



CCAS, Department of Economics

Reimagining Economics instruction with genAI

May 2, 2024

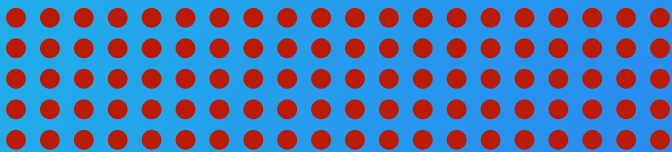
Jason Torres, Ed.D.
Director, Strategic Digital Learning Initiatives

LIBRARY.GWU.EDU

Where I stand (today)

Within LAI, I focus on addressing the elevation of digital and AI literacies by partnering with faculty and staff across GWU. I think...

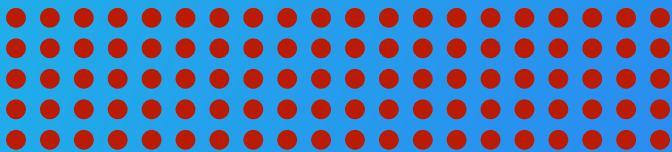
- AI is helpful, insightful, and fun.
- Human-AI collaboration is the future of learning and work.
- We need to prepare ourselves and **students** to be users, leaders, and decision-makers with AI.
- We all need to re-think and communicate the 'value of learning' (the basics).
- We need to identify a plan for AI literacy in our areas.



Objectives for today

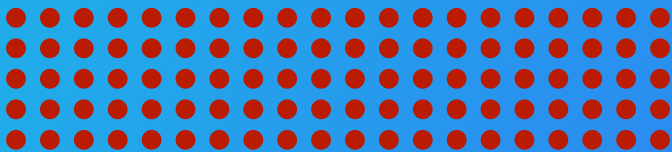
- Provide foundations for thinking about and working with genAI in pedagogy.
- Define and demonstrate communications strategies with genAI tools.
- Review and discuss partnered instructional approaches with genAI tools.

Note: What you see today will likely be different over the next couple of months.



Our roadmap

- Using genAI to **generate realistic economic scenarios and questions**
- Using genAI to **discover complex economic problems**
- Using genAI to **do mathematics**
 - with Juan Kloppe, M.D. (MISPH)
- Using genAI to **enhance student note-taking**





Foundation: genAI and pedagogy

Shortly reviewing what we should do, what AI literacy is, and what AI can do in teaching and learning.

Revise and reimagine

Generative Artificial Intelligence (genAI) helps us to critically re-examine how we are teaching and how our students are learning.

“Revision literally means to “see again”, to look at something from a fresh, critical perspective. It is an ongoing process of rethinking the paper: reconsidering your arguments, reviewing your evidence, refining your purpose, reorganizing your presentation, reviving stale prose.”

University of North Carolina, The Writing Center

<https://writingcenter.unc.edu/tips-and-tools/revising-drafts/>

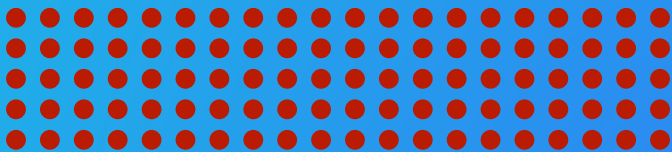


Teachers: self-reflect and adapt

Pursue knowledge of **digital** and **AI literacies**.

- When, where, why and how to use technologies.
- What is available and how it is evolving.
- Strategies to generate humanistic outputs.

We should build our knowledge on **what AI is** and its **capabilities**.



What is AI literacy?

"AI literacy [is] a set of competencies that enables individuals to critically evaluate AI technologies; communicate and collaborate effectively with AI; and use AI as a tool online, at home, and in the workplace." (Long and Magerko, 2020)

A conceptual framework

What is it?

1. Recognizing AI
2. Understanding intelligence
3. Interdisciplinary
4. General vs. narrow

What can AI do?

5. AI's strength and weaknesses
6. Imagine future AI

How does AI work?

Cognitive systems

7. Representations
8. Decision-making

Machine learning

9. Machine learning steps
10. Human role in AI
11. Data literacy
12. Learning from data
13. Critically interpreting data

Robotics

14. Action and reaction
15. Sensors

How should AI be used?

16. Ethics

How do people perceive AI?

17. Programmability



Explore capabilities

Generative Artificial Intelligence (genAI) can be used to deepen your teaching as well as enhance the learning experience. Think about ways that more time can be allocated to teacher-student and student-student engagement.

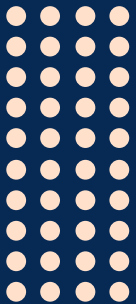
On-going challenges in the teacher-student-AI partnership will be revealing effective uses, communicating ethical applications, and critiquing output.

