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In Pursuit of Increased Student Engagement: Gamification, Introductory Macroeconomics, and The Amazing Race

In this paper, we develop a gamification technique for three typical topics pertaining to macroeconomics classrooms, whereby the television game show The Amazing Race is used to embed clues regarding game locations. Gamification refers to the incorporation of competitive elements, designed as incentives, into tasks. In other words, gamification involves incorporating principles of incentivization into potentially tedious activities like reading a textbook, thus rendering the activity a game. The technique leverages students' innate desire for competition and achievement (Taylor, 2022). Instructors are invited to use this material as a manual to integrate and employ this technique in their Principles of Macroeconomics class.

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1. Introduction

Many instructors struggle with engaging their students in abstract material. We also wrestle with the limited time we have to explore such a rich subject as macroeconomics. When these challenges were exacerbated by a pandemic that mandated online instruction, some instructors sought new and innovative ways to meet learning objectives. Gamifying elements of a course is one such innovation.

Gamification is defined as the strategic attempt to enhance systems, services, organizations, and activities to motivate and engage users (Fleming et al., 2022). Generally, this is accomplished by applying and integrating gamedesign elements and principles (for example, dynamics and mechanics) in non-game contexts. Gamification's use remains limited in the academic setting; we propose its use in economics classes due to its capacity to leverage students' natural competitive drive.

Current teaching modalities sometimes fail to meet the shifting needs and interests of the current generation. However, Deterding et al. (2011) suggest that the use of games in traditionally non-game contexts has become "a cultural medium and source of formative experiences on par with literature, movies, or television in earlier generations." Most current college students were born in the early 2000s. Their adolescence was likely influenced by Homer Simpson, Hannah Montana, iCarly, Nintendo, and Wii, while Instagram and social media helped navigate their social structure. Computer math games, whiteboards, and gaming tools like Quizlet commonly supplemented elementary learning, with texts and emails emerging as a dominant form of communication. The result is a generation of students who are comfortable with a virtual format for entertainment, commerce, and learning. To leverage their propensity for digital materials, particularly games, developing classroom content and projects with this focus will likely aid in garnering interest and enthusiasm for academically based concepts. In addition, many students are innately competitive, as evidenced by the extensive engagement in both games and athletics in this age group. While gamification has not been extensively used in economics classes, it is a natural fit.

In this paper, a gamification technique is developed for use in an introduction to macroeconomics classroom. The gamification technique used in this research is based on the television game show *The Amazing Race* (Doganieri et al., 2001-2022). Examples of game locations are outlined for three different topics typically covered at the introductory macroeconomics level, with additional places to visit and corresponding discussion resources displayed by topic in Appendix A. We invite instructors to use this material as a guide for adopting the technique in a semester-long Principles of Macroeconomics class that incorporates gamification elements to create a more engaging and enriching learning environment for students. The method can be adopted in formats, including in-person and virtual teaching, and is flexible enough to be incorporated into hybrid formats. The authors began using this technique during the COVID-19 pandemic, when many classes moved online and the need for engaging students studying at home became even more important to educators.

2. Literature Review

Gamification in higher education promotes student engagement and emerges as a valuable technique to foster greater student interest. The concept is derived from the notion that heightened user interactivity with a particular topic stimulates the learning process, increases motivation, and fosters student engagement (Deterding et al., 2011).

Director of Games, Research, and Development at the Institute for the Future, Jane McGonigal's (2015) research demonstrates a positive correlation between gaming

and dopamine levels. "Every time you make a prediction, or you take an action that could potentially have a positive result, your brain increases dopamine because it helps you learn." Dopamine is a neurotransmitter that helps with focus, concentration, memory, and motivation, among numerous other effects. It is logical to conclude that increases in dopamine that come from gaming activities may encourage students to spend more time on game-related course elements.

