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The Dual Impact of AIGC Technology on College Students' Learning Efficiency and Motivation: An Interview-Based Study

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Abstract: *This study explores the dual impact of Artificial Intelligence-Generated Content (AIGC) technology on college students' learning efficiency and motivation. Using a qualitative, interview-based approach, this research collected data from 10 students across various disciplines and academic years to assess both the benefits and challenges of AIGC use in academic contexts. The findings reveal that AIGC tools significantly enhance learning efficiency for most students (90%), primarily by reducing cognitive load and facilitating faster task completion. This efficiency gain allows students to focus more on higher-order cognitive tasks, such as critical analysis and creative problem-solving. However, the impact on learning motivation is mixed. While 60% of participants reported increased motivation due to reduced cognitive effort, 40% expressed concerns about over-reliance on automated outputs potentially undermining critical thinking and deep learning. Additionally, ethical and pedagogical challenges emerged as critical concerns, with 40% of students highlighting risks related to academic integrity and the potential for reduced independent thinking. These findings underscore the need for balanced integration of AIGC technology in educational settings, emphasizing the importance of digital literacy to mitigate the risks of over-dependence. This study contributes to the growing body of literature on educational technology, providing valuable insights for educators, policymakers, and technology developers seeking to optimize the use of AIGC in academic environments.*

Keywords: *AIGC Technology; Learning Efficiency; Learning Motivation; Higher Education; Critical Thinking*

1. Introduction

In recent years, the rapid development of artificial intelligence technologies has transformed numerous aspects of human life, including education. One of the most impactful advancements in this field is Artificial Intelligence-Generated Content (AIGC) technology. This technology, exemplified by platforms like ChatGPT, Deepseek, KIMI, DOUBAO, and Midjourney, has emerged as a powerful tool in academic contexts, offering new ways to generate, organize, and present information. These tools have not only reshaped the way students approach learning tasks but have also influenced their motivation and cognitive processes.

AIGC technology leverages natural language processing (NLP) and machine learning to automate content creation, ranging from generating essays and research papers to supporting programming and data analysis[1]. This capability has become particularly significant in higher education, where students often face tight deadlines and complex assignments. The ability to quickly produce high-quality drafts, refine grammar, and structure academic work has made AIGC an attractive option for students seeking to enhance their learning efficiency.

However, while AIGC technology offers clear advantages in terms of efficiency and productivity, it also raises important questions about its broader impact on students' cognitive skills and intrinsic motivation. For instance, does the ease of automated content generation encourage deeper learning, or does it inadvertently promote surface-level engagement? Can the convenience of automated analysis and text generation hinder critical thinking and creative problem-solving? These concerns are particularly relevant as AIGC tools become more integrated into academic routines, potentially shaping the next generation of learners.

This study aims to explore the dual impact of AIGC technology on college students' learning

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efficiency and motivation through an interview-based approach. By examining students' experiences across different academic disciplines and year levels, this research seeks to provide a comprehensive understanding of both the benefits and challenges associated with AIGC use in higher education. The findings will offer valuable insights for educators, technology developers, and policymakers as they work to optimize the use of these tools in educational settings.

2. Literature Review

2.1 Overview of AIGC Technology in Education

AIGC technology, such as ChatGPT, Deepseek, KIMI, DOUBAO, and Midjourney, utilizes advanced natural language processing (NLP) and machine learning algorithms to automatically generate text, images, and other digital content. These tools have gained popularity in educational contexts due to their ability to streamline tasks like writing essays, generating research summaries, and providing real-time feedback[2]. According to Hattenhauer (2024), these systems can significantly reduce the cognitive load associated with academic writing by providing instant support for grammar correction, idea generation, and content organization[3]. Moreover, AIGC tools have proven particularly useful in disciplines that require extensive writing and data analysis, such as humanities, social sciences, and business studies. For example, Tang (2022) and Liu, Zhang and Biebricher (2024) found that students in these fields often use AIGC tools to draft reports, refine language, and quickly generate initial essay structures[4, 5]. This capability not only enhances productivity but also allows students to focus on higher-order thinking tasks, such as critical analysis and conceptual synthesis [6].

