

Undergraduate Students' Experiences Using Generative AI (GenAI) in Academic Activities: A Qualitative Study

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Abstract. The emergence of GenAI has transformed the educational landscape. Various studies have examined the adoption, influence, utilization, impact, and ethical issues surrounding the use of GenAI; this study offers the latest insights into students' experiences with GenAI. This study employs a descriptive-exploratory qualitative approach with four undergraduate students from two universities in Kediri City as participants, who have experience using GenAI from 2022 to 2026. Data were collected through semi-structured interviews and analyzed using thematic analysis following the steps outlined by Braun and Clarke [1], including data familiarization, preliminary coding, theme identification, theme review, theme naming, and report writing. A total of nine themes and sixteen subthemes were identified, including the background and reasons for using GenAI, the utilization of GenAI, the use of GenAI in learning, the shortcomings of GenAI, students' evaluations of GenAI, the learning process without GenAI, the impact of GenAI use, long-term perspectives on GenAI use, and messages and expectations among students. The findings indicate that students' experiences with GenAI outputs that were inaccurate, incomplete, or inconsistent led them to use GenAI more cautiously and selectively, rather than abandoning its use altogether. These findings underscore the importance of specific policies regarding the use of GenAI in higher education. This study has the limitation of a small number of participants; therefore, the results cannot serve as the primary benchmark for students' overall experience in using GenAI. Further research is needed to continue updating our understanding of the use of this technology.

Keywords: *Thematic Analysis; Generative AI; Undergraduate Students; Higher Education; User Experience.*

Abbreviations: GenAI, Generative Artificial Intelligence.

INTRODUCTION

The development of artificial intelligence (AI) has brought changes in various areas of life [2]. One AI development that is increasingly used is Generative AI (GenAI), a technology capable of generating various forms of content based on user instructions [3]. Unlike conventional AI systems, which are generally predictive or classificatory, GenAI is designed to create new content in the form of text, images, program code, or other forms of multimedia through a learning process from large amounts of pre-trained data [4], [5].

GenAI is also a growing force for change in higher education [6]. GenAI has spurred the birth of various learning innovations, from automated writing tools and adaptive learning systems to increasingly sophisticated research facilities based on literature search and summarization. Its presence has also opened up new opportunities for students and lecturers to produce and process content more quickly and personally. Given this rapid adoption, it is important to understand how the wider community, especially students as primary users, respond to and interpret GenAI's presence in their learning process [7].

Previous research has shown varying perceptions of GenAI among undergraduate and graduate students in terms of how they learned about it, its perceived usefulness, and its benefits [8], [9], [10]. Concerns also exist about the reliability of information, ethical issues, and the impact of over-reliance [11], [12]. Students who have never used GenAI remain confident in their ability to use it, and those with higher academic writing confidence are less likely to use or consider using GenAI for academic purposes and less supportive of others who do [13], [14].

However, there is still a research gap regarding how Indonesian students, particularly in Kediri City, manage the use of GenAI in their learning process, including when to use it, when to choose non-AI sources,

and how they verify and address errors in GenAI output. This gap is important to examine to determine the extent and form in which students use GenAI in academic contexts, as GenAI is not only related to the benefits of technology alone, but also to student engagement in the learning process and knowledge formation.

This study aims to explore undergraduate students' experiences using GenAI to support academic activities. It seeks to provide insight into how students currently use and perceive GenAI, after several years of use. Theoretically, this study strengthens our understanding of the relationship between GenAI, cognitive offloading, and student agency. Practically, the research findings can inform the more informed, critical, and controlled use of GenAI in learning.

METHODS

Study area

This study uses a descriptive/exploratory qualitative approach to explore undergraduate students' experiences using GenerativeAI (GenAI) between 2022 and 2026. Participants consisted of four undergraduate students (P1–P4) from two universities in Kediri, selected using a purposive sampling technique, with different majors: Civil Engineering, Islamic Banking, Mathematics Education, and Islamic Religious Education, with each participant representing each major. This was done to capture information from different perspectives and experiences.