Example (current) capabilities →→→

- Give explanation to (new) concepts
- (Re-)create assessment rubrics
- Generate outlines and find resources for presentations
- Generate visuals – creative and realistic
- Creation of synthetic data
- Analyze responses to open-ended questions
- Explore and summarize articles
- Provide alternative perspectives and arguments
- Revise and standardize language
- Create a structure – titles and headers – for papers
- Assist in creative thinking and learning design
- Identify interlinked sources and instructional media

Ways you can use genAI in teaching

General	Summarizing large amounts of text	Personalized learning with custom GPTs	Map out alternative steps to a solution	Identify data visualization strategies
Learning and media design	Draft course and module learning objectives	Generate and/or revising a weekly plan	Brainstorm learning activities	Draft storyboards, visual designs, and scripts
Assessment and discussion design	Create (large pool) questions and answers	Generate explanations why X is correct	Draft discussion questions and potential follow-ups	Create counter arguments
Higher order thinking engagement	Create multiple drafts to compare	Iterate and expand on ideas linking sources	Interview the user, gather information, and pose a solution	Generate practice problems and scenarios



A way to approach design and evaluation

Ng et al. (2021) proposed using the Blooms architecture for educators and designers beginning to build AI literacy; as well as due to a lack of classification levels of cognitive processes with AI learning.

Evaluate and create AI (Blooms levels 5 and 6)

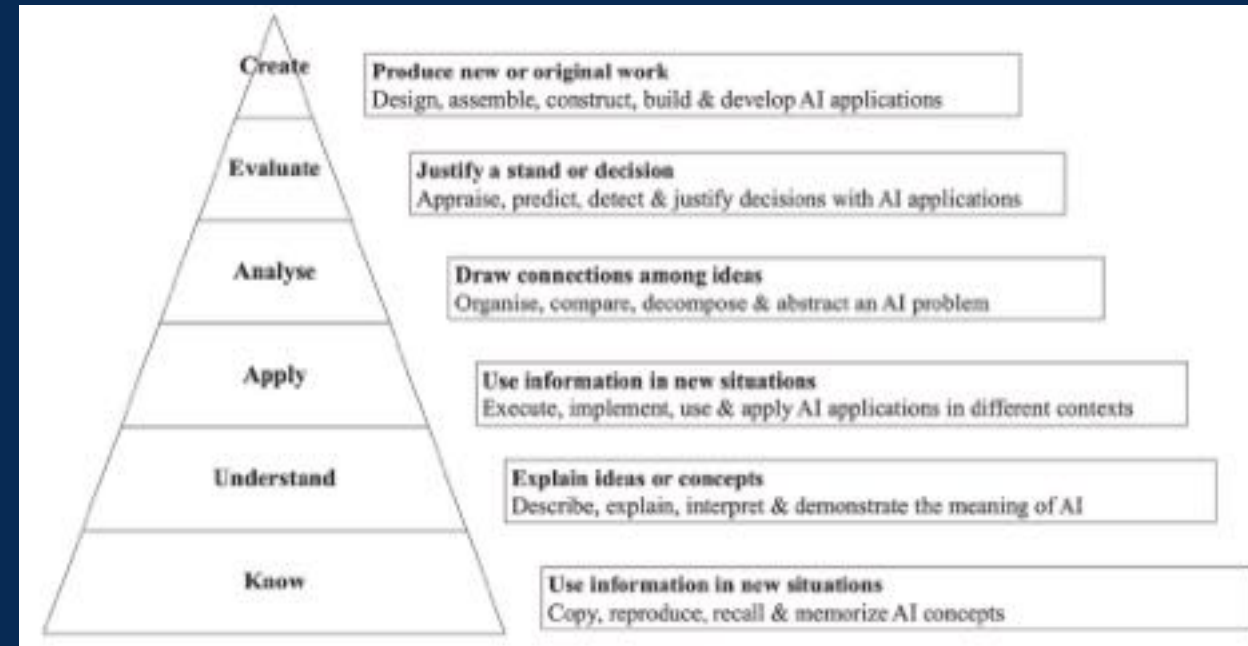
- Learners should use AI applications to augment human intelligence and engage in higher-order thinking activities.