2.2 Related Studies of AIGC Technology on Learning Efficiency and Motivation

Several studies have highlighted the positive impact of AIGC technology on both learning efficiency and motivation. For instance, Zou, et al. (2024) reported that AIGC tools can reduce the time required for writing assignments by up to 50%, allowing students to allocate more time to critical thinking and content analysis[7]. Similarly, studies found that AIGC tools help students overcome writer's block, reduce cognitive fatigue, and improve overall academic performance[8, 9]. These tools can also enhance students' confidence by providing immediate feedback, which can reduce the anxiety associated with complex writing tasks [10].

However, despite these advantages, concerns remain about the potential over-reliance on AIGC tools. For example, Shah and Asad (2024) warned that excessive dependence on automated content generation could undermine students' independent writing skills and critical thinking abilities[11]. This risk is particularly pronounced in technical disciplines, where deep understanding and precise language use are essential [12]. Wang, et al. (2024) also noted that frequent use of AIGC tools might lead to a decline in students' intrinsic motivation, as the tools make complex tasks appear deceptively simple, potentially reducing students' willingness to engage in deep learning[13].

Conversely, some studies have found that AIGC tools can boost motivation by reducing the cognitive effort required for writing and analysis. For instance, Huang, et al. (2024) found that students who used AIGC tools felt more confident in their academic skills, as these tools provided immediate support and reduced the cognitive load associated with challenging assignments[14]. This suggests that the impact of AIGC on motivation may vary depending on the context of use and the specific needs of individual learners.

2.3 Ethical and Pedagogical Considerations

As AIGC technology becomes more widely adopted, ethical concerns have also emerged. Issues such as academic integrity, data privacy, and the potential for reduced cognitive engagement have become central to the debate over AIGC's role in education[15]. For instance, some educators worry that students may become overly dependent on these tools, leading to a decline in original thought and academic honesty[16]. Excessive reliance on AIGC tools can result in a reduction of critical thinking skills, as students may become accustomed to accepting machine-generated responses without sufficient scrutiny[17]. This is particularly concerning in disciplines that emphasize analytical thinking and problem-solving, where independent reasoning is a core component of the learning process[18].

Furthermore, there are concerns regarding the transparency and accountability of AIGC systems. Many AIGC platforms rely on vast datasets that may include biased or inaccurate information,

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potentially leading to the unintentional reinforcement of stereotypes or the spread of misinformation[19]. This highlights the need for more robust data governance and oversight to ensure the ethical use of these technologies in educational contexts.

From a pedagogical perspective, integrating AIGC tools into the curriculum presents both challenges and opportunities. Educators must find ways to incorporate these technologies without compromising the development of critical skills, such as creative problem-solving and independent analysis. According to Su, et al. (2023), one approach is to use AIGC tools as supplementary aids rather than primary sources of information, encouraging students to critically evaluate the outputs they receive[20]. This approach can help balance the efficiency benefits of AIGC with the need for deep learning and cognitive development.

2.4 Research Gap and Innovation

Despite the growing body of literature on the impact of AIGC technology on educational outcomes, several critical gaps remain.

First, while numerous studies have explored the efficiency benefits of AIGC tools in streamlining writing and analytical tasks, there is limited research on the nuanced psychological effects these technologies have on student motivation. Specifically, the long-term impact of relying on automated content generation on students' intrinsic motivation, critical thinking, and self-directed learning remains underexplored. This gap is particularly significant given the potential for AIGC tools to alter the fundamental dynamics of academic engagement and intellectual curiosity.

Second, existing studies often emphasize either the technical efficiency gains or the cognitive drawbacks of AIGC tools but rarely address the complex, dual nature of their impact on learning. This oversight misses the potential for these technologies to simultaneously enhance productivity while challenging traditional cognitive processes, such as critical analysis and creative problem-solving. The current research aims to fill this gap by adopting a holistic, interview-based approach that captures the diverse experiences of students across multiple disciplines, thereby providing a more comprehensive understanding of the psychological and pedagogical implications of AIGC technology.

