

Curating OER Content through AI and ChatGPT

Dorina Tila, Dawn Levy

Department of Business, Kingsborough Community College of New York University, New York, USA

Email: Dorina.Tila@kbcc.cuny.edu

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Abstract

Technological advancements have always influenced academia; however, the proliferation of Artificial Intelligence (AI) is having a significantly extensive impact. Technology has already made it possible for Open Educational Resources (OER) to provide students with freely accessible course content thereby breaking the cost barriers set by commercially printed textbooks. Now, with the increasing use and availability of AI, this paper takes it a step further by investigating the potential for generative artificial intelligence tools, such as ChatGPT, to further refine the quality of OERs and improve open pedagogy processes and content. Could AI tools be a way to improve the process of curating and creating content by faculty and students? This paper shares students' and faculty's perceptions of AI's impact on students' learning and academic experiences. Faculty and students expressed divergent opinions, with students being much more optimistic about the benefits of AI than their faculty, who cited concerns about the dangers of delegating writing and critical thinking to AI. Nevertheless, both students and faculty members recognized that AI is an inevitable part of our futures that cannot be ignored. To this point, the data suggest that a viable solution involves opening conversation between faculty and students about the benefits of properly using AI tools and educating students about how to use the tools ethically. Furthermore, in terms of an OER and open pedagogy framework, by allowing students to fact-check and curate course material using AI generated and regenerated material students can learn to use AI tools to create original and thoughtful material by critically analyzing and curating the AI-sourced materials.

Keywords

OER, Open Pedagogy, Artificial Intelligence, AI, ChatGPT

1. Introduction

New generative artificial intelligence (AI) tools, such as ChatGPT, might provide great opportunities for students to work together to curate course content, fact

check, and have a more active role in processing the information they are learning in their courses. Like any past technological advancements that impact education, ChatGPT is viewed as a positive change by some and in a negative light by others. This article will explore the origin and nature of these divergent views through the analysis of responses to an anonymous survey conducted at Kingsborough Community College (Kingsborough), a two-year college of the City University of New York (CUNY). CUNY is comprised of 25 campuses across the five boroughs in New York City, USA. The survey was delivered to faculty and students enrolled in Spring 2023 at Kingsborough.

The use of ChatGPT and similar AI tools, as some faculty and students point out in the survey, might support student learning and the overall academic experience for students. In addition, AI can more easily support the creation and curation of Open Educational Resources (OER) as a cheaper and financially equitable alternative to commercial textbooks. OER is defined by the Hewlett Foundation as “teaching, learning, and research resources that reside in the public domain or have been released under the intellectual property license that permits their free use and re-purposing by others” (Hewlett Foundation, n.d.). Similarly, UNESCO defines OER as “teaching, learning and research materials in any medium, digital or otherwise, that reside in the public domain or have been released under an open license that permits no-cost access, use, adaptation and redistribution by others with no or limited restrictions” (UNESCO, 2012).

While this freely accessible alternative to high-cost textbooks has certainly led to cost savings, much research has been conducted to establish and verify the efficacy of Open Educational Resources (OER) as compared to commercially printed textbooks. For example, in a meta study looking at dozens of prior studies, Clinton and Khan (2019) found no material differences in learning between students using commercial versus open textbooks. Additionally, other scholars found that learning improved and lower course withdrawals existed among students using OER (Feldstein et al., 2010; Gil et al., 2013; Bowen et al., 2012; Hilton & Laman, 2012; Pawlyshyn et al., 2013; Robinson et al., 2014; Wiley et al., 2017; Grewe & Davis, 2017; Tila & Levy, 2022). Moreover, in addition to academic performance being the same or better when using OER materials student opinions of OER courses have also been positive as shown in CUNY wide surveys conducted in 2018 and 2019 (Brandle et al. 2019; Bliss et al., 2013) and a Kingsborough wide survey in 2020 (Tila, 2023; Tila & Levy, 2022).

Similarly, Werth & Williams (2022) bring evidence suggesting that Open Pedagogy fosters positive student outcomes, such as development of critical thinking skills, greater self-direction, and increased enjoyment of education. Open pedagogy is defined as “an access-oriented commitment to learner-driven education and a process of designing systems and tools for learners that enable learners to shape and contribute to the public knowledge commons of which they are part” (DeRosa & Jhangiani, 2017).

