Generative AI Tutors and Student Learning: Does Assistance Build Understanding or Replace Effort?

Pratiksha Kuchme[1], Anuja Mahajan[2], Shubhangni Dey[3]
[1]Zeal Institute of Computer Application, Business Administration and Research (ZIBACAR), Savitribai Phule Pune University (SPPU), Pune, Maharashtra, India.
[2]Zeal Institute of Computer Application, Business Administration and Research (ZIBACAR), Savitribai Phule Pune University (SPPU), Pune, Maharashtra, India.
[3]Assistant Professor, Zeal Institute of Computer Application, Business Administration and Research (ZIBACAR),
[1]pratikshakuchme27@gmail.com , [2]anumahajan4590@gmail.com , [3]shubhangni.dey@zealeducation.com
ORCID ID: 0009-0002-3094-0346 (Pratiksha Kuchme); 0009-0007-2073-5441(Anuja Mahajan); 0009-0009-9820-0783 (Shubhangni Dey)

Abstract—

Students increasingly turn to generative artificial intelligence (Gen AI) tools like ChatGPT to clarify difficult topics, debug code, draft assignments, and prepare for exams. Because these platforms respond instantly, simplify dense theories, and adjust to individual questions, they hold clear appeal in higher education. Yet their rapid spread raises a pressing question: does AI tutoring genuinely strengthen a student's grasp of a subject, or does it encourage reliance on ready-made answers at the expense of real mental effort? Drawing on a descriptive review of recent academic literature, this paper examines how generative AI tutors influence student learning. We weigh key instructional benefits—such as tailored explanations, immediate feedback, and round-the-clock availability—against notable risks, including overdependence, factual errors, weakened critical thinking, academic dishonesty, and reduced independent problem-solving. Central to this discussion is the line between using AI as a study guide and treating it as a substitute for personal effort. Ultimately, the evidence suggests that educational gains depend less on simply having access to AI tools and more on how students use them and how teachers guide that process. Responsible adoption means encouraging learners to question outputs, verify facts, practice actively, and think for themselves rather than passively accepting completed answers.

Keywords— Generative AI, AI Tutors, Student Learning, ChatGPT, Personalized Learning,Critical Thinking, Independent Learning, Academic Integrity.

I. INTRODUCTION

1) Background of the Study:

Artificial intelligence has gradually become an everyday fixture in modern education. Traditional classroom teaching is now routinely paired with digital learning platforms, online databases, intelligent tutoring software, and AI-driven study apps. Generative artificial intelligence marks a major step forward in this shift because it can produce natural-sounding prose, unpack abstract theories, answer questions, condense long readings, and assist with routine academic work. Conversational tools such as ChatGPT let students interact with a model in plain language—asking questions, requesting examples, and seeking step-by-step help across almost any subject.

Unlike standard search engines that simply return lists of web links, conversational AI works through back-and-forth dialogue, adjusting the depth and tone of its answers whenever a student asks a follow-up question. Used thoughtfully, these tools can act as on-demand tutors that help learners untangle tough concepts, review course notes, debug code, and get unstuck outside class hours. At the same time, the very features that make generative AI helpful also allow it to write full essays and solve problems from start to finish. When students accept those outputs at face value without checking their accuracy or working through the logic, they miss out on the active effort that real learning demands.

2) Statement of the Problem:

The easy availability of generative AI tools presents both clear opportunities and real pitfalls for colleges and universities. Students can use these platforms to clarify confusing topics and build stronger subject knowledge, yet they can just as easily lean on them to finish coursework with very little personal effort. Meaningful learning involves far more than copying down a right answer; it requires thinking carefully, asking questions, applying rules, solving unfamiliar problems, recalling information, and weighing ideas.

When learners rely too heavily on ready-made AI solutions, they may turn in assignments quickly without building the understanding needed to apply that knowledge on their own later. The central question of this paper, therefore, is whether generative AI tutors genuinely support student learning or quietly foster dependence on automated answers.

3) Objectives of the Study:

1. To explore the role generative AI tutors currently play in higher education.
2. To examine how AI-generated explanations and instant feedback can support student comprehension.
3. To identify the main risks tied to relying too heavily on ready-made AI answers.
4. To analyze how AI assistance interacts with independent study habits and critical thinking.
5. To outline practical, responsible habits for both students and educators using generative AI tools.

