

A Comparative Evaluation of Artificial Intelligence Tools for Academic Applications: Usage, Accuracy, and Ethical Considerations

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Abstract: - This paper presents a comparative analysis of the usage, perception, and effectiveness of Artificial Intelligence (AI) tools in the teaching-learning process among computer science students and faculty members across various academic streams. The study highlights similarities and differences in how AI technologies are integrated into educational practices. Findings indicate that students demonstrate higher frequency of AI usage, particularly for assignments, concept understanding, research activities, and exam preparation, with many using AI tools on a daily or weekly basis. In contrast, faculty members show moderate adoption of AI, primarily utilizing it for instructional support and content preparation. The study also explores perceptions regarding the benefits and limitations of AI in education, including its impact on academic performance, learning efficiency, and teaching methodologies. Overall, the paper emphasizes the growing significance of AI in education while identifying the need for balanced and guided integration to enhance its effectiveness in both teaching and learning environments

1. INTRODUCTION

The ability of machines to carry out tasks that normally require human intelligence is known as artificial intelligence. This covers data-driven learning, language comprehension, pattern recognition, decision-making, and problem-solving.[1][6]

AI is fundamentally a combination of several technologies, such as computer vision, robotics, machine learning (ML), natural language processing (NLP), and more. These systems can function with or without human oversight, and they can be rule-based or data-driven.[1]

AI-enabled gadgets and applications are able to observe and recognize items. They are able to comprehend and react to human words. They can pick up new knowledge and skills. They are able to offer consumers and specialists comprehensive advice. They are capable of acting on their own, negating the need for human knowledge or assistance (a self-driving automobile is a prime example).[1][4]

However, in 2024, advances in generative AI (gen AI), a system that can produce original text, graphics, video, and other content, will be the main focus of AI researchers, practitioners, and headlines. Understanding machine learning (ML) and deep learning, the technologies that underpin generative AI tools, is crucial to comprehending generative AI in its entirety.[5]

1.1 Evolution of AI

Artificial Intelligence (AI) has a much longer history than most people realize, dating back to ancient Greece in the fields of philosophy and science. However, Alan Turing and a conference at Dartmouth College in 1956 are largely responsible for its current form. At that time, John McCarthy defined AI as "the science and engineering of making intelligent machines"[6]. It was called "the birth of artificial intelligence" by Russell and Norvig (2020). High-level cognition was fundamental to one of the early AI frameworks. The capacity to engage in multi-step reasoning, comprehend the meaning of natural language, create inventive artifacts, come up with creative plans that accomplish goals, and even reason about their own reasoning—rather than the ability to recognize concepts, perceive objects, or perform complex motor skills shared by most animals. Strong AI was the term used to describe this general human-like intellect. The main strategy for strong AI has been symbolic reasoning, which holds that computers are generic symbol manipulators rather than just numerical calculators. According to Newell and Simon's (1976) physical symbol system concept, the capacity to decipher and work with symbolic structures seems to be necessary for intelligent behavior. Although this approach first showed promise (Newell & Simon, 1963), its difficulties and lack of advancement in the twenty-first century have caused several disciplines of AI to abandon it.[1][13]

1.2 Types of AI

Numerous studies have classified AI into three major types based on capability and functionality [1].

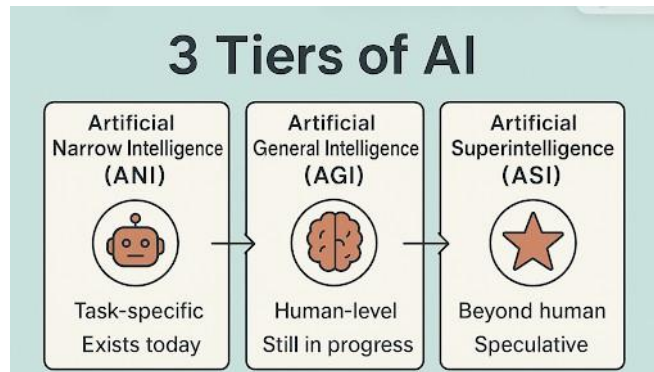


Fig 1: Types of AI

(Source:<http://www.solutionsbased.in/3-tiers-of-ai-explained-ani-agi-and-asi/>)