This paper takes the research a step further by investigating the potential for

generative artificial intelligence tools, such as ChatGPT, to further refine the quality of OERs and improve open pedagogy processes and content. By analyzing the evidence and opinions provided by students and faculty on a survey about their experiences with and perceptions of AI, this article shares ways to use ChatGPT and similar tools to support OER content creation and open pedagogy. Like any other technology, ChatGPT by itself is neither good nor bad but rather it is the way and the extent to which it is used by students and faculty that matters and defines its course.

2. Methods

2.1. Instrument

The data was collected through an anonymous Qualtrics survey distributed via email and text to 1) all full-time and part-time faculty and 2) all full-time and part-time students enrolled at Kingsborough Community College during Spring 2023. The survey was prepared by a group of faculty members of the Using Data to Support Teaching and Learning Faculty Interest Group in collaboration with the Office of Institutional Effectiveness. The survey included 23 questions relating to the students' experience and challenges with remote learning during Spring 2023. Six of these questions, as shown in **Table 1**, relate to the course material and were the items subject to analysis in this article.

These questions aim to find out how familiar, comfortable, and welcoming students and faculty are to new technology, such as AI tools, and how they envision this will be incorporated into academia. Their reported perceptions,

Table 1. Six AI-relevant questions extracted from the spring 2023 surveys.

Student Survey Questions	Faculty Survey Questions
AI.1 How familiar are you with Artificial Intelligence (AI) and related types of technology?	AI.1 How familiar are you with Artificial Intelligence (AI) and related types of technology?
AI.2_1 What effect does Artificial Intelligence have in each of the following: - Your learning and development in your classes. - Your overall educational experience. - Your future careers.	AI.2_1 What effect does Artificial Intelligence have in each of the following: - Your students' learning and development in your classes. - Your students' overall educational experience. - Your students' future careers.
AI.3 Describe the effects that Artificial Intelligence (AI) will have in your future.	Q.AI.3 Describe the effects that Artificial Intelligence (AI) will have in your students' future.
AI.4 Which of these elements powered by artificial intelligence (AI) have you used at least once (check all that apply)?	AI.4 Which of these elements powered by artificial intelligence (AI) have you used at least once (check all that apply)— Selected Choice
AI.5 How many times have you used ChatGPT or other generative AI related elements to submit assignments during this semester?	AI.5 How many times have you spotted students use ChatGPT or other generative AI related elements to submit assignments during this semester?
AI.6 Describe your experience with using generative Artificial Intelligence in your courses.	AI.6 Describe your experience with using or spotting students using generative Artificial Intelligence in your courses.

including opinions, challenges, and benefits, shed light on possible strategies for effectively using such tools to improve learning, course materials, open pedagogy, and the like.

2.2. Study Design and Process

The anonymous survey was distributed to all KCC students and Faculty by the end of Spring 2023 semester. Of 23 questions, six were related specifically to their perceptions and thoughts of use of generative AI tools, such as ChatGPT in student learning. The exemption application for these surveys had been granted by the Institutional Review Board (IRB). The surveys were designed by a group of interdisciplinary faculty members through the Faculty Interest Groups (FIG) supported by the Kingsborough Center for Teaching and Learning (KCTL). The surveys were created and hosted in Qualtrics. While the student survey link was sent by the Information Technology Team to all part-time and full-time students via mass email, the faculty survey link was sent by the Office of the Institutional Effectiveness of the institution to all full-time and part-time faculty. The participation was anonymous and voluntary.

3. Results

According to **Figure 1**, of 115 faculty participants and 76 student participants, 60% of faculty participants and 81% of student participants report some familiarity with AI related technology. Students report having an approximate 20% higher rate of familiarity with AI and related types of technology than faculty. About 40% of the participating faculty report lack of familiarity with this type of technology, as compared to only about 20% of students. When focusing in more detail on the various types of AI powered tools, 89 % of participating faculty show lack of familiarity with ChatGPT, as shown in **Figure 2**. Not surprisingly, **Figure 3** confirms that about the same rate of participants report to have not used such a tool. Due to its recent emergence in the academic world, this can explain the lack of familiarity and lack of use by faculty. On the other hand, as shown in **Figure 2**, students seem to be faster at embracing these new