4) Significance of the Study

This study matters because generative AI is rapidly changing how students find, read, and engage with academic material. Understanding its real impact on learning helps students use these tools more wisely while giving teachers practical insights for designing better coursework.

It also highlights why technological help must be balanced with genuine personal effort. Rather than treating AI as either an unqualified good or an outright threat, this paper looks closely at the specific conditions under which AI becomes a helpful educational partner.

II. REVIEW OF LITERATURE

1) Generative AI in Education

- Kasneci et al. [1] examine both the promise and the pitfalls of large language models (LLMs) in education. Their work shows how generative AI can support tailored learning, break down tough concepts, and assist teachers and students alike. At the same time, they point out serious risks—including factual inaccuracies, bias, and overreliance—arguing that critical thinking and clear guidance remain essential.
- Tlili et al. [2] explore the educational impact of conversational agents like ChatGPT from multiple perspectives. Their study outlines practical classroom uses while drawing attention to questions of reliability, ethical conduct, and thoughtful integration into daily academic work.
- Miao and Holmes [3] offer policy guidance for using generative AI in education and research. Taking a human-centered stance, they urge schools and universities to adopt clear rules that protect learners and ensure AI supports teaching goals rather than replacing human judgment.

2) AI Tutors and Personalized Learning

Generative AI tools can tailor explanations to a student's exact question and offer fresh examples whenever an idea feels unclear. Learners can ask for simpler wording, pose follow-up questions, and move through difficult material at their own pace. Kasneci et al. [1] point to individualized learning and extra academic support as major strengths of large language models, especially for students seeking help outside regular class hours.

Even so, reading a tailored explanation does not guarantee that real learning has occurred. Students still need to make sense of the reasoning, connect new ideas to what they already know, and apply those concepts on their own. For that reason, AI tools work best as a support during study rather than a shortcut around it [1], [2].

3) Active Learning and Independent Understanding

Chi and Wylie [4] developed the ICAP framework to describe different levels of student engagement, drawing a clear line between passively taking in information and actively building or testing knowledge. That distinction applies directly to AI tutors: students who merely skim an AI-generated reply remain passive, whereas those who ask probing questions, restate ideas in their own words, work through practice problems, and compare different solutions engage in active learning.

Along similar lines, Roediger and Karpicke [5] studied the testing effect and showed that actively pulling information from memory improves long-term retention far more than simply rereading notes. Students using AI can put this finding into practice by trying to solve questions on their own before checking an AI-generated explanation.

4) Cognitive Offloading and Overdependence on AI

Cognitive offloading happens when people use external tools to reduce the mental effort needed to complete a task. Risko and Gilbert [6] explain how humans rely on outside aids to support memory and information processing. In school and college settings, AI tools can lighten the workload of searching for sources, organizing notes, or drafting early ideas.

Used in moderation, that help can be productive; used excessively, it robs students of regular practice in reasoning and problem-solving. Learners who grow used to copying finished AI responses often struggle to explain basic concepts or solve similar problems once the tool is taken away. AI should therefore prompt student thinking rather than do all the mental work on a learner's behalf.

5) Research Gap

Existing research covers the broad pros and cons of generative AI in education—including tailored tutoring, study support, accuracy, and ethics [1], [3]—while cognitive science underscores the value of active engagement and retrieval practice [4], [5]. Still, one crucial distinction deserves closer attention: the difference between AI that hands over direct answers and AI that guides learners through hints, explanations, and step-by-step reasoning.

The literature suggests a clear need to investigate whether scaffolded AI tutoring—which offers hints and guided steps—supports deeper understanding and longer retention than direct answer-giving tools. How a student's prior knowledge, confidence, and independent study habits shape those outcomes also remains an open question. This paper examines that tension through a literature-based review of how generative AI either builds understanding or encourages reliance on ready-made answers.

III. RESEARCH METHODOLOGY

1) Research Design

This study follows a descriptive, literature-based research design. It draws on published academic studies and educational policy reports covering generative AI, AI tutoring, active learning, independent thinking, and cognitive offloading. Rather than collecting primary survey responses or online questionnaire data, the paper builds its analysis entirely from secondary scholarly sources.