Generation Z, born between 1997 and 2012, comprises the current, traditional-aged undergraduate population (Miranda, 2020). In light of this, gamification emerges as a potentially effective teaching modality capable of cultivating Gen-Z's fragmented interest. Miranda (2020) demonstrates that, likely due to widespread game use in the late 1990s, Gen-Z relates to the notion of games, noting, in particular, that students become very active and committed to the game. Typically, games elicit an increased sense of involvement, sparking interest in the subject at hand (Fardo, 2013). In addition, students "learn how to apply concepts that could be abstract and hard to relate to" (Secchi & Banerjee, 2019), and "it appears that students gain a deeper understanding of the forces of [economic concepts] throughout the course of the semester" (Staveley-O'Carroll, 2016).

Hisam et al. (2018) conducted a study examining the effect of gaming on cognitive function. The study established a positive effect on cognitive functions in the research group, which was particularly prevalent when compared to the control group. Results indicate the gaming group had improved memory and attention levels compared to the non-gaming group, ultimately indicating that "Gamers exhibit better range of cognitive abilities specifically involving analogy, processing speed, deductive reasoning and mathematical intelligence" (Hisam et al., 2018). Some research delves into game elements, such as whether a game is autotelic, playful (Songer & Miyata, 2014), or contains personality and gender-specific traits (Smiderle et al., 2020). Researchers purport that gamification can engage students, optimize learning (Kraus & Williams, 2015), and increase retention and erudition (Hakulinen, 2014).

While most research has been encouraging, some studies have demonstrated non-positive outcomes from the use of gamification in education. Hanus & Fox (2015) noted a decrease in pleasure and motivation when gaming was used in the classroom, while Christy & Fox (2014) identified displeasure across genders, with male students responding more favorably than female students to a gamification approach. For example, results from a recent study revealed that women learned significantly more than men in a non-gamified situation, while men outperformed women in the gamified condition. Furthermore, men reported higher enjoyment, usefulness, and comfort with the gamified instrument than women (Mellado, 2024). These findings warrant further study in the context of this research, and of particular interest is the concept of how those with less of a competitive drive fare in a gaming environment.

Nevertheless, there seems to be increasing evidence testifying to the merits of gaming in education. Supporting this fact, "97% of children in the United States engage in gaming for a minimum of 1 hour per day" (Hisam et al., 2018). These children are or will be in college, verifying the prospect of using games to accommodate digital gaming natives. Other studies indicate an evolving perspective on the long-term implications of gaming in higher education, such as "to understand the equilibrium between competition and cooperation in a gamified learning environment, and to explore the differential effects of gamification on learners with different characteristics" (Zubkov, 2023).

3. Sample Lessons

The gamification technique used is based on the television game show *The Amazing Race* (Doganieri et al., 2001-2022). In the game show, which falls into the genre of adventure

reality competition, pairs of contestants receive clues to various destinations around the world. They race to the destination with the goal of being the first pair to reach it. Along the way, the teams are asked to deduce clues, navigate in foreign areas, interact with locals, and perform physical and mental challenges that often highlight aspects of a specific location's culture, history, or economy. In the show, teams are eliminated at various destinations called Pit Stops for being the last to arrive. Once they reach one Pit Stop, they are given a clue to find the next one. This process continues until a winning pair reaches the final destination ahead of all other pairs and is awarded a grand prize. .In the past, grand prizes have included trophies, cash awards, and trips. The show has been on television since 2001. The game format is similar to that of a scavenger hunt or an escape room. There are additional show elements that could be incorporated into a class, such as obstacles and roadblocks. We present a simplified form of the game using only clues. For a more detailed description and sample review of The Amazing Race game, visit: Behind the scenes of *The Amazing Race*.

Either the entire course or a subset of the course can be developed around a travel theme similar to the show. This technique could be adapted for pair or group use. The students competed individually in the courses where we used this technique. The gamification method is flexible enough to be adopted in an online, hybrid, or face-to-face modality.