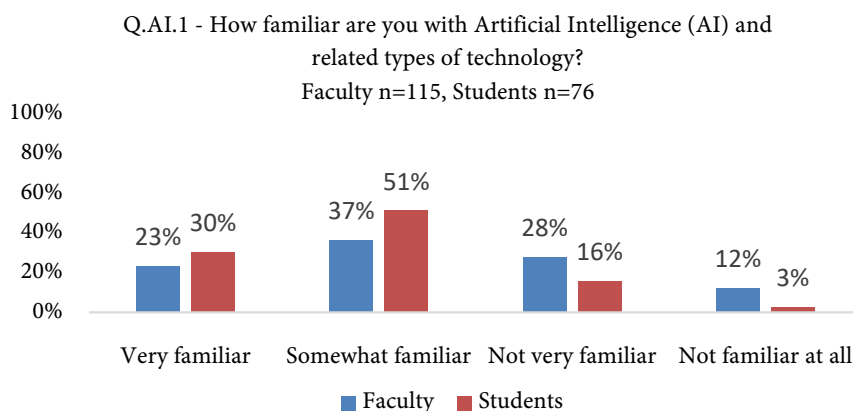


Figure 1. Percentage responses regarding familiarity with AI technology.

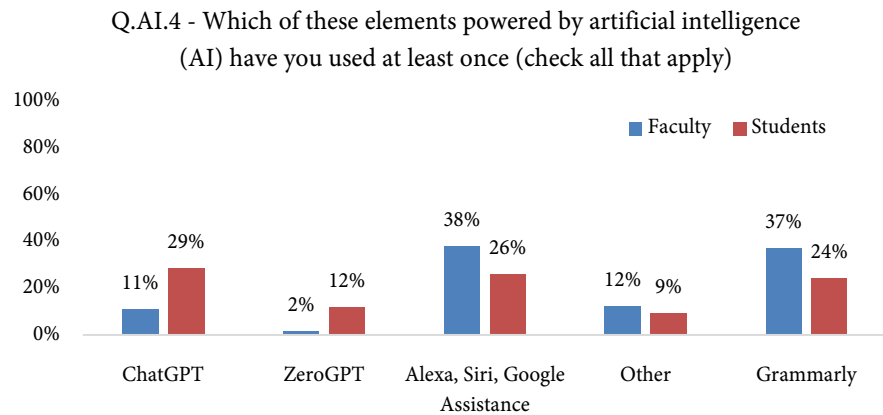


Figure 2. Percentage responses regarding the use with AI powered tools.

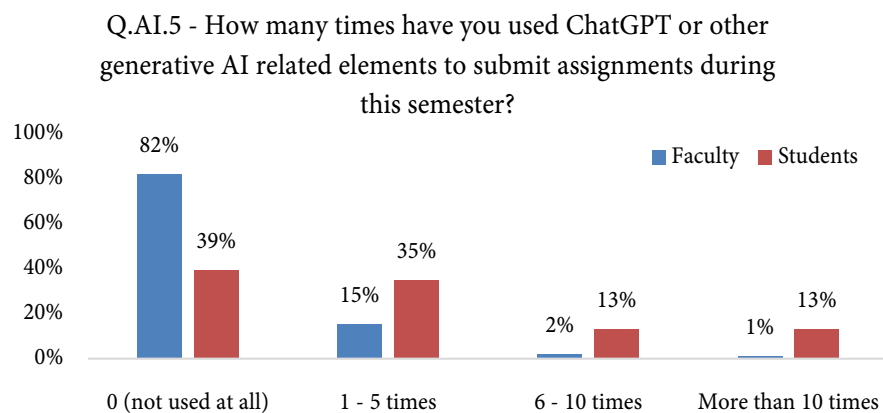


Figure 3. Use of ChatGPT during spring 2023 Semester. Note. Out of 104 faculty respondents and 69 student respondents, 82% of faculty reported not having spotted students using ChatGPT or other generative AI related elements in assignments submitted during Spring 2023, while 39% of the students reported not having used such tools at all.

technological tools by reporting a higher familiarity rate with ChatGPT, specifically about 30%. Also, about 60% report having used it one or more times, as shown in **Figure 3**.

Another important aspect of the survey relates to the perceptions of students and faculty about this recent technology. It is interesting to note the very divergent views between these two groups of stakeholders about ChatGPT and similar AI tools. While about 80% of the faculty reports a negative perception of AI tools, students are more optimistic with only 32% reporting a negative perception. As might consequently be expected, **Figure 1** confirms that students report having a higher rate of familiarity with AI and related types of technology than faculty. Further research could explore whether increased use and familiarity among faculty could increase their comfort level and positive perceptions of the use of AI tools in education.

