

AI-Assisted Learning Sessions Analysis

An End-to-End Data Analysis Project

Executive Summary

This project analyzes **10,000 AI-assisted learning sessions** to understand how students across different academic disciplines interact with AI tools. Using SQL, Python, and data visualization techniques, the analysis explores user engagement, task preferences, satisfaction, reuse behavior, and time-based trends. The findings reveal strong adoption of AI for writing and studying tasks, high reuse rates regardless of outcome, and a preference for moderate AI assistance levels. The project concludes by identifying opportunities for predictive modeling and AI product optimization.

Dataset Overview

- **Total Sessions:** 10,000
 - **Student Levels:** Undergraduate, High School, Graduate
 - **Disciplines Covered:**
Business, History, Psychology, Mathematics, Engineering, Computer Science, Biology
 - **Time Period:** 2024–2025
 - **Key Features:**
Session Length, Total Prompts, Task Type, AI Assistance Level, Final Outcome, Satisfaction Rating, Reuse Indicator
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Project Objectives

- Analyze how students use AI across tasks and disciplines

- Identify factors influencing satisfaction and reuse
 - Compare engagement patterns across years
 - Derive insights that can inform AI product improvement
 - Prepare groundwork for future machine learning models
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Methodology

1. Data Cleaning & Preprocessing

- Handled missing values and corrected data types
- Extracted time-based features (Year, Month)
- Created derived variables for analysis

2. SQL Analysis

- 25 business-driven SQL queries
- Aggregations, CASE statements, reuse rate calculations
- Time-based and behavioral analysis

3. Visualization

- Bar charts, scatter plots, heatmaps
 - Focus on interpretability and storytelling
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Key Findings & Insights

1. Student & Discipline Usage

- Undergraduate students are the **largest AI user group**
 - **Engineering students** use AI the most overall
 - **Mathematics students** are the least frequent AI users
 - Biology students show higher reuse and satisfaction compared to math students
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2. Task Usage Patterns

- Most common tasks:
 - **Writing**
 - **Studying**
- Least common tasks:
 - **Research**
 - **Brainstorming**

 *This indicates that users primarily rely on AI for structured, goal-oriented tasks rather than exploratory or open-ended work.*

3. Engagement Metrics

- **Average session length:** 19–20 minutes
 - **Average prompts per session:** 5–6
 - Writing tasks typically involve **20–21 minutes** and **5–6 prompts**
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4. Task Outcomes

At the end of AI sessions:

- **47%** → Assignment completed
- **28%** → Idea drafted
- **16%** → User confused
- **8%** → User gave up

📌 *Nearly three-quarters of sessions result in productive outcomes.*

5. Reuse Behavior

- **~70% of users reuse AI**, regardless of session outcome
- Reuse rate is consistent across **2024 and 2025 (~69–70%)**
- Over **2,000 sessions** involved usage longer than 10 minutes
- About **600 users** chose not to reuse AI

📌 *This highlights strong user trust and habitual usage.*

6. Satisfaction Analysis

- **Average satisfaction rating: 3.4 / 5**
- **Biology students** report the highest satisfaction (~3.5)
- **Engineering students** report the lowest (~3.2)

A heatmap analysis shows:

- **Session length and satisfaction are weakly correlated**
- Longer sessions often indicate **inefficiency rather than higher satisfaction**

📌 *More time spent does not necessarily improve user experience.*

7. AI Assistance Level Preference

- **AI Assistance Level 4** is most used overall
- **Level 3** is preferred for tasks like:
 - Homework
 - Studying
 - Coding
- Users favor **moderate to high AI support**, not extremes

Graduate students:

- Prefer AI for **writing**
- Use it less for brainstorming

Undergraduate students:

- Use AI more for **coding and homework**
- Use it less for research-oriented tasks

8. Time-Based Trends

- Peak AI usage: **June, July, August**
 - Likely aligned with academic exams
- Lowest usage: **February and December**
- **2024:** 5,100+ sessions
- **2025:** 4,800+ sessions (so far)

- Average session length declined from **~22 min (2024)** to **~19–20 min (2025)**

 *This suggests improved efficiency or increased user familiarity.*

Business & Product Implications

- AI tools are most valuable for **writing and learning support**
 - Moderate AI assistance levels deliver the best balance of engagement and reuse
 - High reuse despite mixed outcomes indicates **strong perceived value**
 - Shorter sessions with higher satisfaction suggest opportunities to optimize AI workflows
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Limitations

- Dataset is limited to academic contexts
 - No causal relationships inferred
 - Satisfaction is subjective
 - No predictive modeling implemented yet
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Future Scope (Machine Learning Transition)

This project sets the foundation for ML applications such as:

- Predicting **satisfaction rating**
- Predicting **likelihood of reuse**
- Identifying **feature importance**

- Classification of session outcomes
 - Recommendation of optimal AI assistance levels
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Conclusion

This analysis demonstrates that AI has become an integral academic support tool, especially for writing and studying tasks. Strong reuse rates, consistent engagement patterns, and preference for moderate assistance highlight user trust in AI systems. The findings provide actionable insights for AI product improvement and establish a solid base for future machine learning models.