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Elevating Economic Education: Implementing ChatGPT Prompt Responses and Using a Proven Conceptual Framework in Macroeconomics, to Enhance Collegiate Student Learning and Academic Performance

Trish Petak**Associate Professor of Business and Accounting, Kansas Wesleyan University, USA*

***Corresponding author:** Trish Petak, Associate Professor of Business and Accounting, Kansas Wesleyan University, USA.

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Abstract

This study presents a novel approach to elevate economics education, primarily focusing on utilizing ChatGPT, an advanced language model, to help collegiate students understand and engage in topics within the complex field of macroeconomics. With the ever-increasing changes and challenges in economies, coupled with professors' high emphases on equations and graphs, and lack of introduction of human behaviors that drive an economy, this study also integrates a proven 5-step conceptual framework while implementing prompt responses from ChatGPT. This paper presents economic educators with transformative tools to enhance student learning, such as mastery of student learning outcomes, overall classroom engagement, and knowledge retention of macroeconomic concepts, by utilizing ChatGPT, leading to higher academic performance.

Keywords: Macroeconomics; ChatGPT; Macroeconomics; Academic performance; Economic education

Introduction

In an article titled What's Wrong with How We Teach Economics, it was discovered that far too many economic professors and economists focus intensely on mathematical equations and graphs while focusing little on understanding human behavior [1]. While understanding and analyzing equations and graphs is necessary to master a collegiate macroeconomics course, calculus and advanced mathematical equations are not necessary for an introductory macroeconomics course. Since macroeconomics is the study of how the economy behaves behind every mathematical equation and graph, economic behavior derived from human behavior. In Macroeconomics, it is individuals' and businesses' spending (consumption), taxes, savings, investments, productivity, investments, and so much

more. Since individuals, businesses, and governments are complex, with their preferences, incentives, and economic transactions, putting more stock into the reasons—human behaviors—behind the economic equations and graphs is crucial to fully understanding how something as complex as The United States of America's economy operates.

Collegiate students need to understand and analyze why an economy behaves the way it does (and why humans and businesses behave the way they do) before fully conceptualizing macroeconomics, leading to enhanced student learning, classroom engagement, and knowledge retention of the complex subject.

Because many university professors spend a great deal of time rethinking their educational strategies and ways to effectively deliver content, advancements in education have been discovered; this is true of the educator in this study. As technology innovates, university professors are gifted with new tools, yet new challenges, to enhance their pedagogy; whether they use specific technological tools to complement traditional education is dependent on the educator's teaching style. Researchers such as Yakin and Seraj [2] have recently proven ways to utilize technology to increase students' intrinsic motivation, engagement, and overall academic performance. Often, technology helps with the retention of material as it increases the number of senses students use to assess and absorb information and/or content, exponentially increasing brain function and cognition-- sight expands with colors seen in photos and movements in videos; additional sounds, such as singing, informative explanation, humorous content, exalt audio (in video). The positives of audio and visual in education is not a new discovery, as a 2014 Huffington Post article admitted that over 500 educational professionals from over 300 institutions agreed upon various benefits of using videos; one main benefit was influencing student learning outcomes and student experience [3].

Making new technologies in Principles of Macroeconomics has been a primary focus for this educator, as over 1/3 of graduating high school students enter college stating courses containing math are their least favorite subjects in school; high school students disclose formulas are dull and can be frustrating, as sometimes making lots of mistakes happens before a student achieves the correct answer [4]. It is no surprise many collegiate students who enter college may not be excited or intrinsically motivated about a Principles of Macroeconomics course, as it is heavy on formulas and graphs; some students recall the frustration suffered in previous quantitative high school courses and may have negative perceptions about the course before even starting the course or semester.

The researcher of this study has enhanced her teaching in a successful attempt for students to be excited about, engage in, and ultimately retain information from its sophomore-level on-ground Principles of Macroeconomics course. This has been achieved by the educator's excitement and energy regarding material as well as implementing numerous visuals into the course. Visuals include photos and charts of relevant macroeconomic topics, or videos that help identify concepts. Visuals are introduced throughout the classroom section, sometimes at the beginning of class and frequently in the middle of class. Researchers, such as Vazquez and Chiang [5], have studied and concluded many positive contributions using visuals in economic education has on cognitive functions, such as the ability to grasp and retain analytical concepts.

Many collegiate students resist math-heavy courses, some educators resist ChatGPT and the use of artificial intelligence [6]. ChatGPT, an advanced language model, is an artificial intelligence tool where a user can simply key in a prompt, such as "What are ways professors can engage collegiate economic students," and the language model will generate a response of a list of ways one could engage their economic students. A relatively new technological tool, ChatGPT is nowhere close to taking over academics; however,

it can simply help a professor brainstorm idea or enhance their creativity in their deliverables in class.