1. Artificial Narrow Intelligence (ANI): It is a machine intelligence that carries out particular tasks based on a large data set that accurately performs particular tasks. Speech recognition, object detection, and motion and human detection in cameras are a few examples. Popular features include fraud detection in financial data sets, sensors in CCTV, Alexa, Siri, and Tesla smart cars. Many businesses utilize photo enhancing software and GPS car control. Data-based AI is being used in education through a variety of teaching, evaluation, and feedback techniques [1][11].

2. Artificial General Intelligence (AGI): This term refers to a human machine and, as its name suggests, it is capable of performing all general human functions. It is referred to as the AI's future stage. Nowadays, it is frequently seen in robotics or fictional movies. In education, we can see the future AI, a teaching program that can assign assignments, coordinate with staff and students, and mimic human intelligence and behavior. AGI, which stands for strong AI, is referred to as the future "AI teacher" [11][13].

Artificial General Intelligence (AGI) also raises significant ethical concerns, particularly in the context of education. These include:

- **Bias in decision-making:** AGI systems may produce biased outcomes based on the data they are trained on, leading to unfair academic evaluations.
- **Lack of transparency:** The decision-making process of AGI systems may not be easily interpretable, making it difficult to justify academic outcomes.
- **Accountability issues:** It becomes challenging to determine responsibility for errors or incorrect decisions made by AGI systems.
- **Privacy and data security:** The use of large-scale student data raises concerns regarding data protection and misuse.
- **Reduction of human role:** Over-reliance on AGI may reduce the involvement of educators in teaching and evaluation processes.
- **Impact on critical thinking:** Excessive dependence on AGI tools may hinder students' independent learning and problem-solving abilities.

Therefore, ethical guidelines and responsible AI practices are essential for the safe integration of AGI in educational environments [2][13].

3. Artificial Super Intelligence (ASI): It is a stage of the Super Evolution of AI (Yampolskiy, 2016). According to studies, ASI would be able to solve issues, be creative in coming up with new ideas, and even have consciousness and emotions (Barney, 2023; Marri, 2018). We are currently in the era of ANI and AGI, ASI is still being studied, and the day when robotics and super AI will be used in virtual classrooms is not far off. [11][13]

1.3 Other types of AI models

The quick development of AI technology inevitably leads to the spread of new names and categories and terminologies describing different AI models[1][11].

1. Generative AI: The term "generative" refers to the AI's ability to produce new content, including literature, graphics, music, and even virtual worlds. These days, generative AI comes in a variety of forms .In education, generative AI is widely used for content creation, assignment assistance, and research support [2][9].

2. Deep Learning: In order to extract complicated patterns, recognize images, interpret natural language, and manage autonomous driving, this technology employs layers of neural networks to simulate how human minds function using multi-layered neural networks to learn complex patterns from large datasets [1][11].

3. Natural Language Processing (NLP): This kind of AI is incredibly useful for translating text, monitoring sentiment and meaning, and developing conversational interfaces that facilitate genuine human-machine communication. It also comprehends and interprets human languages [1][9].

4. Strong AI vs Weak AI: While strong AI models are progressing toward human-like thinking with the capacity to learn and apply knowledge, weak AI models are constrained, simple technology intended for particular jobs. For example, grammar correction tools and recommendation systems are examples of Weak AI as they perform specific predefined tasks [11][13].

5. Multimodal AI: In order to synthesize knowledge of complicated circumstances and carry out a number of activities, such as captioning an image, evaluating a video, and searching across media, these models collect, integrate, and interpret data in numerous formats from a variety of sources [11][15].