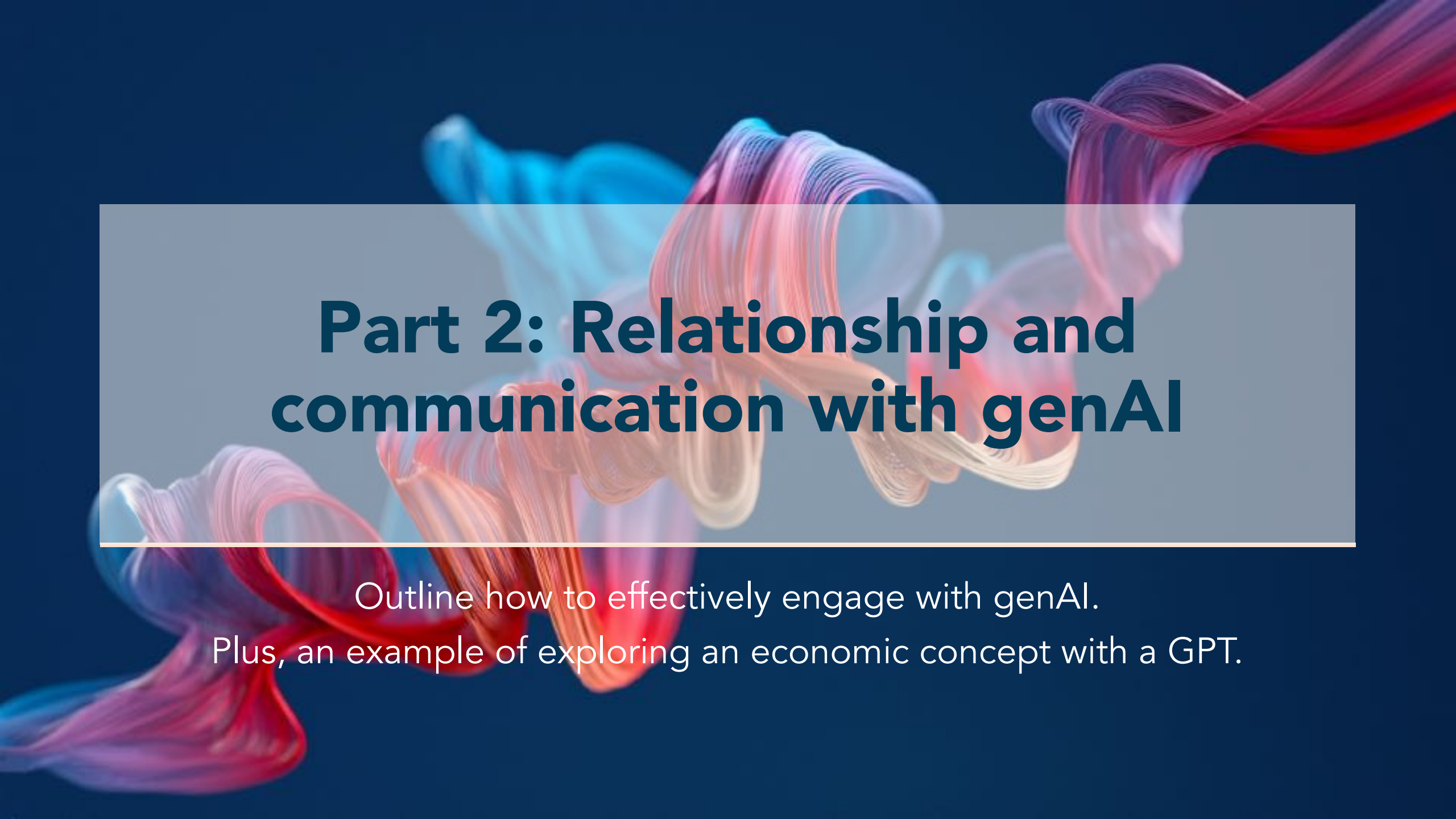
Use and apply AI (Blooms levels 3 and 4)

- Learners should know how to apply AI concepts in different contexts of everyday life.

Know and understand AI (Blooms levels 1 and 2)

- Learners should build knowledge of the technologies behind AI – including the use of AI tools and their functions.





Part 2: Relationship and communication with genAI

Outline how to effectively engage with genAI.
Plus, an example of exploring an economic concept with a GPT.

Decide on your relationship with genAI

Partner or collaborator

def: either of a pair of people engaged together in the same activity

def: a person who works jointly on an activity or project; an associate

Assistant

def: a person who ranks below a senior person

Tool

def: a device or implement, especially one held in the hand, used to carry out a particular function



Note: This matters because of the language we use.

ChatGPT has an idea for this

Prompt:

"I am working on a presentation for some university faculty and want to communicate to them a visual concept of how we work together. Some people see you as a tool or an assistant. I however see you as a partner and collaborator. Will you create a 3 panel image that shows how we partner together? The left panel should show you and I as partners, the middle panel should show you as an assistant, and the right panel should show you as a tool."



Partner or
collaborator

Assistant

Tool

Communicating with genAI



genAI



Iterate

- Refine and ask your question more than once.
- Change your style of asking questions. Consider the persona.
- Just as in writing... walk away, restructure your ideas, and try again.

General guidelines

- Tell it the persona you need it to be. (Don't need to do this with GPTs.)
- State the topic clearly.
- Give context that is specific and concrete.
- Define the output you expect. (Quantify if possible.)
- Chunk large queries, into smaller parts.
- Ask for an explanation.

4 strategies

Scan the QR code with you phone or input the link to see my discussion with 'EconomicsGPT'.

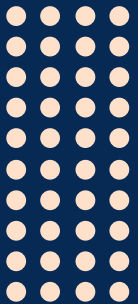
Date of conversation: Sunday, April 28, 2024.

URL option:

<http://tinyurl.com/economicsgpt>

Limitations of 'EconomicsGPT':

- Lack of human judgement
- Trained by someone at the undergraduate level
- Unknown/undisclosed training data



Strategies for working with genAI – 1 of 4

Dig deeper



genAI

About

Ask the AI to help you explore, outline, question, and structure ideas.

ChatGPT-4 – EconomicsGPT

"What is the Phillips Curve and why is it an important concept in the study of economics?"