Digging a bit deeper into the faculty viewpoints expressed in **Figure 4**, an analysis of the responses to the open-ended questions on the survey, presented in **Table 2** and **Table 3** is very telling and provides much guidance for the

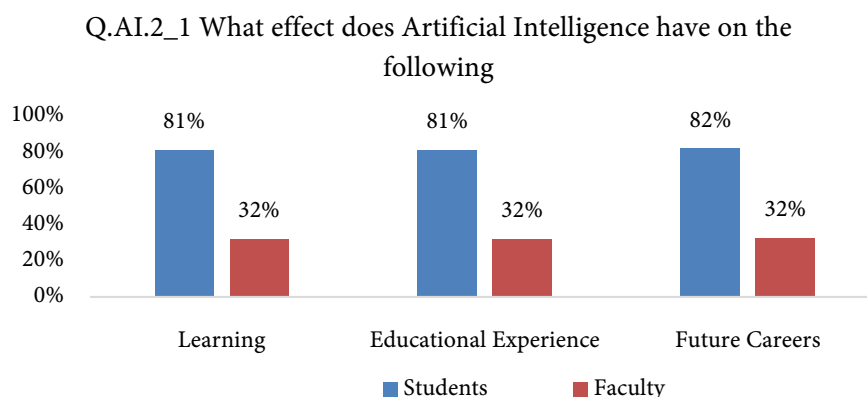


Figure 4. Student and faculty perception on AI impact on learning, experience, and future career. Note. Out of 63 faculty respondents and 95 student respondents, about 32% of faculty anticipate positive impact of AI compared to about 80% of students.

Table 2. The faculty reported challenges with the use of ChatGPT.

Faculty Comments (n = 37)	Responses (%)
Easy to detect	38%
Start conversation with students	22%
Design customized assignments	11%
Difficult to detect or prove its use	11%
Inaccuracies and quality issues	14%
Unclear how to use and detect	5%

Table 3. Sample of faculty quotes.

Question 6. Describe your experience with using or spotting students using generative Artificial Intelligence in your courses

- I haven't spotted them only because I haven't attempted to spot them. Instead, I am doing my best to develop assessments that cannot easily be done using AI. It's not a perfect system, but no detection system ever will be either. My sense is that students who want to cheat will always find a way, and that this is still a minority of students (though probably more than used to do it). [*Assignment Design*]
- In this semester, I taught an online asynchronous course, and large part of the students' work was weekly responses to readings. Spotting the use of Chat GPT or similar in their responses was good teaching moments to talk about these tools and their usage in the class. And also gave me food for thought about written assignments in future classes, as obviously we must adapt and also modify our teaching methods and types of assignments in response to the technological developments. [*Assignment Design*]
- Open conversations about how and when it is okay to use - I have also shared how information can be wrong and misleading by modeling the use which seems to have been effective in minimizing negative use of AI. [*Conversation*]
- I did a short lesson on AI recently that was well received by students (several thanked me). I see little value in getting into a cat and mouse game over AI. [*Conversation*]

effective future use of AI in the college classroom. After reading and categorizing 37 written responses from faculty regarding their challenges facing the use of ChatGPT by students in their courses, 38% reported it easy to detect and 22% offer two solutions for minimizing its negative consequences: 1) faculty should start a conversation with students by educating and supporting them about the proper and ethical use of ChatGPT; and 2) design the assignments in ways that teach students how to use the power of ChatGPT to conduct very targeted searches that yield relevant and factually correct results rather than simply as way to cheat. **Table 3** provides some sample faculty responses with the categorization of the responses as identified by this study's investigators bracketed in bold and italics. As mentioned above, the faculty responses fall primarily into two categories: 1) Assignment Design—some faculty suggest a redesign of assignments to minimize the use of ChatGPT to cheat; and 2) Conversation—other faculty, instead consider it important to show students how easy it is to detect, ChatGPT and, then educate them on how to use AI in an ethical and effective way. This data aligns with proponents of AI who consider ChatGPT a good tool to use to generate arguments and save time in going through sources (Hassell, et al., 2023).

Further investigation of the faculty open-ended responses reveals added insights into the negative perceptions of faculty towards ChatGPT. **Table 4** shows that 55% of faculty believe that ChatGPT harms students' learning because it might lead students to copy an answer, avoids thinking on their own, and eventually could eradicate critical thinking. On the other hand, 45% of the faculty respondents are either unsure of the impact or believe that it helps learning especially with added conversation about proper use. In any event, as shown from sample responses in **Table 5**, some faculty believe that ChatGPT and other AI tools will be an integral part of the future and students need to learn how to use and embrace this tool effectively and ethically rather than bar it totally.