Carefully and strategically maintaining the usage of visuals (both still photos and videos) in Principles of Macroeconomics, this paper helps identify new ways an economic educator can use ChatGPT, a state-of-the-art advanced language model, to help collegiate students understand and engage in topics within the complex field of macroeconomics. This study will research the effectiveness of intentionally using four specific interactive activities, suggested by ChatGPT, to enhance student learning, mastery of course outcomes, overall classroom engagement, and retention of material.

This paper presents and reinforces a conceptual framework for economic educators to; it will provide transformative tools to enhance student learning, such as mastery of student learning outcomes, overall classroom engagement, and knowledge retention of macroeconomic concepts, by utilizing ChatGPT, as an educator, for a collegiate macroeconomics class.

Previous Experiment

In the fall of 2022, the researcher implemented additional visuals (photos and videos) to enhance economic learning in its Principles of Macroeconomic course(s). Some Macroeconomic concepts, coupled with visuals, include:

- GDP – secondhand transactions – brief viewing of Macklemore's Thrift Shop music video
- Macroeconomic Graphing – multiple relatable and humorous diagrams showing how a graph is simply a relationship between two variables.
- Unemployment – brief viewing of Rhianna and Drake's Work music video
- Imports and Exports – brief viewing of Seinfeld, where a character pretends to have a title as an importer/exporter.

While there are many more examples in the researcher's and educator's paper titled Music, Media, and Macroeconomics: Using Audio and Visual Media to Achieve Student Learning Outcomes and Higher Academic Performance in a Collegiate Macroeconomics Class, which shows a slight increase in overall achievements with the introduction of music and media, these examples above are a few in which students found to be humorous and relatable, leading to retention, achieving learning outcomes, and a higher academic success. The previous experiment found an increase of retention, performance, and outcomes of 2.02 total overall percentage points, from 0%-100% (or a 2.66% improvement) for one section and a 2.91 (or 3.84% improvement) for a second section of macroeconomics. The previous experiment's paper contains a more in-depth breakdown and analysis.

New Experiment Details

The new experiment features a similar 5-step conceptual framework to the previous experiment where:

1. **Step 1:** Understanding and Application of Individual, Business, and Government Behavior (Macroeconomic Drivers)

2. **Step 2:** Macroeconomic Concept
3. **Step 3:** Quantitative Information
4. **Step 4:** Economic Analysis
5. **Step 5:** Outcome

Step 1 is crucial and the foundational step in this 5-step conceptual framework. Step 1 is (according to research) where far too many economic educators lack educating or minimize the importance—the understanding and application of individual, business, and government behavior. All of these are significant drivers of The United States of America's economy. Once the freshman or sophomore-level collegiate students become familiar with these aspects, then one can introduce the macroeconomic concept, Step 2, which likely is accompanied by a definition, but should also be defined in relatable terms. (Step 1 - Understanding and applying the drivers of the economy will help introduce the concept in relatable terms.) The macroeconomic concept is likely introduced with a mathematical equation, graph, or both. In Step 3, some quantitative information will be provided via the macroeconomic concept; however, the ultimate solution is unknown until carefully solving the equation. After solving the equation, Step 4, economic analysis is necessary to tie back into the understanding and application of macroeconomic drivers. Often, macroeconomic numbers (whether dollar amounts or percentage/rate changes) are compared to previous quarters, years, and even compared to other nations. The researcher has discovered when Step 4, economic analysis, is not clear, not utilized properly, or when a student struggles to conceptualize and explain the analysis, there is no change in Step 5, the outcome (retention of material or overall grade (academic performance) of that concept).

Following the 5-step conceptual framework is imperative to achieve the outcome. While the educator utilizes ChatGPT to brainstorm and increase creativity in this study, the educator needs to include all the five steps of the conceptual framework outlined above. ChatGPT, an advanced language tool, provides the educator with information based on the researcher's prompts. Below, the researcher will summarize four prompts input into ChatGPT and briefly describe how she will use ChatGPT's response, or one of its responses, in her fall 2023 3 credit hour Principles of Macroeconomics sections. This course is on a typical semester schedule, which operates over 16 weeks.

This study and teaching delivery will heavily implement the 5-step conceptual framework. This study will focus on capturing one key macroeconomic concept, with the educator using ChatGPT, in the four sections of a sophomore-level Principles of Macroeconomics course fall 2023. This conceptual framework and experiment will include anywhere from 60-90 total students in two separate sections of Principles of Macroeconomics. While it is a sophomore-level course, students may be first-year students to seniors; however, most of students will be at the sophomore or second-year level.

The following outlines four macroeconomic sections, a key concept within that section, the educator's prompt to ChatGPT based on the concept, a summary of in-class activity ChatGPT responded based on the prompt, and which step of the 5-step conceptual

framework the implementation will occur:

Section 1 – GDP Expenditure Approach

ChatGPT prompt: "Provide me with an interactive activity that helps students learn GDP expenditure approach, its categories, and relatable examples" ChatGPT provided the educator with one activity.