Furthermore, while ethical concerns about academic integrity and over-reliance on automated tools are frequently cited, there is a lack of empirical evidence on how these challenges manifest in real academic settings. This study seeks to innovate by integrating qualitative insights from students, capturing the personal and often overlooked dimensions of technology use in higher education. This approach not only highlights the practical advantages of AIGC tools but also addresses their potential risks, providing a balanced perspective that can inform future educational technology design and policy development.

3. Methodology

3.1 Research Design

This study adopts a qualitative interview-based approach to explore the dual impact of AIGC technology on college students' learning efficiency and motivation. Given the rapid integration of AIGC tools, such as ChatGPT, Deepseek, KIMI, DOUBAO and Midjourney, into higher education, it is essential to understand their effects on students' academic performance and motivational dynamics. Qualitative methods are particularly suitable for capturing the nuanced perspectives of students, as they allow for a deep exploration of personal experiences and reflections. Semi-structured interviews were chosen as the primary data collection method, as they provide a flexible yet focused framework to guide conversations, ensuring that key themes are addressed while allowing for spontaneous insights from participants. The design of this study focused on capturing a wide range of student experiences by including participants from different academic years and disciplines. This approach was intended to provide a comprehensive understanding of how AIGC technology influences learning efficiency and motivation across various contexts, reflecting the diversity of student experiences in modern higher education.

3.2 Participants

The participants of this study were 10 college students, carefully selected to ensure diversity in

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academic background, gender, and grade level. This purposive sampling approach aimed to include students with varying levels of familiarity with AIGC technology, ensuring a balanced representation of perspectives. Specifically, the sample included: 1) Year 1 (Freshmen): 1 male (Computer Science, 18 years old) and 1 female (Economics, 18 years old); 2) Year 2 (Sophomores): 1 male (Computer Science, 19 years old) and 1 female (English, 19 years old); 3) Year 3 (Juniors): 1 male (Computer Science, 20 years old) and 1 female (Psychology, 20 years old); and 4) Year 4 (Seniors): 1 male (Accounting, 22 years old) and 1 female (Psychology, 23 years old) (see Table 1).

Table 1: Demographic Characteristics of Participants

Participant ID	Gender	Year of Study	Major	Age
P1	Male	Freshman	Computer Science	18
P2	Female	Freshman	Economics	18
P3	Male	Sophomore	Computer Science	19
P4	Female	Sophomore	English	19
P5	Male	Junior	Computer Science	20
P6	Female	Junior	Psychology	20
P7	Male	Senior	Accounting	22
P8	Female	Senior	Psychology	23
P9	Male	Senior	Finance	23
P10	Female	Senior	Law	22

This diverse participant group provided a wide range of perspectives, reflecting differences in academic focus, years of study, and personal goals. Such diversity is critical for understanding how AIGC technologies impact students differently based on their academic maturity and discipline-specific needs.

3.3 Data Collection

Data collection for this study was conducted through semi-structured interviews, which provide a balance between structured inquiry and open-ended exploration. This method allows for the collection of rich, detailed data while maintaining consistency across interviews. Each interview lasted approximately 30-45 minutes and was conducted either in person or online, depending on the participant's availability and preference. The interview guide was organized into four main sections to capture a holistic view of students' experiences with AIGC technologies:

1) Basic Information and Background: This section gathered demographic details, including age, major, and academic year, as well as the participant's prior experience with AIGC tools. This information helped contextualize their responses and identify potential differences in technology impact across disciplines and academic levels.

2) Impact on Learning Efficiency: Questions in this section focused on the perceived effects of AIGC tools on students' time management, task completion speed, and overall academic productivity. Participants were encouraged to share specific examples of how these technologies had helped or hindered their academic work.

3) Impact on Learning Motivation: This section explored whether the use of AIGC tools positively or negatively influenced students' intrinsic motivation, curiosity, and long-term commitment to learning. It also addressed potential changes in self-confidence and attitudes toward independent study.

4) Overall Evaluation and Future Expectations: The final section sought to capture participants' overall impressions of AIGC tools and their expectations for future improvements. This included discussions about the ethical implications of AIGC, potential challenges, and desired support from educators and technology developers.

This structured yet flexible approach to data collection ensured comprehensive coverage of the study's key research questions while allowing for the emergence of unexpected insights.