4. Future Recommendations

Would you like ChatGPT to help you complete the assignment? Probably, any student would respond yes. However, the effects of such actions are debatable. Such an ambiguous answer is confirmed by student and faculty perceptions captured by a recent anonymous survey. The faculty members recognize the danger of delegating writing and critical thinking to another party, such as ChatGPT, but also recognize that it is an inevitable future which needs to be faced.

Table 4. Faculty's perception of AI in their students' future.

Faculty Perception	Response %
Harms learning	55%
Helps learning	7%
Conversation	20%
Not sure	18%

Table 5. Faculty's perception of AI in their students' future.

Question 3. Describe the effects that Artificial Intelligence (AI) will have in your students' future.

- AI is becoming a threat to real learning. Students rely on it to answer questions instead of their own minds. [*Harms Learning*]
 - AI undermines their learning by doing the work for students and undermining their ability to deal with academic challenges. [*Harms Learning*]
 - I feel it will not encourage them to think independently or critically or engage in their own problem-solving skills. [*Harms Learning*]
 - I worry that they will see AI text generation as a short cut and not realize that they need to have superior reading and critical thinking skills to use it effectively, for instance by being able to see what is missing or doesn't work. [*Harms Learning*]
 - They are easily tempted to rely on content that it's not original which means that they do not absorb It's meaning or understand it at a depth necessary for full proficiency. [*Harms Learning*]
 - As more and more fields will adapt different types of AI-based tools, it is essential that students are familiar with the basic concept of these tools and are able to apply them where necessary and appropriate. [*Conversation*]
 - Current research shows that AI has the potential to cut out monotonous aspects of jobs, which is positive and productive, but has the potential of getting rid of tasks done by humans in the labor market. I believe AI is going to be a potentially useful tool to students IF EDUCATED on how to interface with AI ethically and with proper digital literacy capacities. [*Conversation*]
 - There is not a singular answer to the question above, it varies greatly between different subgroups of students. Right now, among some it is perceived as a form of cheating which makes students reluctant to honestly talk about it. I am planning on incorporating AI into some of my lessons next semester to turn it into a learning strategy rather than an enemy, and to help students realize that this is a new workplace tool that they will be using throughout their careers. I think we could use more PD support to increase faculty skills in this direction. [*Conversation*]
-

The data suggest that a converging solution offered is opening the conversation between faculty and students to find and learn the benefits of using AI tools and educate students on how to use them properly and ethically. One way to educate and allow students to do this is through open pedagogy. Allowing students to factcheck and curate the course material using AI generated and regenerated material might teach them how to use AI tools to support their work, create material through their own review and use of critical thinking. Further investigation and assessment of how to customize and curate OER material through the support of AI tools, such as ChatGPT, would be recommended.

As is often the case, it is important to make data-informed decisions when thinking about how to best incorporate and use ChatGPT and other AI tools in higher education. After careful review and interpretation of the data collected about student and faculty perceptions of ChatGPT and related AI tools, there seems to be consensus that AI is here to stay, and we all need to embrace it rather than deny or outlaw it. Two suggested approaches include utilizing ChatGPT to help students curate and create new course content in the form of open pedagogy,

as well as teaching students to effectively and ethically use these new technologies to achieve relevant and optimal results.

Table 6. Illustration on use of ChatGPT in curating OER material.

Examples of Questions	ChatGPT Generate 1 to 4 Times	Content Creation	Assess Content Creation
<ul style="list-style-type: none"> • What Economics? • The Problem of Scarcity? • Can scarcity be eliminated? 	Generate one to four times and review in groups.	Fact check, review, study, compare, and finally recreate and publish.	Establish a mechanism to assess.

As an example, **Table 6** shows an illustration of prompts used in an open pedagogy sample assignment from an OER OpenStax book college economics course requiring the use ChatGPT. **Appendix 1** shows some sample searches for this same assignment. The type of prompts, regeneration of content, comparing, fact-checking, and assessing the validity might be a good process of teaching students how to use the tool, which seems it is here to stay. Furthermore, such series of activities might also be a catalyst in shifting teaching to student-centered since the student will be searching, curating, and validating the content. While there has been no assessment of the use of ChatGPT and its impact in student learning, this article is planting the seed and hoping to this research to grow and flourish.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix: Illustration on Using ChatGPT Prompt to Generate, Compare, and Curate Course Content

Prompt 1: What is economics? ChatGPT (1/4)

Economics is the social science that studies how individuals, businesses, governments, and societies allocate their scarce resources to satisfy their unlimited wants and needs. It is often described as the study of how societies manage resources to produce and distribute goods and services for consumption. Economics can be broadly categorized into two main branches:

1) Microeconomics: Microeconomics focuses on the behavior of individual economic agents, such as consumers, producers (firms), and markets for specific goods and services. It examines how these agents make decisions, allocate resources, and interact with each other in markets. Key topics in microeconomics include supply and demand, market structures (e.g., perfect competition, monopoly), consumer choice, production, and pricing.