Procedures

Data were collected through semi-structured interviews conducted in 2026, both offline and online. Offline interviews were conducted in person, while online interviews were conducted via WhatsApp, either by phone call or text message, to accommodate the participants' needs.

In this study, the term “AI” used by informants refers to Generative Artificial Intelligence (GenAI). To maintain terminological consistency, the term “GenAI” is used in the presentation and discussion of the research findings, although the informants use the term “AI” in the interview excerpts.

Interview lengths varied, from the shortest, 6 minutes 26 seconds, to the longest, 24 minutes 45 seconds.

Data analysis

Interview data were analyzed using thematic analysis, following the steps outlined [1], including data familiarization, initial coding, theme discovery, theme review, theme naming, and report preparation. The analysis was conducted using an inductive approach, with themes being developed based on data that emerged directly from the interviews, without any prior theoretical framework. Thus, the coding and theme determination process was entirely data-driven, rather than tailored to predetermined concepts or categories. This method was chosen for its theoretical flexibility and accessibility.

RESULTS AND DISCUSSION

The qualitative data analysis process in this study successfully extracted nine main themes that describe undergraduate students' experiences in using Generative AI (GenAI) to assist their studies in higher education. The themes that emerged from the thematic analysis are as follows. First, students' background knowledge and reasons for using GenAI. Second, students' utilization of GenAI. Third, use of GenAI in learning. Fourth, shortcomings of GenAI encountered by students. Fifth, student evaluation of using GenAI. Sixth, learning without GenAI intervention. Seventh, impacts felt by students after using GenAI. Eighth, long-term orientation of using GenAI. Ninth, messages and hopes conveyed by students for other students. A total of nine themes and sixteen subthemes were identified related to undergraduate students' experiences using GenAI. A comprehensive summary of the overall themes, subthemes, and their operational definitions is presented in (Table 1).

Table 1. Themes and sub-themes extracted from participant interviews

Themes	Subthemes	Definition
Background	GenAI: Online and Offline Reasons for using GenAI	-Students learned about GenAI from social media and from college friends. -Students stated that the reason for using GenAI was because of the need to simplify the learning process.
Utilization of GenAI	The Role of GenAI Usage orientation	-Students use GenAI as a personal assistant and proofreader personal, study buddy, and final project mentor. -Students use GenAI to assist in the learning process and to help complete assignments at university.

Themes	Subthemes	Definition
Using GenAI in learning	Student usage patterns	-Students use GenAI by making plans, creating prompts, responding to GenAI's answers, and adopting answers.
Limitations of GenAI	Disadvantages of GenAI Attitude in responding to weaknesses	-Students found weaknesses in GenAI such as; incorrect information, inconsistent answers, and answers that did not meet expectations. -Students still use GenAI but are more careful in adopting GenAI answers.
Student reflection	Form of student reflection	-Students reflect on the use of GenAI in several ways; creating clear prompts, verifying answers, and carefully adopting GenAI's answers.
Learning without GenAI	Learning resources other than GenAI Time without GenAI	-Students learn through lecturers' explanations, books, articles and internet websites. -Students do not use GenAI when they are still near lecturers and during the final exam.
The impact felt	Negative impact Positive impact	-Students feel lazy to read and think, physical activity decreases, they become dependent, and they want everything to be instant. -Students feel the benefits in the form of good assignment results, personalized learning experiences
Long-term orientation	Student's sense of use Long-term use	-Students feel happy using GenAI in the learning process and feel worried about long-term use. -Students will continue to use GenAI in the long term.
Messages and hopes	The message conveyed	-Students provide messages and hopes based on their experience using GenAI.

Result-1 (background and reasons for using GenAI by students)

Students gain knowledge about GenAI through two sources: offline and online. Classmates are an offline source that introduces students to GenAI. "Coursemates, too." (P3, personal interview, 2026) Social media is an online source that connects students with GenAI. Through the breadth of information available on social media and their fellow students' networks, students discover information about GenAI and become interested in using it.

