This is in line with Gardner et al. (2021); and Liu et al. (2021) stated that AI is a breakthrough in assisting work in all fields including education and its use must be considered to prevent critical thinking barriers. From the above results, it can be concluded that over-reliance on AI can hinder the improvement of individual thinking skills. The

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overuse of AI in place of human cognitive processes, such as in writing or problem-solving, can make individuals less engaged in critical and creative thinking.

6. Conclusions

This research showed that over-reliance on AI has significant implications for several aspects of academic writing. First, AI can threaten the development of individuals' critical thinking skills, as reliance on this technology reduces active engagement in the process of thinking and reflection, and inhibits creativity. Second, AI has the potential to reduce the originality of academic work, encourage plagiarism, and reduce the analytical quality and creativity of writers. Third, AI can undermine intellectual integrity in the academic environment by leading to violations of ethical codes, especially when work is produced by copy-pasting without a clear understanding of the source. Finally, reliance on AI inhibits the improvement of individual thinking skills by reducing cognitive processes that should be performed independently. Therefore, while AI can be a useful tool, it is important to use it wisely and limit reliance to maintain originality, intellectual integrity, and the development of critical thinking skills in academic writing.

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