2) Macroeconomics: Macroeconomics deals with the overall performance and behavior of an economy as a whole. It explores topics such as inflation, unemployment, economic growth, national income, fiscal policy, monetary policy, and the role of government in regulating the economy. Macroeconomists study the aggregate outcomes of millions of individual decisions and transactions in an economy.

Economists use various models, theories, and quantitative methods to analyze and understand economic phenomena. These analyses often involve concepts like opportunity cost, scarcity, efficiency, utility, and economic indicators (e.g., GDP, inflation rate). Economics plays a crucial role in informing public policy decisions, business strategy, and individual decision-making by providing insights into how resources can be efficiently utilized to improve living standards and well-being.

Prompt 1: Regenerate “What is economics” ChatGPT (2/4)

Economics is a social science that studies how societies allocate their limited resources to satisfy their needs and wants. It explores how individuals, businesses, and governments make choices about the production, distribution, and consumption of goods and services.

Key concepts in economics include:

1) Scarcity: This is the fundamental problem in economics. Resources like land, labor, and capital are limited, while human wants and needs are virtually unlimited. Economics examines how societies prioritize and allocate these scarce resources.

2) Supply and Demand: The law of supply and demand is a fundamental principle in economics. It states that the price and quantity of goods and services in a market are determined by the interaction of supply (the amount producers are willing to offer) and demand (the amount consumers are willing to buy) for those goods and services.

3) Opportunity Cost: This concept refers to the idea that when resources are

used to produce one good or service, they cannot be used to produce another. Therefore, there is an opportunity cost associated with every choice made.

4) Microeconomics: This branch of economics focuses on the behavior of individual consumers and firms. It looks at topics such as consumer choice, production, market structures, and pricing.

5) Macroeconomics: Macroeconomics examines the economy as a whole. It deals with topics like inflation, unemployment, economic growth, fiscal policy, and monetary policy. It aims to understand and influence the overall performance of an economy.

6) Economic Systems: Different societies organize their economic activities in various ways. Common economic systems include capitalism, socialism, and mixed economies, each with its own set of principles and priorities for resource allocation.

7) International Trade: Economics also explores how countries engage in trade to benefit from specialization and comparative advantage. Trade theories like absolute advantage and comparative advantage help explain why countries trade and how they can benefit from it.

8) Market Failures: Economists study situations where markets do not work perfectly, leading to inefficiencies. Examples include externalities (spillover effects of economic activities), public goods, and monopolies.

9) Economic Indicators: Economists use various indicators, such as Gross Domestic Product (GDP), inflation rates, and unemployment rates, to assess the health and performance of an economy.

Economics provides valuable insights into how societies make choices, allocate resources, and address economic problems. It plays a crucial role in shaping government policies, business strategies, and individual decision-making.

Prompt 1: Regenerate “What is economics” ChatGPT (3/4)

Economics is the social science that studies the production, distribution, and consumption of goods and services to understand how societies allocate their limited resources to meet their unlimited wants and needs. It explores how individuals, businesses, governments, and other organizations make decisions to allocate resources and how these decisions impact the well-being of individuals and society as a whole.

Economics can be broadly categorized into two main branches:

1) Microeconomics: Microeconomics focuses on the behavior of individual economic agents, such as consumers, producers, and firms. It examines how these agents make decisions regarding what to buy, produce, and sell and how they interact in markets. Key topics in microeconomics include supply and demand, price determination, consumer behavior, production theory, and market structures (e.g., perfect competition, monopoly, oligopoly).

2) Macroeconomics: Macroeconomics looks at the broader picture of the economy as a whole. It studies aggregate economic variables, such as GDP (Gross Domestic Product), inflation, unemployment, and overall economic growth.

Macroeconomists analyze the factors that influence these variables and develop theories to explain economic fluctuations and long-term growth trends. Policy areas like monetary policy and fiscal policy are also part of macroeconomics.

Economists use various models, theories, and quantitative methods to analyze and predict economic phenomena. They also examine the impact of government policies, external factors like international trade, and behavioral economics, which considers how psychological factors influence economic decision-making.