Strategies for working with genAI – 2 of 4

Think broader



genAI

About

Ask the AI to help you explore alternative perspectives, refine your questions, collect information from you on what you're looking for.

ChatGPT-4 – EconomicsGPT

"To my understanding, economists differ in the value they place on the Phillips Curve calling it an unstable relationship. This is because sometimes the curve can be affected by supply shocks, structural changes nations make to their economies, and that there is never full employment (but instead a natural rate of unemployment). Can you tell me more about these alternative perspectives, as well as tell me about historical examples?"

Strategies for working with genAI – 3 of 4

Identify solutions/pathways



genAI

About

Ask the AI to help you identify and work through technical bits of a problem.

ChatGPT-4 – EconomicsGPT

"Now, I've studied this a number of years and am about to introduce this into a course that I'm teaching this term. This is a first year macroeconomics course and I have a mix of students from different degree programs in my course. Some are economics majors, but others are majoring in fields such as political science, finance, international relations, psychology, data science, and statistics. Can you propose a pedagogical strategy for introducing and teaching this topic?"

Strategies for working with genAI – 4 of 4

Examine reasoning



genAI

About

Ask the AI to explain its reasoning for a given solution.

ChatGPT-4 – EconomicsGPT

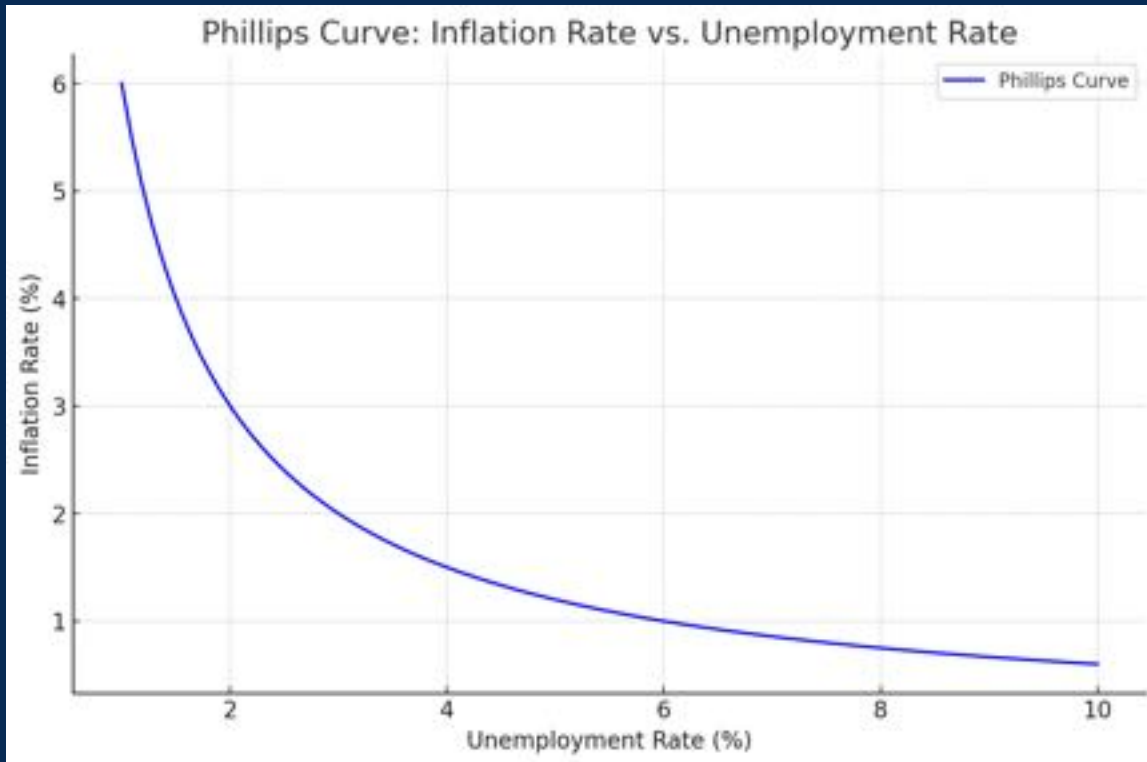
"I noticed that you did not mention the 2008 financial crisis in your suggested case studies. Was there a reason for this? Do you think that should be included as a case study?"



