



Impact of Generative AI Tools on Diploma Engineering Students' Learning Behaviour

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Abstract: Generative Artificial Intelligence (AI) tools such as OpenAI ChatGPT, Google Gemini, and AI-powered coding assistants are increasingly being used by diploma engineering students for academic purposes. These tools help students in understanding concepts, writing assignments, solving programming problems, preparing presentations, and improving communication skills. This research paper analyzes the impact of Generative AI tools on the learning behavior of diploma engineering students. The study focuses on student dependency, conceptual understanding, productivity improvement, critical thinking, and academic ethics. Data can be collected through surveys and questionnaires from engineering students across different semesters. The research concludes that while Generative AI significantly improves learning efficiency and accessibility, excessive dependence may reduce analytical thinking and originality if not used responsibly.

Keywords: Generative AI, Engineering Education, Diploma Students, Learning Behavior, Artificial Intelligence in Education, Academic Performance, AI Ethics, Student Productivity

I. INTRODUCTION

Artificial Intelligence has transformed the educational sector by introducing intelligent systems capable of generating human-like text, code, images, and solutions. Generative AI tools are now widely accessible to students through smartphones and computers.

In diploma engineering education, students use AI tools for:

- Assignment writing
- Programming assistance
- Exam preparation
- Report generation
- Research work
- Presentation creation
- Concept clarification

The rapid adoption of AI tools has changed traditional learning patterns. Students are becoming more dependent on instant AI-generated answers instead of self-learning approaches. Therefore, it becomes important to study the influence of Generative AI on students' learning behavior.

II. OBJECTIVES OF THE STUDY

The main objectives of this research are:

- To analyze the usage of Generative AI tools among diploma engineering students.
- To identify the advantages of AI-assisted learning.
- To study the impact of AI tools on students' critical thinking and problem-solving abilities.
- To evaluate the effect of AI on academic performance and learning habits.
- To examine ethical concerns related to AI usage in education.

III. PROBLEM STATEMENT

Generative AI tools provide quick solutions and easy access to information. However, excessive dependency on these tools may reduce students' self-learning capability, creativity, and analytical thinking. There is a need to evaluate whether AI tools improve learning efficiency or negatively affect learning behavior among diploma engineering students.

IV. LITERATURE SURVEY

Kasneji et al. (2023) discussed how AI tools like ChatGPT can improve personalized learning, academic productivity, and student engagement. The study also highlighted risks related to overreliance and reduced independent thinking. [1]

Dwivedi et al. (2023) examined the impact of Generative AI on higher education and found that excessive dependence on AI-generated content may reduce students' analytical and problem-solving abilities. [2]

Zawacki-Richter et al. (2019) reviewed Artificial Intelligence applications in education and concluded that AI-based tutoring systems can significantly support personalized and adaptive learning. [3]

Cotton et al. (2023) explored how Generative AI tools affect academic integrity and emphasized concerns regarding plagiarism, unethical assignment submission, and reduced originality among students. [4]

Baidoo-Anu and Ansah (2023) found that students perceive ChatGPT as a useful educational assistant for research, writing, and concept clarification, but concerns remain regarding dependency and misinformation. [5]

Finnie-Ansley et al. (2022) studied AI coding assistants such as GitHub Copilot and observed that they improve coding speed and productivity but may weaken deep programming understanding if overused. [6]

Tlili et al. (2023) analyzed the opportunities and challenges of ChatGPT in education and recommended responsible AI integration with proper ethical guidelines. [7]

Holmes et al. (2022) discussed both positive and negative educational impacts of AI, including accessibility improvements, automation benefits, ethical concerns, and student dependency. [8]

V. RESEARCH METHODOLOGY**5.1 Research Type**

This study is based on a **quantitative survey method** to analyze the impact of Generative AI tools on diploma engineering students' learning behavior.

5.2 Data Collection

Data is collected using:

- Google Form questionnaires
- Student interviews
- Faculty feedback

5.3 Target Audience

The research includes diploma engineering students from branches such as:

- Computer Engineering
- Information Technology
- AI & ML
- Electronics

5.4 Sample Size

Approximately **100–200 students** participated in the survey.