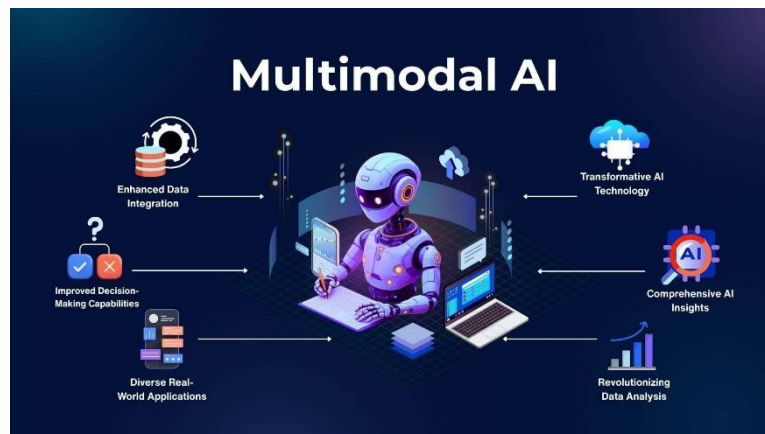


Fig 2: <https://k21academy.com/wp-content/uploads/2025/08/Multimodal-AI-applications.jpg>

6. Large Language Models(LLMs): These AI models can translate, comprehend and respond to questions, and summarize text or spoken words using deep learning and natural language processing. To improve accuracy, they apply contextual and cultural awareness to the task. Examples include ChatGPT, Google Gemini and Microsoft Copilot. These models are widely used in education for answering questions, generating assignments, summarizing content and assisting in programming tasks. However, LLMs may sometimes generate inaccurate or fabricated responses, which raises concerns regarding reliability [10][12].

2. AI IN EDUCATION

The field of education has undergone radical transformation as a result of AI's engagement. A science fiction and robotics model sprang to mind as we discussed AI. According to the term's interpretation, artificial intelligence (AI) refers to computer-based algorithms created by humans that are capable of carrying out human tasks quickly and intelligently, much like the human brain. It is a piece of software that we use on a daily basis, such as Siri on smartphones, Alexa at home, YouTube, Amazon, Mynta, META AI, and Face Books, Google Translate, and Google Maps are examples of software with built-in intelligence. These programs have equalized capabilities in image processing, speech recognition, choice patterns, decision making, language, and artificial creativity based on performing functions and regularly recording search data on these platforms. They also read and record human patterns and behave or respond like humans. Artificial Intelligence (AI) is the replication of human intelligence in machines designed to think and behave like humans. [2]

3. DIGITAL AI TWIN

The AI-powered equivalent is a **Digital Twin**, a digital representation of an individual that operates continuously to manage tasks such as scheduling, responding to emails, providing information, and performing routine activities on behalf of the user. It functions as an intelligent assistant that enhances, rather than replaces, human decision-making by learning user preferences and contextual information from connected systems. Digital twin operates under defined guidelines, ensuring data privacy and security and typically requires user consent before accessing or sharing sensitive data. This makes it a more reliable and efficient tool for improving productivity in both personal and educational contexts [3].

4. METHODOLOGIES

4.1 Sample

The study included both students and faculty members from different academic streams. In order to better understand the variation in AI usage and perception, the responses of students and faculty were analyzed separately, as previous studies indicate differences between these two groups.

The total sample consisted of **195 respondents**, which included:

200 students from the Computer Science stream

25 faculty members from different streams, including Computer Science, B.Com, BBA, and English

Students from the Computer Science stream were selected because they are more exposed to AI tools and technologies in their academic curriculum and are active users of such tools for learning, assignments, and project work. Faculty members from multiple disciplines were included to capture diverse perspectives on the integration of AI in teaching, evaluation, and academic practices.

Data was collected using a structured questionnaire distributed through Google Forms. Participants were selected based on their availability and willingness to respond, following a convenience sampling method. The inclusion of faculty from varied academic backgrounds helped in understanding cross-disciplinary adoption of AI, while the larger student sample provided detailed insights into usage patterns and learning behavior.

However, since the sampling method is non-probability based and the sample distribution is uneven, the findings are primarily exploratory and may not be generalized to the entire population. Future research can consider a more balanced and larger sample size for improved reliability.