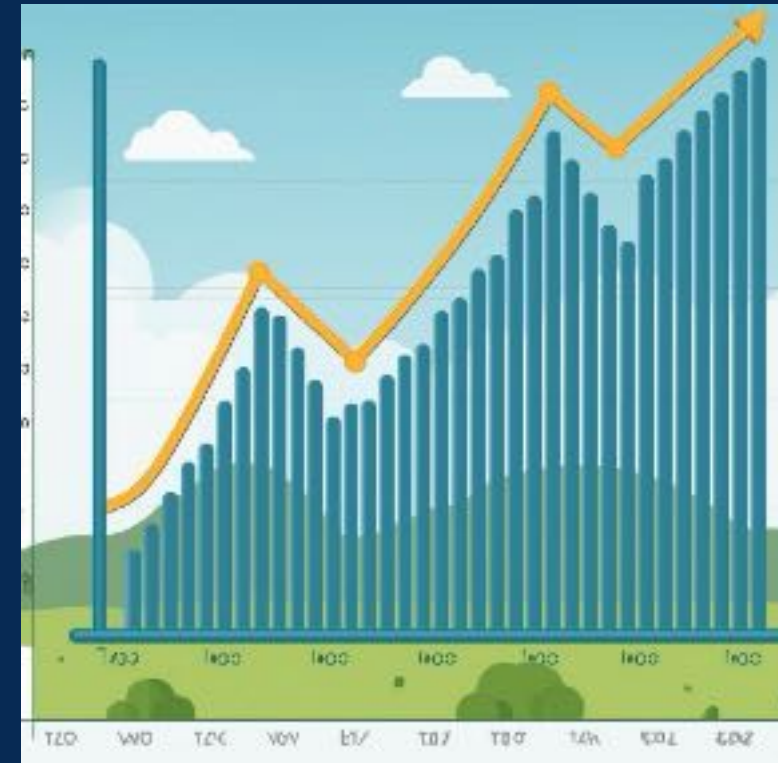
Visual capabilities: Phillips Curve

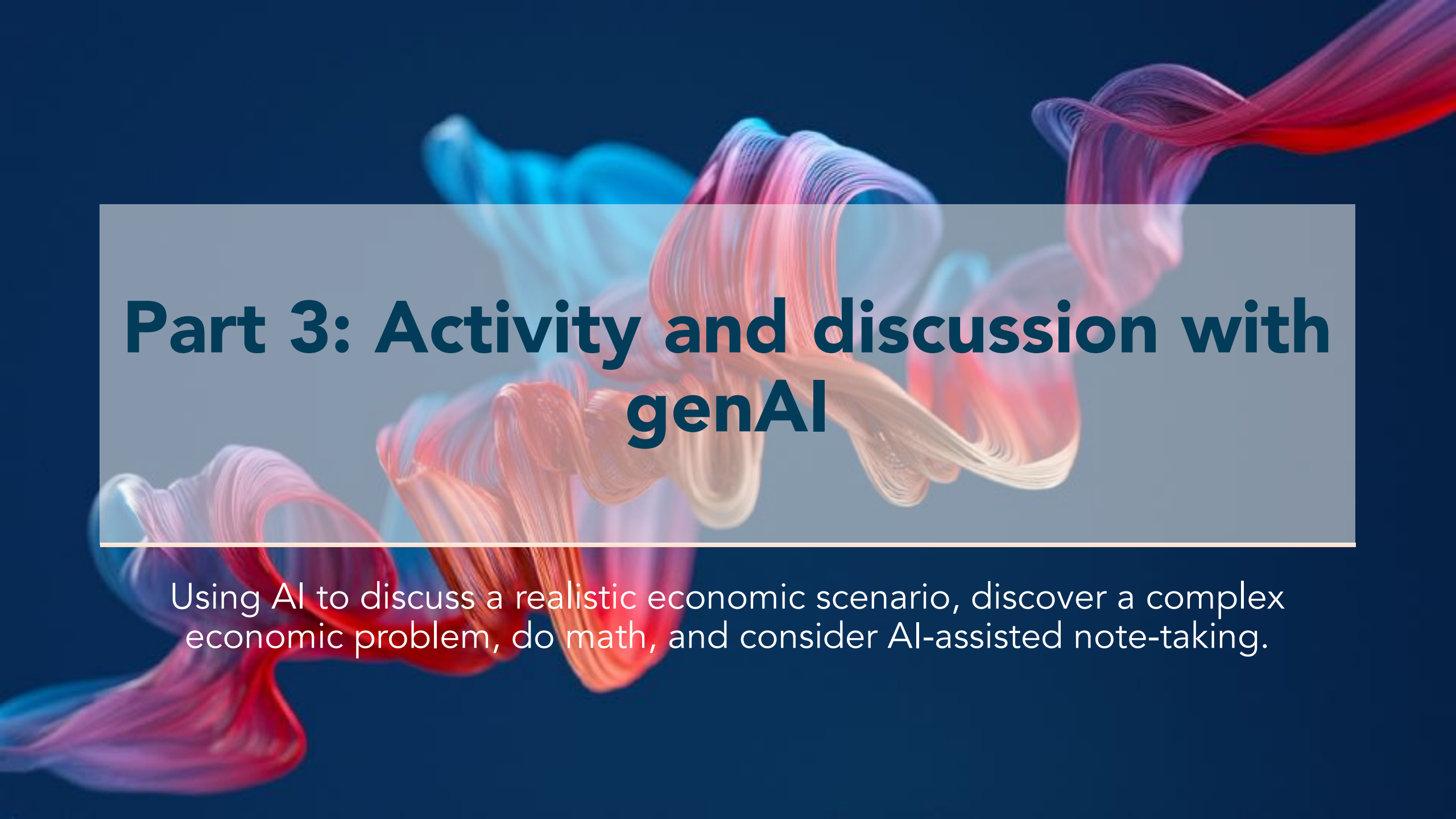
Prompt: "Could you produce a chart for me that demonstrates the Phillips Curve as an example?"