"The thing is, when you browse social media, you're bound to find a lot of information popping up, including GenAI. GenAI, on social media, offers convenience, which is why I'm interested." (P2, personal interview, 2026)

Students reported a number of reasons for using GenAI, ranging from ease of access, the need for a study partner, confusion in learning material, difficult assignments, and the need to provide various learning needs. "There are difficult assignments, and then when I want to research more in-depth information, and also when I want to create something, like what a lesson plan looks like, asking for an overview. Yes, in those circumstances it's possible." (P1, personal interview, 2026) Overall, students' use of GenAI emerged primarily as a response to the learning needs and difficulties they faced.

Result-2 (Utilization of GenAI)

The role of GenAI varies for students. First, GenAI as a personal assistant, namely according to students, GenAI's presence helps their activities, such as streamlining their personal time. "Because it (GenAI) shortens time, it's like having an assistant. So it's faster, lighter, and makes the work easier." (P1, personal interview, 2026) Second, GenAI as a study buddy, namely students use GenAI like a friend with whom they can discuss, talk about study materials, and ask questions if the material is difficult. Another student said: "A study buddy, but if there is perhaps a difficult problem, like that, I try to ask AI to broaden my insight." (P3, personal interview, 2026) Third, GenAI as a final project supervisor, namely GenAI provides direction and understanding of material that is difficult for students to understand.

Yes, for example, yesterday, when I was working on my thesis. Well, I used quantitative methods. Well, what do you use for that? Data analysis, so collecting data. Well, I actually used AI, but not the results, but... what... how do I figure out the process when conducting quantitative research? (P2, personal interview, 2026)

Finally, GenAI acts as a personal proofreader. When students are working on or studying course material, GenAI is positioned to correct and remind them of errors in the material being studied. "But I submitted it to GenAI and asked for corrections, and it turned out there were quite a lot of errors. That experience made me think AI is good for our learning companions, not for the main material." (P4, personal interview, 2026)

According to students, GenAI is used for many things to support their learning activities, including understanding the contents of books, brainstorming, overcoming confusion, organizing daily schedules, searching for information, and understanding lessons. These needs are adjusted to the needs and conditions of students. "When I have difficulty learning, when there is a problem or the meaning of a problem may be difficult to explain, then I ask the AI, ask for help." (P4, personal interview, 2026) Another participant also revealed: "One of them is when the assignment is difficult. For example, there is a math problem, 'This is difficult, I can't answer it.' Well, with questions like that, I immediately copy-paste, I ask the AI, 'What is the answer? How do I do it?'" (P2, personal interview, 2026).

Result-3 (Patterns of GenAI usage in learning)

Based on data obtained from students, this study successfully summarized the patterns commonly used by students in using GenAI. These patterns were arranged from the initial stage to the final stage, namely: (1) planning learning before using GenAI, (2) creating clear prompts, (3) responding to answers that appear from GenAI, which consists of two forms of student responses, namely directly skimming then copy-pasting, or verifying the answers that appear, and (4) adopting GenAI answers. The following is an explanation:

First, plan your learning before using GenAI. Students create a plan before using GenAI, such as visualizing the format of the material they want to learn. Students don't immediately use GenAI if the material involves simple calculations that can be easily understood, and only use GenAI if they are truly confused about the material.

"For me, I only use it sparingly. If I can, I think manually, and I think for myself. For example, with simple calculations, I calculate them myself. Only if it's a complex calculation, and I'm confused about how to do it, or if I've tried and I'm still confused about the answer, do I ask AI." (P1, personal interview, 2026)

Second, create prompts. Students create prompts as needed. "So, for me, it's like giving a prompt, and then the answer will appear." (P3, personal interview, 2026)

Third, students' responses to GenAI's answers take two forms: a. Students do not directly consume the answers generated by GenAI, but verify them first. "So, I also validate the results from the AI, whether they are correct. So I don't take everything. Basically, I still filter them." (P2, personal interview, 2026) Another student also expressed something similar: "Then I examine the responses or answers from the AI again, whether they are consistent or not." (P1, personal interview, 2026) b. Students respond to answers by skimming through the material that is considered basic and already understood, then immediately copying and pasting the answer. "But for regular, basic lessons, like regular Q&A, I... just skim through them, and if it's logical, I just copy it." (P1, personal interview, 2026) Pressurized conditions, such as approaching assignment submission dates, are also factors that make students immediately copy and paste answers. "When working on questions in a hurry, or lessons..." (P1, personal interview, 2026)

Fourth, for students who respond to GenAI answers through the verification process, the answers can only be accepted after going through that stage. "The information is acceptable." (P3, personal interview, 2026) Overall, GenAI usage patterns indicate that students do not use GenAI uniformly. Usage is tailored to their needs and the difficulty level of the material, with some students verifying the output before adopting it.