4.2 Data Collection and Research instrument

The data collected through the questionnaire was analyzed using descriptive statistics such as frequency and percentage to understand the usage, perception, and effectiveness of AI tools. Since the study included both students and faculty, the responses were analyzed separately to compare their perspectives.

The analysis was based on different sections of the questionnaire. Questions related to awareness and usage (Items 1–5) were used to study familiarity and frequency of AI tool usage. Questions 6–10 focused on usability and confidence levels, while

Items 11–15 examined the impact of AI on learning and teaching. Trust and accuracy of AI tools were analyzed using Items 16 and 17, where accuracy was evaluated based on factors such as correctness, relevance, and completeness of responses.

Challenges faced by respondents (Item 18) and their overall perception of AI tools (Items 19 and 20) were also analyzed to understand common issues and suggestions for improvement. This approach helped in identifying patterns and differences between students and faculty in the use of AI tools in education.

4.3 Data Analysis

Descriptive statistical techniques, such as frequency and percentage computations, were used to examine quantitative data in order to give a clear picture of respondents' opinions, usage trends, and perceived efficacy of AI tools. A comparative knowledge of the use of AI in the teaching-learning process was made possible by the analysis, which included replies from instructors and computer science students from a variety of academic streams.

The student questionnaire's open-ended question yielded a small amount of qualitative data, which was then subjected to basic thematic analysis to find common recommendations and ideas about enhancing the use of AI in education. [4]

Two kinds of analysis were performed: vertical analysis focused on individual responses to capture specific points of view, while horizontal analysis examined trends throughout the entire dataset to identify common tendencies across students and teachers.

To increase the validity and dependability of the findings, a methodical approach that included data organization, answer coding, and pattern interpretation was employed. A comparison study was also carried out to identify similarities and differences between teachers' and students' viewpoints, applications, and challenges with AI tools.

This approach provided a comprehensive understanding of the impact of AI technologies in education while ensuring the results were transparent, consistent, and trustworthy by fusing quantitative and limited qualitative insights

5. RESULT

5.1 AI usage among Students

Survey findings indicate that AI adoption among students is very high, with the majority of respondents actively using AI tools in their studies. Most students reported having 1–3 years of experience, while a growing number have started using AI within the last year, showing a rapid increase in adoption.

In terms of tool usage, ChatGPT is the most widely used AI tool, followed by Google Gemini and Microsoft Copilot, along with writing tools like Grammarly and Quillbot. Students reported using these tools frequently, with many accessing them daily or weekly, making AI an integral part of their academic routine.

Students are utilizing AI for a variety of academic purposes, including:

- Completing assignments and projects
- Understanding difficult concepts
- Research and information search
- Exam preparation
- Writing assistance

This highlights that AI tools are supporting multiple dimensions of learning rather than a single function.

Students generally find AI tools user-friendly, with most ratings ranging from moderate to high. Their confidence in using AI without guidance is also moderate to high, indicating increasing familiarity and independence in using these tools.

In terms of impact, most students agree that AI tools enhance learning efficiency, help them understand complex topics more easily, and enable them to complete academic tasks faster. However, responses related to motivation and personalized learning are more balanced, suggesting that AI support varies depending on individual learning preferences.

Despite the benefits, students reported several challenges. The most common concerns include:

- Lack of accuracy in AI-generated content
- Data privacy and security issues
- Overload of information
- Lack of proper guidance on effective use
- Overdependence on AI tools

Trust in AI-generated outputs is generally neutral to high, while satisfaction levels range from neutral to satisfied, indicating that students find AI useful but not completely reliable.

Overall, most students believe that AI tools improve learning to some extent or significantly, although a small group feels there is no major difference compared to traditional methods.