Students receive the following instructions early in the course:

We will be adopting an interactive game element in this course based on the TV game show, "The Amazing Race" (see Behind the scenes of The Amazing Race if you are unfamiliar with this show). Keep a lookout for clues or buried treasure, so to speak, about where our class will end up next. The clues may be found in the readings, homework, assigned videos, or lectures for each lesson. When you think you know in which city we are, take The Amazing Race one-question "quiz". If you are correct, you will receive a stamp on your luggage for the country where the target city is located.

We gave the one-question "quiz" as an extra credit opportunity through our course management system, awarding ½ extra credit points for each correct answer, either toward the final course grade or the final exam grade. We used a multiple-choice format with the correct city/country pair given, along with other city/country pairs from around the world.

For correct answers to the extra-credit travel question, "Where are we?", students also received an old-fashioned travel sticker on their suitcases, similar to this one for Spain.

The correct answer and a brief explanation were posted in an announcement (see examples below). Of course, the correct city/country choice could also be announced in the classroom for a hybrid or face-to-face class. The only important point here is that you adhere to the deadline for the "quiz."

Lesson #1 Market Equilibrium/Price Controls

Topic: Adam Smith, "The Wealth of Nations"

The principles course is ideal for introducing students to Adam Smith, the father of modern economics. While students may have learned about Smith earlier in a historical context, perhaps in middle school social studies classes, they will now be introduced to him in an economic context.

The Amazing Race game helps students think about Smith less abstractly. Scotland, particularly Edinburgh [Smith's place of death], for example, is a great place to start your class on their 'adventure.' A popular textbook includes an FYI feature about Adam Smith and a Case Study entitled "Adam Smith would have loved Uber" (Mankiw, 2021). The case study examines Uber's impact on the highly regulated taxi market, turning it vigorously competitive. This and the following hints, clues, keywords, and exercises may be sprinkled throughout your class to encourage your students to choose Edinburgh, Scotland, at the end of the week. Note, not all of the items need to be used; just a few are usually sufficient to point your students in the right direction and, hopefully, further engage them in deep reading about a 250-year-old economic philosopher.

Topic: Adam Smith, the Invisible Hand, The Power of Markets

Place: Edinburgh, Scotland

Relevant readings: About Adam Smith, Econlib on Adam Smith

Keywords (to fit into announcements, lectures, video recordings, instructions): Panmure House, William Wallace, Braveheart, David Hume

Goods [to fit into exercises]: oat cakes, kilts, whiskey, haggis (meat pudding)

Currency for exercises: Scotland uses the pound sterling

Homework or Class exercise: Suppose that the demand and supply schedules for apartments in Panmure are given in the following table.

Rent	Supply	Demand
£800	8000	2,800
£750	1,000	2,400
£700	1,776	1,776
£650	2,500	1,200
£600	3,250	975