3.4 Data Analysis

The collected interview data were transcribed and analyzed using thematic analysis, a widely recognized method for identifying, analyzing, and reporting patterns within qualitative data. This approach involves several stages, including familiarization with the data, initial coding, theme development, and final interpretation. Initial coding focused on identifying key phrases and concepts

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related to learning efficiency, motivation, and overall attitudes toward AIGC technologies. These codes were then grouped into broader themes, reflecting common experiences and challenges reported by the participants. Themes such as "time savings", "task automation", "increased engagement", and "technology dependence" emerged from this process, providing a structured framework for interpreting the findings. To ensure the reliability of the analysis, transcripts were cross-checked and reviewed multiple times, reducing the risk of researcher bias and enhancing the credibility of the results. This rigorous approach allowed for the development of a detailed and nuanced understanding of how AIGC tools influence college students' academic experiences.

3.5 Ethical Considerations

Ethical considerations were carefully addressed throughout the research process to protect the rights and privacy of the participants. Prior to each interview, participants were provided with a detailed consent form outlining the purpose of the study, their right to withdraw at any time, and the measures taken to ensure the confidentiality of their responses. All interviews were conducted in accordance with institutional ethical guidelines, ensuring that data were securely stored and participants' identities were anonymized. No identifying information, such as full names or specific academic institutions, was included in the final analysis or reporting of results. This approach ensured that participants felt comfortable sharing their honest perspectives, contributing to the richness and authenticity of the collected data.

4. Findings

This section presents the key findings from the interviews conducted with 10 college students regarding the impact of AIGC technology on their learning efficiency and motivation. The analysis is organized around the main themes identified during the data analysis process, including the positive and negative impacts on learning efficiency, motivation, and the overall academic experience. The findings are supported by direct quotes from the participants, reflecting a diverse range of perspectives across different academic disciplines and years of study.

4.1 Impact on Learning Efficiency

AIGC technology was found to significantly enhance learning efficiency for most students. Of the 10 participants, 9 (90%) reported that AIGC tools, such as ChatGPT, Deepseek, and KIMI, had a positive impact on their ability to complete assignments, prepare for exams, and conduct research more efficiently. For instance, P1, a freshman majoring in Computer Science, stated, *"AIGC tools have greatly improved my learning efficiency, especially in quickly generating text, writing code, and finding relevant information."* This sentiment was echoed by P3, a sophomore also in Computer Science, who noted, *"It significantly reduces the time I spend on debugging and optimizing algorithms."* These tools were particularly valued for their ability to provide quick responses, automate routine tasks, and assist in structuring complex projects, which are crucial for technical subjects.

Moreover, 8 out of 10 participants (80%) mentioned that AIGC tools helped streamline the process of writing essays and research papers. P4, a sophomore in English, highlighted this benefit, saying, *"AIGC helps me quickly generate outlines and refine grammar, which saves a lot of time during the writing process."* Similarly, P2, an Economics major, mentioned that the technology *"greatly reduces the time spent on data analysis and structuring economic reports."* This was especially evident in subjects that require extensive literature review and structured writing, where AIGC tools can act as effective drafting assistants, reducing the cognitive load associated with complex writing tasks.

However, not all experiences were uniformly positive. Five participants (50%) expressed concerns about over-reliance on AIGC potentially hindering their critical thinking skills. P5, a junior in Computer Science, cautioned, *"Sometimes I find myself relying too much on the generated code, which can reduce my motivation to fully understand the algorithms."* This concern was further emphasized by P7, a senior in Accounting, who noted, *"The convenience of automated financial analysis can sometimes discourage deep, independent thinking."* This highlights a critical challenge in balancing the efficiency gains of AIGC with the need for deep, critical learning, particularly in disciplines that demand rigorous analytical skills.

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4.2 Impact on Learning Motivation

The impact of AIGC technology on learning motivation was mixed. Six participants (60%) reported increased motivation, primarily due to the sense of accomplishment and reduced cognitive load provided by these tools. For instance, P8, a junior in English, stated, *"I feel more motivated to write because AIGC helps me organize my thoughts and improve my writing style."* Similarly, P10, a senior in Psychology, shared that *"the ability to quickly process large amounts of interview data has made my research work much more engaging."* This suggests that AIGC can enhance motivation by reducing the effort required for routine tasks, allowing students to focus more on creative and analytical aspects of their work.