OpenAI DALL-E



Adobe Firefly





Part 3: Activity and discussion with genAI

Using AI to discuss a realistic economic scenario, discover a complex economic problem, do math, and consider AI-assisted note-taking.

Realistic economic scenarios – 1 of 3

Fields of economic study:

1. Applied microeconomics
2. Behavior economics
3. Econometrics
4. Experimental and economic theory
5. Finance
6. Health economics
7. Industrial organization
8. Macroeconomics
9. Microeconomics
10. Political economy

Japanese women in STEM and impact on Japan's GDP

<https://www.imf.org/en/News/Articles/2023/11/13/cf-japans-economy-would-gain-with-more-women-in-science-and-technology>

1. Why does female education in developing countries increase growth?
2. Does technological progress increase the returns to schooling in a developing economy?

The impact of AI on jobs around the world

<https://www.imf.org/en/Blogs/Articles/2024/01/14/ai-will-transform-the-global-economy-lets-make-sure-it-benefits-humanit>

1. How can we make machine intelligence work for humanity?
2. How should societies manage dominant networks?

The impact of cryptocurrency on monetary policy

<https://www.imf.org/en/News/Articles/2024/02/23/sp022324-changing-landscape-crypto-assets-considerations-regulatory-and-supervisory-authorities>

1. What are the implications for central banks and monetary policy in the public adaption of cryptocurrency?
2. What are the potential risks and benefits of a nation backed cryptocurrency?

Realistic economic scenarios – 2 of 3

Perplexity AI (Pro)



Prompt: identify real scenarios

"I am looking for examples of challenging economic scenarios that have impacted the global economy or individual advanced economies in the past 50 years. I'm throwing a wide net across economic fields such as: applied microeconomics, behavior economics, econometrics, experimental and economic theory, finance, health economics, industrial organization, macroeconomics, microeconomics, and political economy. Can you tell and describe to me 3-5 examples?"

Prompt: draft research questions

"Let's focus on the third scenario: COVID-19 pandemic economic impact. I recall how this impacted supply chains, employment, trade, and saw rounds of government stimulus. I think that I may dig deeper into this scenario for my research. Can you give me a list of 5 research questions that can help me explore the context of event?"

<https://www.perplexity.ai/search/I-am-looking-wjEIMrEeTZWLIN.eU5nZzQ>

Realistic economic scenarios – 3 of 3

Perplexity AI (Pro)



Prompt: fictional pandemic scenario

"Now I'm thinking that I want to use pandemics as a means to teach my students about economic shocks. Can you provide me a draft scenario for a global pandemic 25 years into the future. Some parameters of the disease are: 1) it originates in Asia; 2) it has an r-naught of 8; and 3) it is contagious via aerosol. Please give me a fictional scenario that puts the student in the role of a United States central banker and identify 3-4 economic challenges they must problem-solve for in the first 6 months of the pandemic."

Prompt: student discussion questions

"With all of this in mind, let's say that I want to setup an online discussion forum for my students after they have run through the scenario and made decisions. Can you provide me 2 questions that may ask them for each one of the 4 central banker decision challenges you listed?"

<https://www.perplexity.ai/search/I-am-looking-wjEIMrEeTZWLIN.eU5nZzQ>

Discovering complex economic problems – 1 of 4

Fields of economic study:

1. Capital
2. Commodity
3. Consumer Price Index (CPI)
4. Cost and benefits
5. Employment
6. Gross Domestic Product (GDP)
7. Inflation
8. Supply and demand
9. Tariffs
10. **Terms of Trade (ToT)**

** ChatGPT-4 (2024-04-29)

1. Volatility

Terms of Trade can be highly volatile, especially for countries reliant on a narrow range of exports. Changes in global commodity prices, demand shifts, and geopolitical events can all cause significant fluctuations.

2. Economic dependency

Countries that depend heavily on a limited number of exports may find their economies are more susceptible to external shocks. This can lead to instability in national income and government revenues, particularly in countries dependent on commodities like oil or minerals.

3. Dutch disease

An improvement in a country's terms of trade through increased prices for its primary exports can lead to a decline in other sectors like manufacturing. This phenomenon, known as Dutch Disease, can make the economy less diversified and more vulnerable to shocks.

4. Income distribution

Changes in terms of trade can affect income distribution within a country. For instance, an improvement in terms of trade might benefit exporters and those directly linked to them but could harm consumers through higher prices for imported goods.

5. Impact on balance of payments

Improved terms of trade can strengthen a country's balance of payments by increasing the value of exports relative to imports. Conversely, a deterioration can lead to trade deficits and associated economic pressures.

6. Long-term development

The terms of trade can influence a country's development trajectory. Persistent adverse terms of trade can discourage investment in industries other than those linked to primary exports, hindering broader economic development.

7. Negotiation power

Terms of trade can reflect a country's power in international trade negotiations. Countries with more favorable terms of trade often have more leverage in setting global trade rules and conditions.