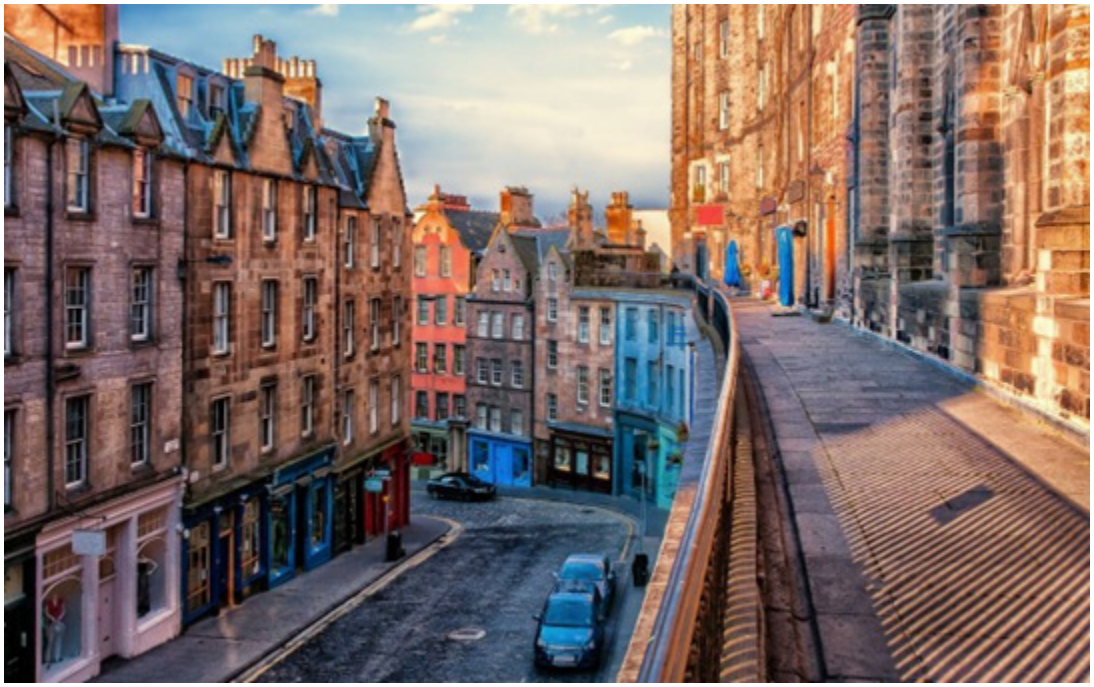
a. What is the market equilibrium monthly rental price and the equilibrium number of apartments demanded and supplied?

b. If the local governor, William Wallace, can enforce a rent-control law that sets the maximum monthly rent at £700, will there be a surplus or a shortage? How many units? How many units will be rented each month?(Adapted from McConnell et al., 2021)

Most of all, you will want to have a little fun with this. For example, "seachdain mhath a bhith agad" means "have a good week" in Scottish Gaelic. You may want to include this in an announcement, if relevant. While mistakes may occur with your foray into foreign languages, the students are likely to embrace the spirit in which the clue is intended.

At the end of the week or the beginning of the next, you will announce the location of the class. Your announcement may look something like this:

Picture of the location from Google (Edinburgh, Scotland, 2024).



We have arrived in Edinburgh, Scotland!

Edinburgh has been recognized as the capital of Scotland since at least the 15th century. The city has long been a center of education, literature, philosophy, the sciences, and engineering. It is also the second-largest financial center in the United Kingdom.

Adam Smith traveled extensively but spent his last years in Panmure House in Edinburgh. He died there in 1790. Smith laid the foundations of classical free market economic theory. His book, "The Wealth of Nations," was a precursor to the modern academic discipline of economics.

Next week we will not travel too far. We are heading to a country where the leader holds the title of First Secretary and President, as described in your text. Have a great week!

Lesson #2 Trade

Topics: Trade Policy, Comparative Advantage, Trade Restrictions

There are no limits to where you may want to take this topic. Numerous other suggestions are listed at the end of the section. For the sake of simplicity, we will focus on using Havana, Cuba, for your Amazing Race location for the topic of trade. The Cuban trade embargo is considered one of the most enduring trade embargoes in modern history and is rich in examples of the economic and humanitarian consequences of trade policies. This may be used at different points in the course as you explore the topics listed above. You may choose to use it early in the course when teaching comparative advantage or later when teaching tariffs and quotas.

Topic: Trade

Place: Havana, Cuba

Relevant readings: Is Trade and Investment from the United States the Solution to Cuba's Economic Woes?

Keywords: el bloqueo [the blockade], missile crisis, Fidel Castro, embargo

Goods: refined fuels, sugar, tobacco, nickel, and pharmaceuticals

Currency: Cuban peso

Homework or Class Exercise: Consider the maximum-output alternatives for the island countries of Hemingway and Santiago given below. Suppose the two nations decide to trade.