However, 4 participants (40%) expressed concerns that the ease and speed provided by AIGC tools could reduce their intrinsic motivation to explore subjects deeply. P6, a junior in Psychology, noted, *"Sometimes I feel less inclined to fully understand complex theories because the tool can provide quick summaries."* This perspective highlights a potential drawback of AIGC, where convenience may come at the cost of deeper cognitive engagement. Additionally, P9, a senior in Finance, reflected on this risk, stating, *"Relying too much on automated analysis can make me less willing to explore the underlying principles of financial models."* This underscores the importance of maintaining a balanced approach to technology use, where efficiency is complemented by a commitment to deep learning.

4.3 Overall Evaluation and Future Expectations

Overall, 8 out of 10 participants (80%) rated their overall experience with AIGC tools positively, citing significant improvements in efficiency and confidence in handling academic tasks. P9, a senior in Finance, summarized this sentiment well, stating, *"AIGC has transformed the way I approach financial data analysis, making complex tasks much more manageable."* However, most participants also called for improvements in contextual understanding and critical reasoning capabilities of these tools to better support deep learning and reduce dependence on automated responses. For example, P2, an Economics major, suggested, *"It would be great if AIGC tools could provide more nuanced analyses and avoid generic responses, especially in data-intensive subjects."* Similarly, P7, a senior in Accounting, emphasized the need for better integration of financial context into automated analysis, stating, *"The tools are efficient, but they sometimes lack the depth needed for real-world financial assessments."*

5. Discussion

5.1 Enhanced Learning Efficiency

The interview results indicate that most students (9 out of 10, or 90%) perceive AIGC tools as significantly enhancing their learning efficiency. These tools effectively reduce the cognitive load associated with academic writing and research tasks, saving considerable time. Students from technical disciplines, such as Computer Science, particularly emphasized the benefits of automated code generation and real-time debugging in streamlining their learning processes. This observation aligns with previous studies, which have shown that AIGC technology can enhance productivity by automating routine tasks, allowing students to focus on higher-order cognitive tasks such as critical analysis and problem-solving (Hattenhauer, 2024; Tang, 2024; Zou et al., 2024; Tica & Krsmanović, 2024).

However, about half of the students (5 out of 10, or 50%) also expressed concerns about the potential for over-reliance on AIGC tools, which might lead to a decline in critical thinking and problem-solving skills over time. While these tools effectively reduce academic burdens, some students reported that they sometimes rely too much on automated outputs, potentially undermining their deeper understanding of learning materials. This result echoes previous warnings that excessive dependence on automation can weaken students' independent learning abilities and intrinsic motivation (Shah & Asad, 2024; Wang et al., 2024; Gerlich, 2025).

5.2 Mixed Impact on Learning Motivation

The impact of AIGC technology on student motivation is more nuanced. Many students (6 out of 10, or 60%) reported increased motivation due to the reduced effort required for routine academic tasks,

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aligning with research findings that reducing cognitive load can positively influence motivation (Huang et al., 2024; Zhu & Yang, 2023; Khan & Khan, 2024). For instance, students in humanities and social sciences often appreciate the ability of AIGC tools to quickly generate essay outlines and optimize language, reducing cognitive fatigue and boosting confidence (Tica & Krsmanović, 2024).

However, 4 out of 10 students (40%) also noted that the convenience of AIGC tools might make them more likely to rely on automated outputs rather than deeply understanding complex concepts, potentially reducing their intrinsic motivation for learning. This is the same as findings from Wang et al. (2024), who observed that frequent use of automated tools can reduce students' willingness to engage deeply with their subjects, highlighting the importance of carefully integrating AIGC technology into educational processes to maintain motivation (Jose & Jose, 2024; Kenedy, 2024).