8. Resource allocation

Fluctuations in terms of trade can lead to inefficient resource allocation, as producers may shift resources toward sectors with temporarily high returns, potentially at the expense of overall economic efficiency.

Complex economic problems – 2 of 4

ChatGPT-4



Prompt 1:

"I teach an undergraduate economics course and am preparing to discuss the topic of Terms of Trade with my students. Can you first give me a list of issues that are associated with this topic?"

Prompt 2:

"Please give me a list of 3 examples in the past 20 years where Terms of Trade was an economic issue in the United States."

Prompt 3:

"Let's focus on the recent Trade Wars (2018-2020). Please list for me 5 key problems faced by the U.S. side and 5 key problems faced by the Chinese side."

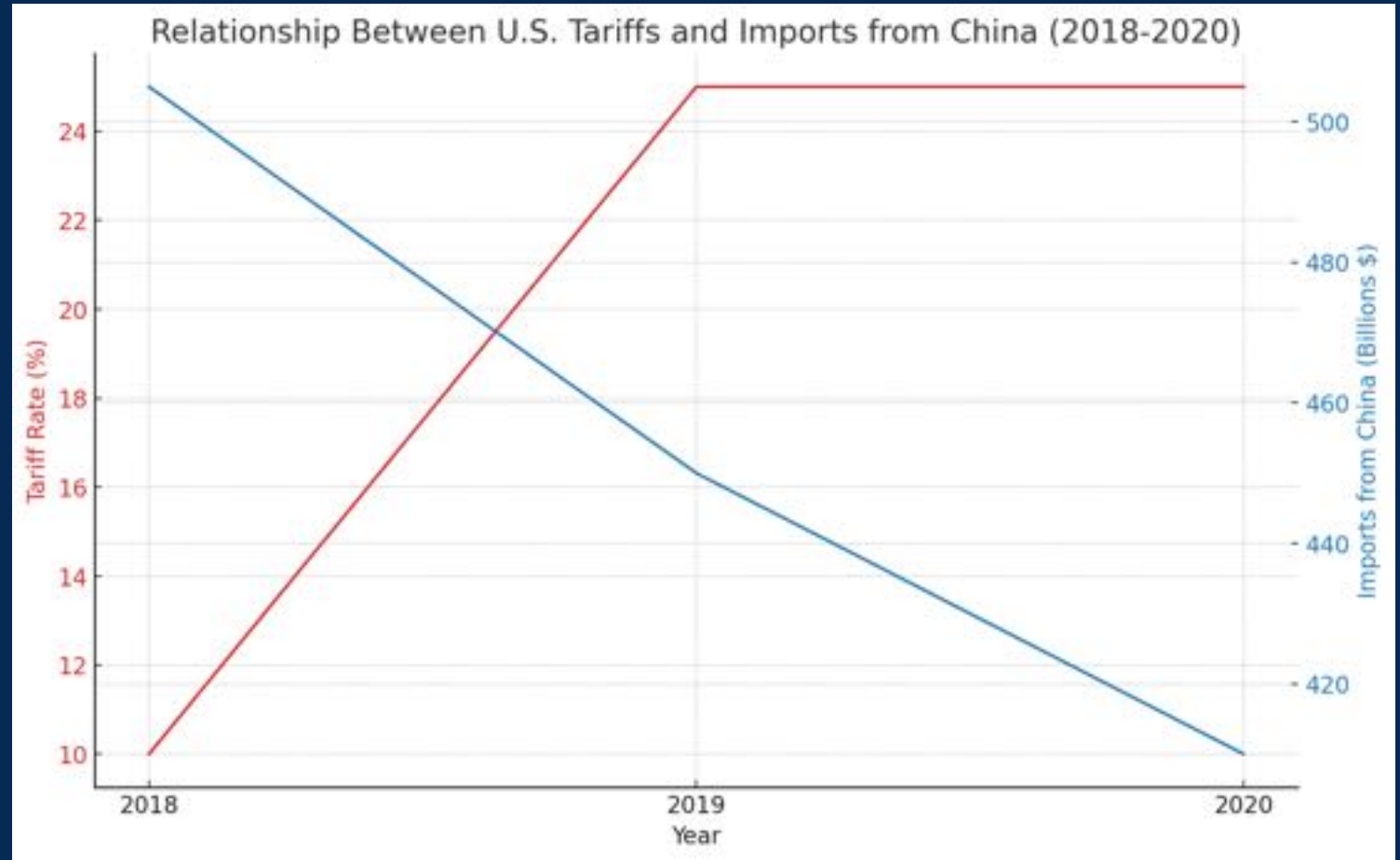
Complex economic problems – 3 of 4

ChatGPT-4



Prompt 4:

"Can you show me in a chart the relationship between tariffs and imports from China to the U.S. side during this 2018-2020 time frame?"



Complex economic problems – 4 of 4

ChatGPT-4



Prompt 5:

"Thank you. Lastly, can you give me some ideas for simulated economic problems focused on Terms of Trade, as well as your suggested steps that students should follow when examining these problems?"