Result-4 (Finding GenAI's weaknesses)

Based on their experiences, students have found several errors in the answers generated by GenAI. These errors include answers that do not match what was requested, incomplete text generated, and inconsistent answers. "The oddity is that sometimes it doesn't match what we asked for and what came out." (P4, personal interview, 2026) and "Usually the text is incomplete." (P4, personal interview, 2026) Another student said: "First the answer is, for example, A=1, then another answer, the answer after that is A=2. That's usually the case. But rarely." (P1, personal interview, 2026)

Despite knowing GenAI's shortcomings, students admitted they would continue using it, but with more caution. "Hmm, I believe it, but I have to be more careful. More careful. I still believe it, but still... still research it further, okay? Not 100% trust it straight away." (P1, personal interview, 2026) It can be understood here that students are not abandoning GenAI but rather changing their usage methods to be more cautious.

Result-5 (Student reflection)

Based on the experiences of students who have encountered GenAI's shortcomings, they have changed the way they use GenAI to minimize future errors. They also strive to create clear and targeted prompts to avoid potential errors. "My first step is to be cautious. I have to be clear about the prompts. I mean this, this." (P1,

personal interview, 2026) Students have also become more cautious and don't immediately consume GenAI's output, but rather read what GenAI displays first. "We read first before taking data from AI, to anticipate errors. That's how we evaluate it." (P4, personal interview, 2026)

Result-6 (learning resources other than GenAI)

Students also have learning resources other than GenAI, in the form of books, journal articles, and applications such as YouTube to search for materials. "But for everyday learning, I still use physical books. Well, that's how it is in the real world too." (P2, personal interview, 2026) In addition, students also have certain times when they don't use GenAI, namely when they are still near their lecturers and during final semester exams (UAS). "Maybe when I'm on campus, and the lecturer is there, and then... oh, during class. During class. If there's something I don't understand, I explain it to the lecturer, then I ask, and then we discuss it. Or when I'm making... what is it, during guidance. During guidance, I tend to ask the lecturer questions. That's it." (P1, personal interview, 2026)

Result-7 (Positive and negative impacts felt by students)

Table 2. Some negative impacts felt by students

Participants	Statement
P1	Dependence on anything. Dependence. Yes, everything goes straight to AI. I mean, like when you're feeling lazy, AI. Just straight to AI.
P2	Sometimes, it makes me less inclined to seek out physical reference sources, such as books in the library or ask teachers directly. This reduces my physical activity. Sometimes, I feel satisfied just sitting back, enjoying a cup of coffee, and waiting for Gemini's answers.
P3	It makes people not want to think hard. For example, if there's an assignment or something, or something, for example, there's an assignment or a problem, something related to work or academics, right?
P4	We want everything to be instant

Students experienced several impacts, both negative and positive, after using GenAI (see Table 2 and Table 3).

Table 2 shows the negative impacts experienced by the four informants. In P1, GenAI made him dependent. In P2, physical activities such as searching for books in the library decreased, because with GenAI everything became easier. In P3, GenAI made him lazy to think. Finally, in P4, everything related to college assignments and other things made him want everything instantly and not want to put in the effort. The students' statements illustrate the effects of GenAI related to reduced involvement in physical activity and thinking skills, as well as the emergence of a desire to obtain things instantly.

Table 3. Some positive impacts felt by students

Participants	Statement
P1	Yes there is a positive
P2	If it's positive, of course using GenAI will give better results.
P3	It helps with the learning process. Especially when it comes to understanding books, or perhaps complex terms, in scientific fields, you can ask GenAI. The point is, it makes the learning process easier.
P4	The benefit is that we save time, it doesn't take long if we use GenAI.