2) Scope of the Study

The study centers on college and university students who use generative AI tools for coursework and exam preparation. Because the paper relies solely on published literature, no human participants were recruited and no sampling procedures were carried out.

3) Sources of Secondary Data

Published journal articles, academic books, and educational policy guidelines served as the secondary sources for this review. The selected studies were grouped and analyzed across five core themes:

- Generative AI in higher education.
- AI tutors and personalized learning.
- Active learning and independent understanding.
- Cognitive offloading and overdependence on AI.
- Student effort and long-term knowledge retention.

4) Data Collection and Analysis

Sources were chosen based on their direct relevance to generative AI in education, AI-assisted tutoring, personalized learning, active engagement, cognitive offloading, and memory retention. A descriptive thematic review was used to identify shared findings, potential benefits, recurring limitations, and gaps in current research. Since no primary survey data were gathered, the paper presents qualitative thematic findings aligned with its main objectives rather than statistical tests.

IV. LITERATURE-BASED ANALYSIS AND RESULTS

Taken together, the reviewed studies show that generative AI can shape student learning in very different ways depending on how it is used. Organized around the main themes found in the literature, the subsections below examine the key benefits, risks, and classroom implications of generative AI tutors.

A. AI as a Learning Assistant

Generative AI tools can explain dense concepts in everyday language, provide helpful examples, summarize long readings, and answer follow-up questions on the spot. These features are especially useful for students who need extra clarification or want to review material at their own speed [1] [3]. A student learning a new programming concept, for instance, can ask an AI tutor to break down the logic, show a short example, and explain an error message. When the learner actively tests and questions that feedback, the interaction genuinely supports learning.

B. Personalized Learning and Immediate Feedback

One of the clearest advantages of generative AI is its ability to respond to individual questions right away. Students can ask for simpler or deeper explanations, request extra examples when stuck, and get immediate feedback without waiting for the next class or office hour [1], [2]. Still, students need to double-check AI feedback carefully, since generated replies can contain subtle errors or leave out important context [1], [3].

C. Ready-Made Answers and Reduced Effort

A major concern arises when students use AI to generate finished answers for assignments and graded work. Copying responses without working through the reasoning lets learners submit completed tasks while skipping the mental effort those exercises are meant to build [1], [2]. Ultimately, what matters most is not whether a student uses AI, but whether they stay actively involved in thinking through the work. AI assistance loses its educational value whenever it replaces careful reading, reasoning, practice, and independent problem-solving [4], [6].

D. Independent Learning and Critical Thinking

Independent learning requires students to ask thoughtful questions, check evidence, weigh competing ideas, and reach their own conclusions [4]. Generative AI can help by offering fresh angles or outlining possible arguments, yet students must evaluate every response critically instead of assuming it is right. Comparing AI outputs with textbooks, peer-reviewed articles, lecture notes, and worked examples helps keep critical thinking sharp [3].

E. Understanding and Long-Term Retention

True understanding means being able to explain an idea in one's own words and apply it to a brand-new problem. Simply reading a smooth AI-generated answer can create a false sense of familiarity without building real mastery. Research on retrieval practice, including Roediger and Karpicke [5], shows that actively recalling information is vital for long-term memory. Students can use AI productively to generate practice questions, provided they try answering those questions on their own before looking at the solutions [4], [5].

Table I. Potential Benefits and Challenges of Generative AI Tutors

Area	Potential Benefits	Possible Challenges
Concept explanation	Simplifies difficult topics	May provide incomplete or inaccurate explanations
Personalized learning	Responds to individual questions	Students may rely on AI for every doubt
Feedback	Provides quick suggestions	Feedback may not always be correct
Assignment support	Helps organize ideas and understand tasks	May encourage copying ready-made answers
Problem-solving	Demonstrates possible approaches	May reduce independent practice if copied
Revision	Generates summaries and practice questions	Passive reading may not ensure retention
Accessibility	Offers support at different times	Access and digital literacy may vary

*Source: Authors' synthesis based on references **[1]-[6]***

Table II. Comparison Between AI as a Learning Guide and AI as an Answer Provider

AI as a Learning Guide	AI as an Answer Provider
Student asks for concept explanations	Student asks only for final answers
Student attempts problems independently	Student copies generated solutions
AI is used to identify mistakes	AI output is accepted without checking
Student verifies information	Student assumes every response is correct
Encourages active learning	Can reduce personal involvement

This comparison shows that the educational value of generative AI depends heavily on how students choose to use it rather than on the tool itself.