Economics plays a crucial role in informing public policy decisions, business strategies, and personal financial choices. It helps us understand how resources are allocated, how wealth is created and distributed, and how economic policies can affect the well-being of individuals and society.

Prompt 1: Regenerate “What is economics” ChatGPT (4/4)

Economics is the social science that studies how individuals, businesses, governments, and societies allocate resources to satisfy their wants and needs. It is often described as the study of how people make choices in a world with limited resources. Economics seeks to understand and explain how goods and services are produced, distributed, and consumed, as well as how individuals and societies make decisions about the allocation of resources.

Key concepts and areas of focus within economics include:

- 1) Scarcity: Economics begins with the recognition that resources are limited, while human wants and needs are virtually unlimited. This scarcity of resources necessitates choices and trade-offs.
- 2) Supply and Demand: The law of supply and demand is a fundamental principle in economics. It describes how the price and quantity of goods and services are determined in a market. When demand for a product is high and supply is low, prices tend to rise, and vice versa.
- 3) Opportunity Cost: This concept refers to the cost of choosing one option over another. When you make a decision, you are often giving up the next best alternative, and that foregone alternative is the opportunity cost.
- 4) Production and Efficiency: Economics examines how goods and services are produced and how resources can be used most efficiently to maximize output and minimize waste.
- 5) Market Structures: Economists study different types of market structures, such as perfect competition, monopolies, and oligopolies, to understand how they affect prices, competition, and consumer welfare.
- 6) Macroeconomics: This branch of economics focuses on the overall performance of an economy, including concepts like inflation, unemployment, GDP (Gross Domestic Product), fiscal policy, and monetary policy.
- 7) Microeconomics: Microeconomics deals with individual economic units such as households, businesses, and industries. It explores topics like consumer behavior, production costs, and market behavior.
- 8) International Economics: This area of economics examines trade between nations, exchange rates, and international economic policies.

9) Development Economics: It explores the economic development of countries and regions, looking at factors that contribute to economic growth and poverty reduction.

10) Environmental Economics: This subfield focuses on the economic aspects of environmental issues, including the allocation of resources to address environmental challenges and the impact of economic activities on the environment.

Economists use various methods, including mathematical models, statistical analysis, and empirical research, to study these concepts and gain insights into how economies function. Economics plays a crucial role in shaping public policy, business decisions, and individual choices by providing a framework for understanding the allocation of resources and the consequences of different economic actions.

Prompt 2: The problem of scarcity ChatGPT (1/2)

The problem of scarcity is a fundamental concept in economics and refers to the situation where limited resources are insufficient to satisfy the unlimited wants and needs of individuals, businesses, and society as a whole. It is a central theme in economics because it is the starting point for understanding how choices are made, how resources are allocated, and how economic systems function. Here are some key points about the problem of scarcity:

1) Limited Resources: Resources are the inputs used to produce goods and services. These resources include natural resources (like land and minerals), labor (human effort and skills), and capital (machines, buildings, and tools). No matter how abundant these resources may be, they are finite. There is a limit to the amount of land, labor, and capital available.

2) Unlimited Wants and Needs: Human wants and needs are essentially limitless. People desire a wide variety of goods and services, and these desires are influenced by factors like culture, society, advertising, and personal preferences. As a result, there is always more that people want than can be satisfied with the available resources.

3) Necessity of Choice: Scarcity necessitates making choices. Since resources are limited and wants are unlimited, individuals and societies must decide how to allocate these resources among various competing uses. This involves trade-offs, where choosing one option means giving up another.

4) Opportunity Cost: Every choice involves an opportunity cost, which is the value of the next best alternative that is forgone when a decision is made. When resources are scarce, choosing to allocate them to one use means sacrificing the potential benefits of allocating them to another use.

5) Allocation Mechanisms: Economics explores different mechanisms for allocating resources, such as markets, government policies, and central planning. These mechanisms determine how resources are distributed, who gets to consume goods and services, and at what prices.

6) Efficiency and Equity: Economists study how resources can be used most efficiently to maximize output and satisfy as many wants and needs as possible.

They also examine issues of equity and fairness in resource allocation, as not everyone has the same access to resources.

7) Scarcity in Different Contexts: Scarcity is not limited to traditional economic resources. It can also apply to time, energy, and other non-material resources. For example, individuals must allocate their time between work, leisure, family, and other activities, and this allocation involves trade-offs due to the scarcity of time.

8) Dynamic Nature: Scarcity is a dynamic problem. It evolves over time due to changes in population, technology, and resource availability. What is scarce today may not be scarce tomorrow, and vice versa.