To improve the effective use of AI in education, students suggested that institutions should:

- Provide AI training and workshops
- Establish ethical guidelines for AI use
- Improve digital infrastructure
- Ensure better access to AI tools

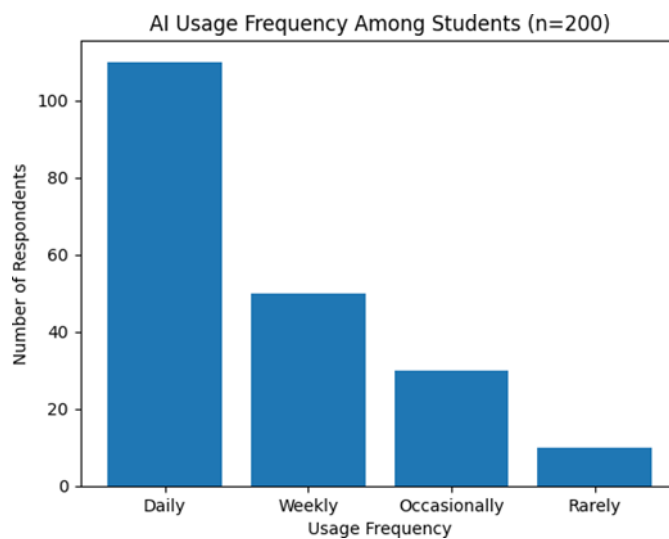


Fig 3: Distribution of AI Tool Usage Frequency Among Students

5.2 AI Usage Among Faculty

The survey responses indicate that awareness of AI tools among faculty is very high, with almost all respondents confirming that they are familiar with AI tools used in education. However, their level of usage and experience varies, with most faculty having 1–3 years of experience, while a smaller group has either recently started (less than 6 months) or has more than 3 years of experience.

In terms of tools, ChatGPT and Google Gemini are the most commonly used, followed by tools like Grammarly, Microsoft Copilot, and Quillbot. Faculty mainly use these tools for understanding concepts, research and information search, writing assistance, assignment preparation, and exam question setting.

When it comes to frequency of use, many faculty members use AI tools daily or weekly, showing that AI has become a regular part of their academic workflow, although not always deeply integrated into teaching practices.

Faculty generally find AI tools easy to use, with most ratings falling between 4 and 5 (easy to very easy). Similarly, their confidence levels are moderate to high, though some still prefer guidance, especially when using AI for more complex tasks.

Perceived Benefits

Faculty responses highlight several key advantages of AI tools:

- AI helps make learning and teaching faster and more efficient
- It supports better understanding of difficult concepts
- It assists in organizing notes, references, and schedules
- It contributes to personalized learning experiences
- It improves motivation and overall academic performance

Trust and Satisfaction

Most faculty members show a neutral to moderate level of trust in AI-generated content, with a few expressing high trust. In terms of satisfaction, responses are largely “satisfied” or “neutral,” with only a small number expressing dissatisfaction.

Challenges Faced

Despite the benefits, faculty reported several challenges:

- Data privacy concerns (most common)
- Lack of accuracy in AI outputs
- Overdependence on AI tools
- Too much or overwhelming information
- Lack of proper guidance or training

These challenges indicate that while AI is useful, faculty are cautious about relying on it completely.

Perception of AI in Education

Most faculty believe that AI tools help students learn better to some extent, and a few believe they significantly improve learning. However, some still feel that traditional methods are equally or more effective, showing a balanced and cautious perspective.

Suggestions for Improvement

Faculty suggested several ways institutions can improve AI usage:

- Providing AI training and workshops (most recommended)
- Offering access to better AI tools
- Improving digital infrastructure
- Establishing ethical guidelines for AI use