Table 3 shows the various positive impacts experienced by students. In P1, GenAI demonstrated a generally positive impact. In P2, the positive impact was seen in the improvement of assignment results. In P3, the positive impact was seen in assisting the learning process, particularly in GenAI's ability to understand complex terms in textbooks, which oriented learning activities. In P4, the positive impact was seen in GenAI's presence, which made learning time more efficient.

Result-8 (Feelings that arise in using GenAI and Long-term Orientation)

Two positive feelings emerged among students when using GenAI: enjoyment and happiness. These feelings emerged because GenAI made learning enjoyable, serving as a discussion partner. "It's accelerated learning, helped me become a discussion partner, and made studying more streamlined. It's fun, enjoyable, and I have a friend." (P1, personal interview, 2026)

However, concerns also emerged, as some students believed that GenAI would make humans lazy, potentially diminishing critical thinking skills. "What I'm worried about is that humans won't be able to understand long sentences, whether from books, articles, or other sources, because AI provides information in a summarized form, thus hampering their ability to process information." (P3, personal interview, 2026)

Students also admitted they would use GenAI even into the workplace. "Hmm, most likely. Maybe even when I'm still... I'm working." (P1, personal interview, 2026) Students also expressed that they would continue to use GenAI because it adapts to the times, but with controlled use. "For today, yes, it will continue, but with limitations." (P4, personal interview, 2026)

Result-9 (From students to other students: messages related to the use of genai)

Several messages and hopes were conveyed by students based on their experiences using GenAI to support their learning activities. These messages included: to obtain good GenAI answers, the prompts must be clear, and messages to minimize negative impacts by using GenAI sparingly, not consuming GenAI results raw, not being lazy even though GenAI is available, continuing to actively read books and other sources, and using GenAI wisely, oriented towards learning needs.

GenAI's usability depends on the user. So, when the prompt is more specific and clear, the AI will be even clearer. So, if someone is good at using GenAI, the GenAI will also be smarter. But if the user isn't smart, meaning they aren't very specific in their prompts, the AI's response will be just like that, ordinary." (P1, personal interview, 2026)

Different from the previous message "Maybe, my message, yes maybe for AI users it is wiser to control themselves." (P2, personal interview, 2026) Another student said: "Don't depend on AI. If possible, read more books than AI." (P4, personal interview, 2026) A similar thing was also expressed by another participant: "GenAI is used as a study friend, a discussion partner, yes. So, for example, if we are doing assignments or something like that, yes, related to lectures, we better look for books first, or journals, articles, read." (P3, personal interview, 2026)

Discussion

GenAI Introduction Resources: Convergence of Offline and Online Paths

The findings indicate that students become familiar with GenAI technology through two main channels: offline, through interactions with fellow students, and online, through exposure to information on social media. The offline channel reflects the influence of interpersonal communication (peer influence) within the campus environment [15]. Peers are often effective first-time technology adoption agents due to the high social trust within student groups [16].

On the other hand, online channels through social media leverage recommendation algorithms and the vast flow of digital information. Visual exposure and narratives of ease of use on social media act as triggers that foster students' curiosity to try the technology [17]. This phenomenon aligns with the diffusion of innovation theory, where online mass communication channels are effective in raising awareness, while offline interpersonal channels play a key role in driving adoption decisions [18].

Motives and Reasons for Using GenAI in an Academic Context

Students' use of GenAI is driven by a variety of pressing situational needs, ranging from ease of access, finding virtual study partners, overcoming confusion about material, completing difficult assignments, and assisting with the development of learning tools (such as lesson plans). Quotes from participants indicate that GenAI is relied upon as a coping mechanism when students encounter cognitive obstacles in their independent learning process [19].

This confirms the principle of Task-Technology Fit (TTF), where technology adoption occurs because the characteristics of the information system (GenAI's ability to process information and generate text quickly) are deemed to align with the needs of students' complex and highly efficient academic tasks [20], [21]. GenAI bridges the gap between the level of task difficulty and the cognitive resources available to students at that time.