Understanding the problem of scarcity is fundamental to the study of economics because it underlies all economic decisions and is the basis for the study of resource allocation, production, consumption, and distribution in societies. Economists analyze how individuals, businesses, and governments make choices in the face of scarcity to optimize their well-being and achieve their goals.

Prompt 2: Regenerate the problem of scarcity ChatGPT (2/2)

The problem of scarcity is a fundamental concept in economics that refers to the condition where limited resources are insufficient to meet the unlimited wants and needs of individuals and society as a whole. In other words, scarcity arises because there are not enough resources (such as land, labor, capital, and natural resources) to produce all the goods and services that people desire.

Here are some key points to understand about the problem of scarcity:

1) Limited Resources: Resources, which can be physical inputs like raw materials and labor or financial capital, are finite. They have constraints in terms of quantity and availability. For example, there is only a limited amount of arable land, a finite labor force, and a finite amount of money available for investment.

2) Unlimited Wants and Needs: Human wants and needs are virtually unlimited. People constantly desire more goods and services to improve their quality of life, achieve their goals, and satisfy their preferences. These wants and needs encompass everything from basic necessities like food and shelter to luxury items and experiences.

3) Choice and Trade-offs: Because of scarcity, individuals, businesses, and societies must make choices about how to allocate their limited resources. When they choose to produce or consume one good or service, they are forgoing the opportunity to use those resources for something else. This is known as the concept of opportunity cost.

4) Allocation Mechanisms: Economics studies how different allocation mechanisms work to address scarcity. These mechanisms include market forces (supply and demand), government policies, and central planning, among others. How resources are allocated can have significant economic and social consequences.

5) Efficiency and Equity: Economics also explores questions of efficiency (producing the most output with given resources) and equity (fair distribution of

resources and benefits). These issues are central to debates about economic systems and public policies.

6) Trade and Specialization: One way to mitigate the problem of scarcity is through trade and specialization. By specializing in the production of certain goods and services and trading with others, individuals and nations can access a wider variety of goods and enjoy the benefits of comparative advantage.

7) Constant Challenge: Scarcity is a constant and inherent challenge in economics. It shapes decision-making at the individual, business, and societal levels. Economists seek to develop models, theories, and policies that help societies make the best use of their limited resources to maximize overall well-being.

In summary, scarcity is the foundational problem of economics because it forces individuals and societies to make choices about how to allocate limited resources among competing wants and needs. Understanding how these choices are made and their consequences is essential to the study of economics and informs many economic and public policy decisions.

Prompt 3: Can scarcity be eliminated ChatGPT (1/1)

Scarcity, in the fundamental economic sense, cannot be entirely eliminated. It is an inherent condition resulting from the basic economic problem of limited resources and unlimited human wants and needs. There will always be constraints on resources such as land, labor, capital, and time, and people will always have desires and needs that exceed the available resources. However, it is possible to mitigate the impact of scarcity and improve overall well-being through various means:

1) Technological Advancements: Technological progress can increase the efficiency of resource use and production, allowing us to produce more with fewer resources. This can help alleviate scarcity to some extent by expanding the available resources in practical terms.

2) Economic Growth: Economic growth, driven by increased productivity and innovation, can lead to an expansion of available resources and a rise in overall living standards. As economies grow, they may be better equipped to meet a broader range of needs and wants.

3) Resource Management: Effective resource management, including sustainable practices, can help ensure that available resources are used wisely and efficiently, reducing waste and stretching the available resources further.

4) Trade: Trade allows regions or countries to access resources that they may lack domestically. Through international trade, nations can specialize in the production of certain goods and services and trade with others to obtain the resources they need, potentially reducing the impact of scarcity.

5) Government Intervention: Government policies and programs, such as social safety nets, public education, and healthcare, can help address some of the consequences of scarcity by redistributing resources and providing for basic needs.

6) Innovation and Creativity: People can find innovative solutions and create

new products and services to address unmet needs. Entrepreneurship and creativity can lead to the development of goods and services that were previously unavailable.

While these measures can help mitigate the effects of scarcity and improve overall well-being, it's essential to recognize that scarcity itself is a fundamental concept in economics. It drives decision-making, trade-offs, and the allocation of resources. Efforts to address scarcity may lead to new challenges, such as environmental concerns or distributional issues. Therefore, while we can manage and mitigate the impacts of scarcity, complete elimination of scarcity is not a realistic goal within the framework of traditional economic thinking.