AI generated Adobe Stock

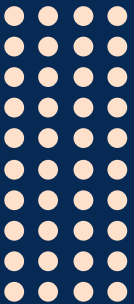
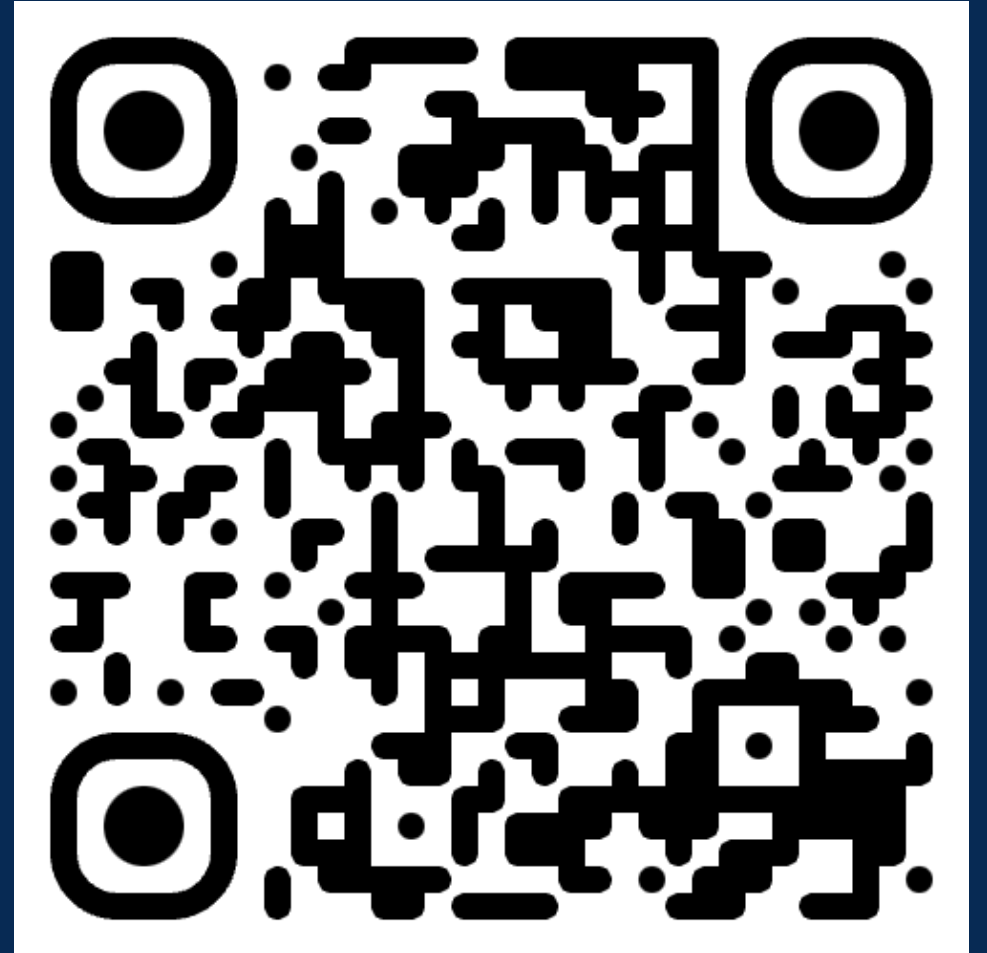
Teaching mathematics

Juan Kloppe, M.D. (MISPH)

Websites:

<https://blogs.gwu.edu/juanklopper/>

<https://publichealth.gwu.edu/departments/biostatistics-and-bioinformatics/juan-klopper>



Student note-taking

Ways that students can take notes:

1. Type notes on a computer or tablet
2. Handwrite notes on paper
3. Audio record notes for a transcript
4. Annotate notes on materials given

Key: To make note-taking active.



AI generated Adobe Stock



Teachers can...

- Give slides or outlines before class
- Allow pictures to be taken
- Record and provide a transcript

Combinations

- Type with photographs
- Typing with audio recording
- Digital slide annotation and audio recording



Some potential tools

There are many tools you can recommend to students to improve their note-taking with the assistance of AI. However, no tool can (or should) replace the value of actively taking notes and making connections between learning content.

1. Sherpa labs
 - Discuss materials with AI
 - URL: <https://sherpalabs.co/>
2. Notion
 - Note-taking with built-in AI
 - URL: <https://www.notion.so>
3. Otter
 - Audio recording with AI analysis
 - URL: <https://otter.ai>
4. Goodnotes
 - Annotating with audio recording
 - URL: <https://www.goodnotes.com/features>



References

Long, D., & Magerko, B. (2020, April). What is AI literacy? Competencies and design considerations. In Proceedings of the 2020 CHI conference on human factors in computing systems (pp. 1-16).

Ng, D. T. K., Leung, J. K. L., Chu, S. K. W., & Qiao, M. S. (2021). Conceptualizing AI literacy: An exploratory review. Computers and Education: Artificial Intelligence, 2, 100041.

Slide 23 – Research questions from Brown University faculty

<https://economics.brown.edu/orlando-bravo-center/research/faculty-research-questions>