Santiago		Hemingway	
Tobacco	Sugar	Tobacco	Sugar
0	32	0	48
4	24	4	26
8	16	8	24
12	8	12	12
16	0	16	0

a. What is the opportunity cost of producing tobacco in Santiago? In Hemingway?

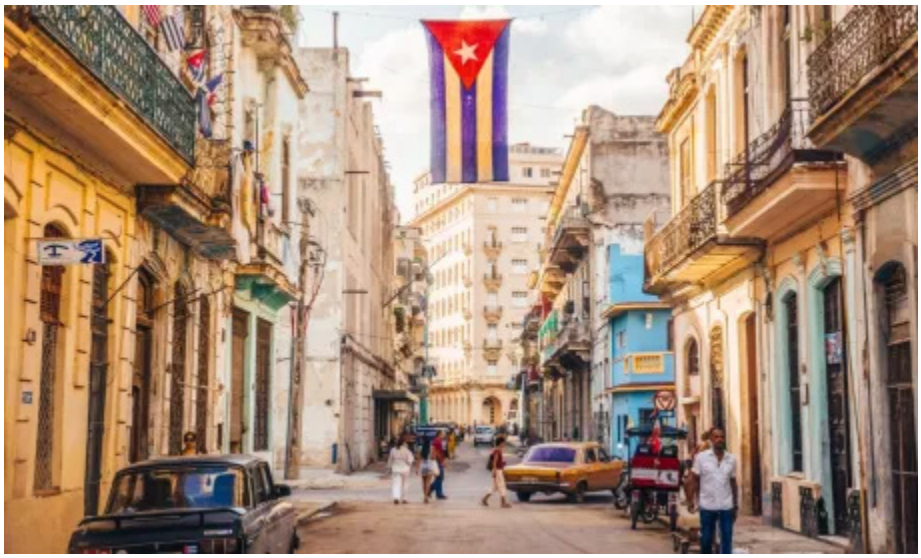
b. If Santiago and Hemingway specialize according to comparative advantage, which country will export tobacco?

c. Identify the limits on the terms of trade.

Again, be creative and have a little fun with your clues. Consider using color as a visual cue to highlight data, such as the red and blue columns in the example above, which correspond to the colors of the Cuban flag. Highlighting individual letters in your examples can spell out unique local attractions or can create anagrams to the name of the city (Havana in red above). Post quiz, you might announce the location in class, using Havana, Cuba as a backdrop for a discussion of the economic impacts of trade policies.

A sample announcement, which you would post the day of the class's "arrival," may look something like this:

Picture Location from Google (Havana, Cuba, 2024).



We have landed (virtually) in Havana, Cuba!

Cuba, lying 90 miles to the south of Key West, Florida, is of great strategic importance to the US both because of its proximity to the Panama Canal and to the sea lanes of the Caribbean. Modern diplomatic relations between the two countries are cold, stemming from historic conflict and divergent political ideologies. Beginning in 1958, the United States' embargo against Cuba prevented businesses from conducting trade or commerce except under strictly defined circumstances. So, while trade and travel restrictions continue to evolve, I hope to visit Cuba's beautiful and nostalgic 1950s vibe one day.

Passports and Duolingo will be needed for our next stop!

Lesson #3 Inflation

Topics: Hyperinflation, Monetary Injections, Purchasing Power, Money Velocity

All macroeconomic principles cover inflation and prices to some extent. Post-pandemic, students are increasingly aware of the effect of inflation on their purchasing power. There has never been a better time to make the abstract concepts of real and nominal variables relevant.

While many locations could have been chosen for your class to visit when you are teaching inflation, we have chosen the perhaps lesser-known experience of Ankara, Turkey, to add an element of diversity to the discussion.