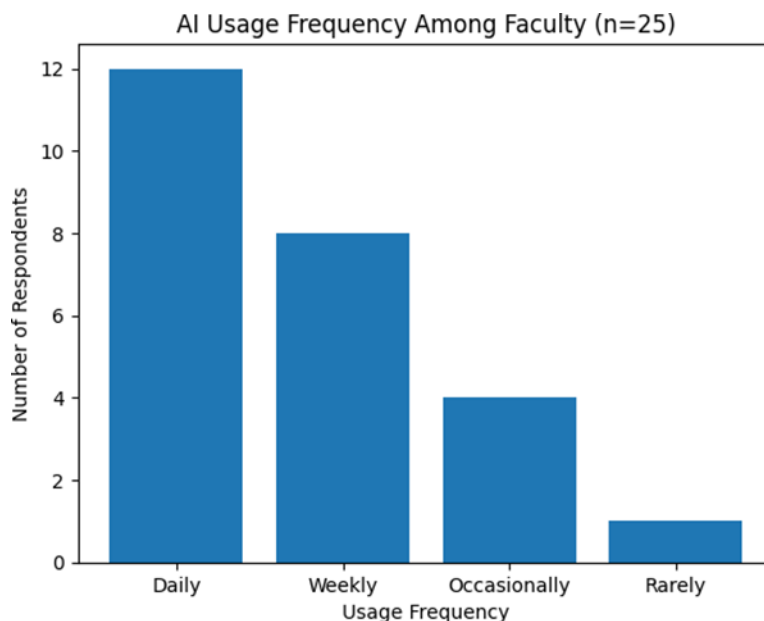


Fig 4: Distribution of AI Tool Usage Frequency Among Faculty

6. COMPARING OF STUDENT AND FACULTY SURVEYS

A comparative analysis of responses from instructors and students studying computer science from various streams reveals important similarities and differences in the application, perception, and effectiveness of AI technologies in the teaching-learning process.

Category	Student Surveys	Faculty Surveys
AI Usage	Students demonstrate high usage of AI tools, especially for assignments, understanding concepts, research and exam preparation with most using AI daily or weekly	Faculty show moderate usage, mainly for preparing assignments, generating content, and referencing materials, with less frequent usage compared to students.
AI Proficiency	Students exhibit moderate to high comfort levels, but still require guidance for responsible and effective use.	Faculty are interested in integrating AI, but require formal training and institutional support.
Perceptions of AI	Students are generally positive, appreciating efficiency and speed, but express concerns about	Faculty show a positive but cautious attitude, with concerns about accuracy, reliability, academic integrity

	overdependence, accuracy and data privacy.	and ethical use of AI.
Challenges	Students report issues such as data privacy concerns, lack of accuracy, overdependence, and lack of proper guidance.	Faculty report concerns including data privacy, accuracy, excessive information, and need for training.

7. CONCLUSION

This study shows that Artificial Intelligence (AI) is becoming an important part of the teaching–learning process, with noticeable differences between students and faculty. Students demonstrate high usage of AI tools, frequently using them for assignments, concept understanding, research, and exam preparation. They are generally comfortable with AI and view it as a tool that improves learning efficiency and performance.

On the other hand, faculty show moderate adoption, mainly using AI for content preparation, references, and academic tasks. While they are interested in integrating AI into teaching, many require formal training and institutional support to use it effectively.

Both students and faculty have a positive but cautious perception of AI. They appreciate its benefits but share concerns about data privacy, accuracy, and overdependence, with faculty also emphasizing academic integrity and ethical use.

Overall, AI has strong potential to enhance education, but its success depends on responsible usage, proper guidance, and institutional support. Providing training, clear guidelines, and better infrastructure can help maximize its benefits while minimizing risks.

8. FUTURE SCOPE

Based on the findings of this study, several measures can be taken to enhance the effective and responsible use of AI in education.

Firstly, institutions should provide regular training programs and workshops for both students and faculty to improve their understanding of AI tools and their practical applications. This will help users move beyond basic usage and adopt AI more effectively in teaching and learning.

Secondly, there is a need to establish clear ethical guidelines and policies for AI usage. These guidelines should address issues such as academic integrity, responsible use, and avoidance of overdependence, ensuring that AI supports learning rather than replacing critical thinking.

Improving digital infrastructure and access to reliable AI tools is also essential. Institutions should ensure that students and faculty have access to secure, high-quality AI platforms that protect user data and provide accurate information.

Additionally, future efforts should focus on integrating AI into the curriculum in a structured manner. This includes using AI for personalized learning, adaptive assessments, and interactive teaching methods that cater to different learning needs.

Finally, further research can be conducted to analyze the long-term impact of AI on academic performance, critical thinking, and skill development. Expanding the study to larger and more diverse groups can provide deeper insights into how AI can be effectively implemented in education.

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