The findings identified four primary roles for GenAI for students: personal assistant, study partner, final project supervisor, and personal proofreader. This flexibility makes GenAI a multifunctional support tool. Participant P4's statement that AI is good as a "learning companion, not a primary resource" indicates the emergence of mature metacognitive awareness among some students. They don't simply copy AI's output, but rather use it critically as a tool for verification, proofreading, and brainstorming [22].

Theoretically, this utilization strengthens the concept of the Extended Mind Thesis [23], where external digital tools (in this case GenAI) are integrated by individuals as part of their cognitive system to expand their thinking capacity, organize their schedules, and unravel the complexity of learning problems.

The Efficiency Paradox: The Benefits of Learning and the Risks of Dependence

The use of Generative AI (GenAI) in student learning highlights the tension between academic efficiency and cognitive engagement. GenAI can accelerate information retrieval, aid understanding of difficult concepts, and reduce the time students spend completing academic tasks. Ahmed et al. [24] demonstrated that

students perceive GenAI as beneficial for supporting academic work, including increasing efficiency, but simultaneously acknowledge the risks of dependency and interference with critical thinking skills. This suggests that efficiency cannot be understood simply as increasing the speed of obtaining answers, but rather needs to be linked to how these time savings impact student engagement in the learning process [25].

GenAI's efficiency has a pedagogical function when the technology is used to assist mechanical activities without replacing students' thought processes. GenAI can help students obtain initial explanations, understand difficult terms, or find alternative ways of viewing a problem. This use allows students to allocate time for activities that require interpretation and evaluation [26]. P3's experience demonstrates this pattern. He explained that using GenAI after searching through Google and the Indonesian Dictionary (KBBI) did not provide adequate understanding, especially when encountering difficult terms in textbooks. This pattern suggests that GenAI serves as additional assistance after students have made initial efforts, rather than as a primary source for all learning needs.

This usage pattern demonstrates that efficiency can support learning if students maintain independent inquiry and understanding. This perspective aligns with Chan and Hu [27], who found that students viewed GenAI as a source of learning support but still identified concerns about its impact on academic competence. In this context, GenAI serves to address learning barriers, not to take over the entire learning process.

Problems arise when GenAI's efficiency diminishes cognitive activities that play a crucial role in knowledge formation. The processes of reading, comparing sources, constructing arguments, and solving problems not only generate answers but also provide students with opportunities to practice their thinking skills [28]. When these activities are excessively outsourced to GenAI, students may achieve academic results with less effort, but opportunities for cognitive elaboration may also be diminished. P3 explicitly links the overuse of AI to a tendency to avoid the effort of thinking.

This statement is more accurately understood as students' perceptions of the risks of using GenAI, rather than as evidence that GenAI directly causes a decline in thinking skills. This distinction is important because phenomenological research focuses on participants' experiences and meanings, not on testing causal relationships. However, this experience demonstrates an awareness that the ease of obtaining answers can alter how students allocate cognitive effort in learning [29].

This condition can be understood through the concept of cognitive offloading, namely the use of external assistance to reduce the demands of information processing that must be done internally [30]. In the use of GenAI, cognitive offloading can occur when students hand over activities such as information searching, summarizing, formulating answers, or problem solving to the AI system. This transfer is not always negative because external assistance can be used to reduce mechanical workloads. Problems arise when such assistance replaces cognitive activities that should still be carried out by students [31]. Ahmed et al. [24] identified the potential disruption to critical thinking skills as one of the challenges in integrating GenAI in education, so the use of technology needs to maintain human involvement in the cognitive process.

Dependence on GenAI is also not appropriately understood solely based on the frequency of its use. A more relevant indicator lies in the role of AI in students' knowledge formation and decision-making processes. Students still retain cognitive agency when they define problems, evaluate AI output, compare it with other sources, and form their own conclusions [32]. Conversely, dependency becomes stronger when students accept AI output as the final answer without any evaluation process. This understanding explains why frequent use of AI does not necessarily indicate dependency, while less frequent use can still be problematic if students delegate intellectual decisions to AI.

