



AI Engagement Activities in Introductory Statistics

College and Classroom Setting

Centre College is a liberal arts college of around 1400 students in Danville, KY.

About 70% of students take MAT 130:
Introduction to Statistics
(required for data science, economics, and several other majors on campus).

Stats and AI Discussion Boards

Students interact with an AI bot to answer a prompt.

The goal is a low stakes, high impact assignment.

Graphical Displays

Ask an AI chat bot to find an example on the Internet of one of the types of graphs that we have learned about in this class. It should be in the context of a real data analysis for a specific topic you are interested in. Then ask the chat bot to give you a description of the graph, in context, as if you were in an introductory statistics class. Post that description below along with a link to the graph. Below the AI description, write a couple of sentences evaluating the AI answer based on what we have learned in this class. Did it incorporate our required components (shape, center, spread, context)? Did it do a good job telling the story of the data?



Troubleshooting R

Take a bit of R code that is giving you an error message or that is not doing what you expect. Type it into an AI chat bot and see if it can tell you what is wrong and how to fix it. Post the transcript of your chat below, along with a sentence about whether it was able to help you figure out the problem.



Exam Prep

Ask an AI chat bot to quiz you over a topic that will be covered on an exam (such as simple linear regression). Try asking it for a variety of question formats and difficulty levels. Post an excerpt of your transcript below, including at least one AI question, your response, and its feedback.



Help with a Topic

Think of a topic in this class that you have struggled to understand. Then engage in a conversation with an AI chat bot about this topic. This should include specific questions that you have about the topic, but it can also be a request for more resources. Post a transcript of your conversation below.



Hypothesis Testing

Ask an AI chat bot to find a article (or paper, blog post, etc.) that performs statistical inference, including a hypothesis test, on a subject of interest to you. Ask the chat bot to identify/describe the population of interest, the sample, and the null and alternative hypotheses for the test.

Record the bot's response below, along with the link and a couple of sentences about whether or not you agree with the bot's characterization of the test.



Answering Exam Questions

Type one of the exam questions into an AI chat bot, and ask it to answer the question like it was an intro stats student. Post the question and answer below. Then compare the answer to the posted rubric, and write a couple sentences explaining whether or not you think the chat bot would have gotten full credit on this question.

Help with a Topic: Example

Me: I'm having trouble understanding the central limit theorem in statistics. Can you help me understand?

AI: The Central Limit Theorem tells us that:

If you take many samples of size n from a population and compute their means, then the distribution of those sample means will be approximately normal (bell-shaped) — even if the original population is not normal — as long as the sample size is large enough.

It also gives us the mean and standard deviation of that sampling distribution.

Me: So how do I know when I should use it and when I should not use it?

AI: You use the CLT when you want to make inferences about a population mean (or the sum) using a sample, but the population distribution is unknown or not normal.

Typical situations:

1. You want to calculate a confidence interval for a mean, but the population is not normal.

Example: You measure wait times at a restaurant. The data is skewed.

→ Use CLT if sample size is $n \geq \sim 30$.

2. You want to use z-scores or normal approximations for sample means.

If you're dealing with a mean of a sample, not a single observation, CLT lets you treat the mean as normally distributed.

3. You want to perform hypothesis tests about a mean.

Example: Testing whether average battery life is really 10 hours.

→ You use CLT to justify that the sample mean behaves normally.

Help with a Topic: Example

When NOT to Use the CLT

1. When the sample size is very small AND the population distribution is very non-normal.

In this case, the sample mean may not be close to normal yet.

2. When you're dealing with single observations.

CLT is about sample means, not individuals.

3. When you know the population itself is already normal.

Then you don't need CLT — the sample mean is automatically normal for any n .

Me: Why do I have to use the Central Limit Theorem though?

AI: The CLT is what makes statistical inference possible in real life.

Most real-world data is not normally distributed — but with CLT, sample means behave normally, so we can:

build confidence intervals

do hypothesis testing

use z-scores and normal tables

approximate probabilities

Even when the raw data is messy (skewed, lumpy, weird), the averages smooth everything out.

Answering Exam Questions: Example

I asked ChatGPT:

Answer this question like you're an intro to stats student: "If the p-value is calculated to be 0.39, write an interpretation of what this means"

Chat responded with:

If the p-value is 0.39, that means there is a 39% chance of getting results like the ones we observed (or more extreme) if the null hypothesis is actually true. Since 0.39 is much larger than the usual significance level (like 0.05), we don't have enough evidence to reject the null hypothesis.

The answer on the rubric has the same fundamental answer but including the specific context of the problem.

I think Chat would've gotten full credit on this question. It knew exactly what the concept/meaning of a p-value was, and had it been given the context of the problem, I think it could have made the correct interpretation based on the information it was given and then generated. By knowing what a p-value actually is, it should be applicable to any contextual situation.

I found all of them particularly useful. I feel as though they were helpful in allowing me to interact with AI and to see how they interacted with complex statistical problems. I wish that there would be more priority of them in class. I liked them overall.

One that I found helpful was the exam preparation one as it showed me how I could have AI quiz me for exams. Each one was a valuable learning experience as it showed us how to use other resources.

I did not find them useful. I do not use AI often and I think this assignment further proved that it is not beneficial for the majority of academic topics. It often gave me a really vague or wrong answer, so these felt like a waste of time.

As someone who does not agree morally with the usage of generative AI, I felt like it was more of a waste. There are plenty of resources to help understand topics in statistics without having to harm the environment.

Student Feedback



Discussion

- These types of activities can be helpful in demonstrating ways AI can help enhance student learning.
- However, students have very different viewpoints on the ethics of AI, which should probably be addressed when discussing these assignments.
- One challenge is determining how much to emphasize/incentivize completing such assignments.