V. DISCUSSION

Across the reviewed literature, a clear pattern emerges: generative AI tutors offer real promise for widening access to clear explanations and individualized study support. Used well, these tools help students resolve doubts, untangle difficult concepts, and explore extra examples at their own pace [1], [2]. Yet the ease of getting instant answers also creates a steady temptation toward overdependence. When learners treat AI mainly as a shortcut to finish homework or grab final answers, they miss out on developing their own reasoning and problem-solving skills [1], [6].

Drawing a firm line between guided support and direct answer generation is therefore essential. Guided tutoring encourages learners to attempt a task first, follow each step, and catch their own mistakes [4], [5]. Direct solutions can still be useful as worked examples or for checking completed attempts, but they should never take the place of independent practice. Teachers and institutions also play a vital role by setting clear expectations, teaching students how to verify AI claims, and keeping learners actively engaged in their own coursework [3].

VI. FINDINGS AND RECOMMENDATIONS

1) Findings

Reviewing the selected literature highlights several consistent findings:

- Generative AI tools expand access to clear explanations and extra academic support outside the classroom [1], [2].
- Tailored responses and fast feedback allow students to review material at a comfortable pace [1], [2].
- Overreliance on ready-made AI answers reduces opportunities for independent practice and skill building [1], [6].
- Because AI responses can include errors or bias, students must verify generated information carefully [1], [3].
- Active learning, retrieval practice, and independent problem-solving remain central to lasting comprehension and memory [4], [5].
- The true educational value of AI depends on active student effort, responsible habits, and thoughtful teacher guidance [3], [4].
- AI literacy and academic integrity should form a core part of modern technology-supported education [3].

2) Recommendations

Based on the literature reviewed, the following practical recommendations are offered (though not directly tested in this paper):

- Students: Use AI to clarify concepts, ask for hints, and generate practice questions rather than relying solely on finished answers.
- Teachers: Design assignments and classroom activities that evaluate students' reasoning, explanations, and independent problem-solving steps.
- Institutions: Publish clear guidelines covering responsible AI use, academic integrity, and fact-checking of AI-generated content.
- AI Developers: Build educational AI tools around guided learning—favoring hints, step-by-step prompts, and practice exercises over immediate final answers.
- Researchers: Run controlled studies comparing direct answer-giving AI with scaffolded AI tutoring, measuring independent problem-solving, understanding, and long-term retention.

VII. LIMITATIONS OF THE STUDY

- This study relies entirely on secondary literature and does not include primary survey or classroom data.
- No direct testing of student grades or learning outcomes was carried out.
- The effectiveness of AI tutors likely differs across subjects and student skill levels.
- Generative AI tools continue to evolve rapidly, meaning their features and limitations may shift over time.
- While this review identifies key educational relationships and concerns, it does not prove statistical cause and effect.

VIII. FUTURE SCOPE

Future research could use experimental studies to compare three study settings: traditional learning without AI, AI tools that give direct answers, and scaffolded AI tutors that provide hints and guided explanations. Researchers could measure immediate comprehension, delayed memory retention, independent problem-solving, and student confidence across each group.

Further work could also explore how a student's prior subject knowledge shapes the effectiveness of different AI tutoring styles. Larger studies spanning multiple academic fields and institutions would provide stronger evidence on how generative AI best supports higher education.

IX. CONCLUSION

Generative AI tutors give students new ways to explore tough concepts, get fast feedback, and study at their own pace [1], [2]. Yet the real educational payoff depends on how learners choose to use them. As the reviewed literature shows, AI strengthens learning when it encourages active questioning, independent practice, and critical thinking, whereas heavy reliance on ready-made answers weakens those very skills [4], [6].

Generative AI should therefore serve as a study partner rather than a substitute for a student's own effort. Learners need to work through the explanations they receive, verify facts against reliable sources, and practice applying ideas independently [3], [5]. In the end, the goal of bringing AI into education should be to deepen genuine understanding, not simply to finish coursework faster.

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