5.3 Ethical and Pedagogical Challenges

The study also highlights critical ethical and pedagogical challenges associated with the use of AIGC technology. Some students (4 out of 10, or 40%) expressed concerns about academic integrity, noting the potential for these tools to be misused for plagiarism or superficial learning. As AIGC tools become more advanced, generating increasingly accurate and contextually appropriate responses, the difficulty of regulating academic assessments increases. As noted by Su et al. (2024), ensuring that students use these tools ethically is essential for maintaining the fairness of academic evaluations and fostering independent critical thinking (Su et al., 2024; Alqahtani et al., 2023).

Moreover, AIGC tools may unintentionally propagate stereotypes or present misleading information due to their reliance on large, uncurated datasets, which poses a significant ethical challenge. Addressing these issues requires both technological improvements and enhanced digital literacy education, helping students critically assess AIGC outputs (Zhang et al., 2025; Aoun, 2017).

5.4 Balance Between Efficiency and Deep Learning

Overall, the findings suggest that while AIGC technology can significantly improve learning efficiency, its impact on motivation and cognitive development is more complex and context-dependent. Educators need to find a balance between encouraging efficiency and fostering deep learning. This can be achieved by encouraging students to use AIGC as a supplementary tool rather than a primary source of information, ensuring that they remain active participants in the learning process. Additionally, integrating digital literacy training into the curriculum can help students critically evaluate AIGC outputs, reducing over-reliance and promoting long-term academic growth (Guo et al., 2023; Su et al., 2024; Alqahtani et al., 2023).

In a word, this study emphasizes the double-edged nature of AIGC technology in higher education, highlighting the need for careful integration to maximize its benefits while minimizing potential drawbacks. Future research should continue to explore the long-term cognitive and motivational impacts of these tools, further revealing how they can be most effectively utilized to support diverse learning goals (Cheng & Wang, 2024; Gerlich, 2025).

6. Conclusion

6.1 Summary of Key Findings

This study provides valuable insights into the dual impact of AIGC technology on college students' learning efficiency and motivation. Based on the analysis of interviews with 10 diverse college students, several key findings emerged.

First, the majority of participants (90%) reported that AIGC tools significantly improved their learning efficiency. These tools effectively reduced the cognitive load associated with academic writing, code generation, and research tasks, allowing students to complete assignments more quickly and focus on higher-order thinking tasks such as critical analysis and problem-solving.

Second, while 60% of students noted increased motivation due to reduced cognitive effort, 40% expressed concerns about the potential decline in intrinsic motivation. They highlighted the risk of becoming overly reliant on automated outputs, which might discourage deep learning and critical thinking.

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Third, approximately 40% of the participants raised concerns about academic integrity, emphasizing the risks of plagiarism and the potential loss of independent thinking due to the overuse of AIGC tools. These ethical concerns underline the need for balanced integration of these technologies in educational contexts .

Finally, the study highlighted the importance of maintaining a balance between the efficiency gains offered by AIGC tools and the need for deep cognitive engagement. Educators are encouraged to integrate digital literacy training to help students critically assess AIGC outputs and reduce over-reliance on these technologies.

6.2 Limitations and Future Directions

While this study provides a comprehensive view of the impact of AIGC technology on student learning, several limitations should be acknowledged.

First, the findings of this study are based on interviews with only 10 students, which may limit the generalizability of the results. Future research should include a larger, more diverse sample to capture a broader range of student experiences and perspectives.

Second, the data were collected through self-reported interviews, which might introduce biases related to students' subjective perceptions and recall accuracy. Future studies could incorporate quantitative methods, such as surveys or experimental designs, to validate these findings.

Third, the findings are based on a single institutional context, which may not fully capture the diverse experiences of students from different universities or cultural backgrounds. Future research should consider cross-institutional studies to explore the impact of AIGC tools in a wider variety of educational settings.

Finally, this study primarily focused on short-term impacts. Further longitudinal studies are needed to assess the long-term effects of AIGC technology on learning outcomes, motivation, and cognitive development.

In conclusion, while AIGC technology holds significant potential for enhancing learning efficiency, its broader impact on motivation, critical thinking, and academic integrity requires careful consideration. Future research should aim to address these limitations and provide deeper insights into the evolving role of AIGC in higher education.

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