GDP Expenditure Approach Sorting Game engages students by dividing them into sections of consumption, investment, government spending, and net exports and has them write down multiple examples/transactions that fall within that category (and are included in calculating GDP). Next, the cards are scrambled and distributed to groups; groups then assess the transactions and identify which category the example belongs to—C, I, G, or NX. Groups present some of their favorites to the class.

This activity occurs in Step 4 of the conceptual framework, Economic Analysis. The educator will have already introduced GDP, and the expenditure approach, and carefully completed Step 1, Step 2, and Step 3. This will help reinforce the key concept.

Section 2 – Aggregate Supply and Demand

ChatGPT prompt: "Provide me with an interactive activity where taxes, savings, government spending, and planned investment increase or decrease aggregate supply or aggregate demand." ChatGPT results provided the educator with one activity.

The Aggregate Economy Game

This activity allows students to work in small groups, and the educator will provide students with initial economic conditions, such as current aggregate supply and aggregate demand, current tax rates, savings rates, government spending, and planned investment. Each group will create policy decisions to manipulate the variables, leading to increases or decreases in aggregate supply and aggregate demand. Groups will share policy decisions with the class.

This activity occurs in Step 4 of the conceptual framework, Economic Analysis. The educator will have already introduced aggregate supply and demand and carefully completed Step 1, Step 2, and Step 3. This will help reinforce the key concept.

Section 3 – Economic Fluctuations

ChatGPT prompt: "Provide me with an interactive activity to help teach expansion and recession."

ChatGPT results provided the educator with four different options for interactive activities.

Rollercoaster ride simulation is the activity selected by the educator. The educator will play a short video of a rollercoaster ride to enhance learning of expansions, peaks, recessions, troughs, and normal economic functions. If the educator can find a video where the riders scream during the recession, it would be even better.

This activity occurs in Step 2, of the conceptual framework, Macroeconomic Concept. The educator will have already introduced economic fluctuations, such as expansions, peaks, recessions,

sions, and toughs in Step 1. This will help define and understand the key concept.

Section 4 – Money Supply and Hyperinflation

ChatGPT prompt: “Create an interactive activity where collegiate students can calculate hyperinflation”

ChatGPT results provided the educator with one activity.

Hyperinflation Simulation is an activity where students can simulate a calculate the effects of hyperinflation on a hypothetical economy. Students will be divided into small groups and provided with specific economic conditions, such as inflation rate, money supply, and price levels. Students will then be provided with a specific period, such as four months, and calculate how an increase in money supply leads to inflation, and a significant increase in money supply leads to hyperinflation. Each group will calculate the rate of inflation for four rounds, and hyperinflation rates to the class.

This activity occurs in Step 3 of the conceptual framework, Quantitative information. The educator will have already carefully completed Step 1 and Step 2 and provide groups quantitative information to properly calculate hyperinflation. This will help reinforce the key concept and segue in Step 4, where the class can apply proper Economic Analysis to the calculations and variables that led to the highest hyperinflation.

Anticipated Results

Just as the researcher’s past paper and experiment titled Music, Media, and Macroeconomics: Using Audio and Visual Media to Achieve Student Learning Outcomes and Higher Academic Performance in a Collegiate Macroeconomics Class, the anticipated results of continuing the utilization of photos and media, coupled with the implementation of the four ChatGPT activities and simulations, the researcher hypothesizes the following:

Fall 2023 Principles of Macroeconomic students will have higher academic success (at a rate of 2.00 percentage points or higher) compared to fall 2022 students.

The implementation of the four activities and simulations will aim to increase academic success, by enhancing student learning, such as mastery of student learning outcomes, improving overall classroom engagement, and increasing knowledge retention of macroeconomic concepts.

Some factors the researcher notes that could also directly increase/decrease academic performance include, but are not limited to:

- Students’ previous understanding of and adaptability to economics or the economy
- Students’ positive/negative perceptions of math, equations, and graphs
- Students’ relatability reception professor’s teaching and materials, such as pedagogy/style and photos/videos

Conclusion

Some technological advances have helped educators better deliver their craft to students, enhancing student learning outcomes and academic performance. While implementing and using technology in the classroom is not a novel topic, using ChatGPT is, as it is a contemporary tool that some educators are now exploring, while other educators are resistant to (or may not be familiar with). This study presents an already proven conceptual framework for economic educators to use. It provides transformative tools to enhance student learning, such as mastery of student learning outcomes, overall classroom engagement, and knowledge retention of macroeconomic concepts, leading to increased academic success. All this aim to be achieved by utilizing ChatGPT as an educator, for four key concepts throughout the course, for a collegiate macroeconomics class.

Acknowledgment

None.

Conflict of Interest

No conflict of interest.

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