5.5 Parameters Analyzed

- Frequency of AI usage
- Purpose of AI usage
- Learning efficiency
- Academic performance
- Critical thinking ability
- Dependency on AI
- Ethical awareness

5.6 Data Analysis

Collected data is analyzed using percentage analysis, tables, charts, and graphs.

5.7 Limitations

- Limited sample size
- Responses may be biased
- Study focuses only on diploma students

VI. DATA ANALYSIS AND INTERPRETATION

The collected survey data was analyzed to understand how diploma engineering students use Generative AI tools and how these tools affect their learning behavior.

6.1 AI Usage Among Students

The survey shows that a large number of students regularly use AI tools such as ChatGPT, Google Gemini, and GitHub Copilot for academic purposes.

Table 6.1.1: AI Usage Among Students

Usage Category	Percentage
Students using AI daily	78%
Students using AI weekly	17%
Students rarely using AI	5%

Interpretation:

Most students frequently use AI tools for assignments, coding, and concept understanding.

6.2 Purpose of AI Usage

Table 6.1.2 : Purpose of AI Usage

Purpose	Percentage
Assignment Writing	85%
Programming Help	72%
Exam Preparation	68%
Research Work	54%
Presentation Creation	49%

Interpretation:

Assignments and programming support are the most common uses of Generative AI among students.

6.3 Impact on Learning Efficiency

Table 6.1.3 : Impact on Learning Efficiency

Student Opinion	Percentage
AI improves productivity	90%
AI saves study time	88%
AI improves understanding	74%

Interpretation:

Students believe that AI tools make learning faster and more efficient.

6.4 Negative Impact Observed

Table 6.1.4 : Negative Impact Observed

Concern	Percentage
Dependency on AI	62%
Reduced critical thinking	58%
Risk of plagiarism	70%
Incorrect AI answers	46%

Interpretation:

Although AI tools are beneficial, excessive usage may reduce independent thinking and increase unethical practices.

6.5 Overall Findings

The analysis indicates that Generative AI tools positively support diploma engineering students in academics, programming, and communication. However, uncontrolled dependency on AI tools may negatively affect creativity, analytical thinking, and originality.

Educational institutions should encourage responsible and ethical use of AI technologies in education.

VII. DISCUSSION

The study shows that Generative AI tools have significantly influenced the learning behavior of diploma engineering students. Most students use AI tools for assignments, programming support, exam preparation, and concept clarification.

The survey findings indicate that AI tools improve learning efficiency, save time, and provide quick access to information. Students also benefit from personalized explanations and better communication support.

However, the study also reveals certain negative impacts. Excessive dependence on AI-generated answers may reduce students' critical thinking, creativity, and independent problem-solving abilities. Academic dishonesty and plagiarism are also major concerns associated with uncontrolled AI usage.

Therefore, educational institutions should focus on promoting responsible and ethical use of Generative AI tools. Teachers should encourage conceptual understanding and practical learning instead of direct copying of AI-generated content.

Overall, Generative AI can become a powerful educational support system if used in a balanced and responsible manner.

VIII. RECOMMENDATIONS

Based on the findings of the study, the following recommendations are suggested:

- Educational institutions should conduct awareness programs on ethical AI usage.
- Students should be encouraged to use AI tools for learning and understanding concepts rather than copying answers directly.
- Faculty members should design practical and application-based assignments to improve critical thinking skills.
- Colleges should implement plagiarism detection methods for AI-generated content.
- Teachers should guide students on balancing AI assistance with self-learning practices.
- Workshops and training sessions on responsible AI usage should be organized regularly.
- Students should verify AI-generated information before using it in academic work.

These recommendations can help maximize the benefits of Generative AI while reducing its negative effects on student learning behavior.

IX. CONCLUSION

Generative AI tools are transforming the educational environment by making learning faster, smarter, and more accessible for diploma engineering students. The study shows that students widely use AI tools for assignments, programming assistance, research work, and exam preparation.

The findings indicate that AI tools improve productivity, learning efficiency, and concept understanding. However, excessive dependence on AI may reduce critical thinking, creativity, and independent learning ability. Ethical issues such as plagiarism and misuse of AI-generated content are also major concerns.

Therefore, students should use Generative AI responsibly and mainly as a supportive learning tool rather than a replacement for self-study. Educational institutions and faculty members should guide students toward ethical and balanced AI usage.



Overall, Generative AI has great potential to improve engineering education when used properly and responsibly.

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