The change in learning patterns experienced by P4 reveals another side of this paradox. Before using GenAI, analyzing books or journals required gradual reading and note-taking. After using GenAI, some of these processes can be done more quickly with the help of the AI system. P4 described this benefit as a time saving.

Student experience shows that these risks don't always lead to discontinuation of GenAI use. Instead, students can develop limiting strategies based on their experience of encountering AI errors. P4, for example, continued using GenAI after encountering inappropriate output, but stated:

These findings indicate that students do not view AI errors as a reason to reject the technology altogether. Instead, they adjust their usage patterns by setting limits on dependency. This pattern suggests that experiences with GenAI can shape awareness of when the technology is helpful and when users need to revert to personal resources or abilities [33].

These differences demonstrate that GenAI's impact is not automatic. The same technology can generate efficiency or dependency depending on how students integrate it into their learning activities. Amzalag et al. [34] demonstrate the importance of viewing students' experiences in GenAI-supported learning based on their interactions with the technology, not just its presence. In the context of this study, these differences in usage

patterns are evident in the presence of students who use AI after conducting initial research and those who use AI to expedite the process of completing assignments.

This situation places students' cognitive agency as a crucial aspect in determining the quality of GenAI's use. Students need to maintain control over the process of understanding, evaluating, and determining the accuracy of information, even though some of the work can be delegated to AI. GenAI can be an efficient tool when students use it to overcome specific learning obstacles, but this efficiency becomes risky when students use AI as a substitute for reading and thinking. Ahmed et al. [24] also showed that students can recognize the benefits of GenAI while also being aware of the potential for over-reliance towards the technology.

GenAI as a Complementary Technology in the Learning Ecosystem

The use of Generative AI (GenAI) in student learning demonstrates that the technology is more appropriately positioned as part of a learning ecosystem rather than as a replacement for existing learning resources and academic interactions. Participants' experiences demonstrate that GenAI is used alongside books, journal articles, search engines, the Indonesian Dictionary (KBBI), lecturers, and discussions with fellow human beings. This position suggests that GenAI's usefulness is not primarily determined by its ability to provide quick answers, but by how students integrate the technology with other knowledge sources. Chan and Hu [27] demonstrated that students view GenAI as a tool that can support the learning process while still requiring other academic resources and interactions. This perspective is also supported by Irshad et al. [29], who demonstrated that GenAI can transform student learning practices through easier access to information, but does not eliminate the need for learning strategies involving other academic resources and activities.

This pattern indicates a division of functions between learning resources. Academic resources are used as a basis for acquiring knowledge, while GenAI is used to help clarify areas of interest. This pattern aligns with findings that students used ChatGPT in conjunction with their previous information-seeking and processing practices [35].

The role of lecturers remains distinct from GenAI because interactions with lecturers allow students to obtain explanations, clarifications, and perspectives derived from human experience. P1 explained that when on campus and lecturers are available, he prefers to ask questions and discuss directly if he has difficulty understanding the material. This pattern indicates that students do not consider GenAI as the sole source for solving academic problems. Lecturers remain a reference when students need direct explanations or when problems cannot be understood through technological assistance. Romaniuk and Łukasiewicz-Wieleba [36] show that the integration of GenAI in higher education is not only related to student use of technology, but also to changes in the relationship between technology, the learning process, and the role of educators.

P4's experience reinforces GenAI's position as a second party in the academic process. During presentations, P4 explained that the main ideas remained his, while GenAI was used when he had difficulty explaining them.

This statement indicates that students still position themselves as idea generators, while GenAI serves as a supporting instrument in the elaboration process. This pattern differs from the use of GenAI, which makes the system the primary generator of academic answers.

GenAI's complementary function is also evident in situations where students consciously do not use the technology. GenAI's use does not occur in all learning situations, as some academic activities require students to rely on personal skills. P4 explained that during the final exam, when the lecturer did not allow students to bring mobile phones, he had to rely on his own thoughts and experiences. This situation indicates that students' academic skills are not fully transferred to technology. Students must still be able to understand the material and solve problems when access to GenAI is not available.

This situation demonstrates that the use of technology integrated into learning is not synonymous with the use of technology in every academic activity. Amzalag et al. [34] demonstrated differences in student experiences between traditional learning and GenAI-supported learning. This difference suggests that the presence of GenAI does not eliminate the need for other forms of learning, but rather changes how students determine when to use technology [37].

The complementary use of GenAI also relates to students' ability to determine the limits of technology use based on the characteristics of the task and learning situation. P3 chose to use GenAI after searching through Google and the KBBI (Indonesian Dictionary), while P4 used GenAI when experiencing difficulty interpreting a problem. In other situations, students chose to ask lecturers or use academic sources directly. These differences demonstrate a decision-making process in technology use. Students considered not only whether GenAI was available but also their needs, level of difficulty, and sources deemed relevant.

GenAI's position as a complementary technology also limits the perception that AI capabilities can replace all forms of academic interaction. While GenAI can provide explanations, generate alternative answers, make corrections, and help students understand information, it doesn't have the same standing as lecturers, books,

journals, or the student's learning experience. Each source contributes differently to learning. Books and journals provide searchable academic resources, lecturers provide explanations and feedback based on the learning context, while GenAI provides system-based interactions that can be used flexibly.

Students also indicated a tendency to continue using GenAI long-term, but not to the point of complete dependence. P4 stated that he would continue using GenAI, but that his use would need to be limited. P3 even positioned GenAI as a discussion partner that could be used before engaging with a human.

This orientation suggests that the continued use of GenAI does not necessarily mean replacing conventional learning resources. Long-term use can occur through the division of functions between AI and other learning resources. Hua and Cunningham [38] demonstrated that students' reflections on the use of AI develop through their experiences in utilizing the technology for academic activities. Jadhav [39] also pointed out that student use of GenAI should be viewed based on how students incorporate the technology into their academic activities, not solely on the intensity of use.

This division of functions demonstrates that GenAI's presence expands the student learning ecosystem, not simply replacing legacy learning resources with new technology. GenAI provides additional assistance in finding information, understanding concepts, making corrections, and discussing issues. Books, journals, lecturers, human discussions, and students' thinking skills still serve distinct functions and cannot all be transferred to GenAI.

The findings of this study demonstrate that the primary issue lies not in the choice between using GenAI or not using GenAI, but in how students position GenAI among various learning resources. The use of GenAI is complementary when students retain the functions of books, journals, lecturers, human discussions, and personal thinking skills in the learning process. This position can shift when GenAI begins to take over the function of learning resources and students' cognitive processes. In this context, the integrated use of GenAI is determined not by how often students use it, but by their ability to maintain control over learning objectives, source selection, information evaluation, and understanding construction [39].

CONCLUSION

The introduction of Generative AI (GenAI) among college students occurs through a convergence of online channels which trigger initial awareness and offline channels where peer influence drives adoption. The use of GenAI is driven by situational needs to overcome cognitive barriers and improve efficiency in completing academic tasks, which theoretically aligns with the concepts of Task-Technology Fit and the Extended Mind Thesis. However, this efficiency gives rise to a paradox: if its use is unchecked, the risk of excessive cognitive offloading can erode critical thinking skills, deep reading, and independent analysis. Students' experiences when confronted with GenAI outputs that are incorrect, incomplete, or inconsistent actually become crucial experiences that shape their future attitudes toward its use. Students do not simply abandon GenAI, but show a tendency to be more selective in accepting and utilizing the information it generates. The key to avoiding this dependency lies in students' ability to maintain cognitive agency to retain control over intellectual evaluation and decision-making.

Overall, GenAI positions itself not as a replacement for the conventional learning ecosystem, but as a complementary technology that expands learning capacity. Students wisely utilize GenAI as a supportive tool, a catalyst for ideas, and a discussion partner that works alongside book references, scientific journals, and pedagogical interactions with faculty. The successful integration of GenAI in higher education depends heavily on a balanced division of roles: students remain the primary agents in processing and verifying knowledge, while GenAI acts as an efficiency accelerator that helps overcome learning barriers without sacrificing the depth of the thinking process.

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