Topic: Inflation

Place: Ankara, Turkey

Relevant readings: The Rising Price of Bread in Turkey: Daily Life in a High Inflation Economy

Keywords: Bronze age, King Midas, Lira, Nazar [the Evil Eye], ₺

Goods: pears, honey, muscat grapes, Angora wool

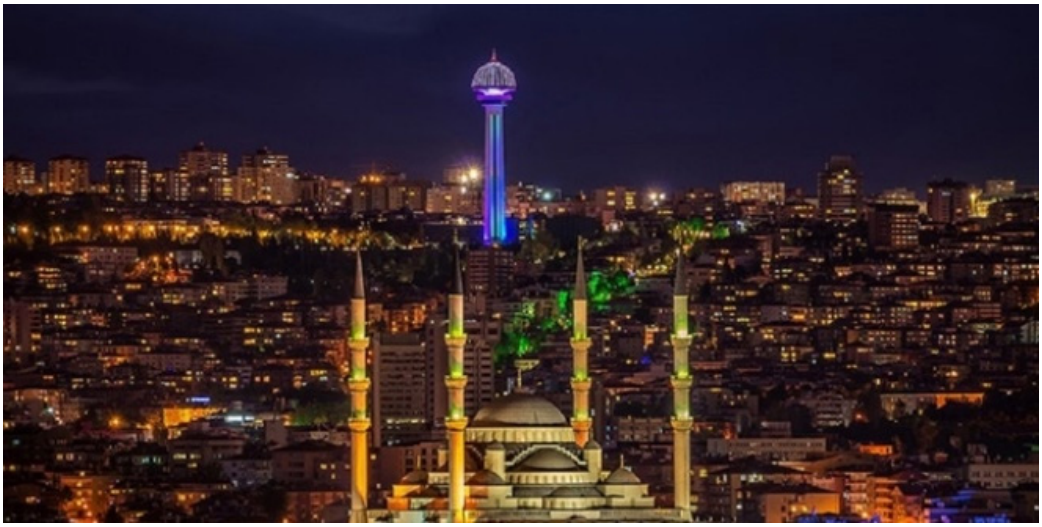
Currency: Turkish lira

Homework or Class Exercise: In January 2020, the value of Simit honey exports was 385 million Lira. In January 2021, Simit honey exports were valued at 500 million Lira. Two politicians in the capital city debate the value of honey exports. Parliamentarian A argues that the increase in exports results from greater foreign demand for Simit honey. Parliamentarian B argues that the quantity of honey exports has fallen despite the rise in the value of exports.

Who is correct if the price of Simit honey increased from 675 Lira per kilo in 2020 to 900 Lira per kilo in 2021?

Your announcement may look like this:

Picture Location from Google (Ankara, Turkey, 2024).



We end our journey in Ankara, Turkey.

Ankara is the capital of Turkey, and it is Turkey's second-largest city after Istanbul. It is most definitely on my bucket list! A little bit about Ankara...the region's history can be traced back to the Bronze Age. Ankara has been home to Hittites, Phrygians, Lydians, Persians, Byzantines, and Turks. It has been Turkey's capital since 1923. Ankara is a modern city with a pleasant climate. It is a cultural and industrial hub for the region.

I hope you have enjoyed our Amazing Race! Special congratulations to Cesar and Whitley, who guessed all of the cities correctly. Great job!

4. Conclusion

While there are numerous tools you could add to your course to engage this generation of students, this is one of the most versatile and easiest to use. There are really no limits to the technique's flexibility.

The three lessons outlined here are just the beginning of the uses for gamification in economics. Additional topics, places to visit, and suggested correlated readings are listed in Appendix A. The techniques outlined here could be employed in both principles and upper-level classes as well as across a multitude of disciplines. One could also adapt some of the elements of The Amazing Race show, like roadblocks, and use these in the classroom in creative ways. In our online class, we adopted a weekly travel plan and corresponding quiz to provide a uniform structure to virtual learning tasks. We used the in-person quiz to introduce video clips and articles that demonstrate the relevance of class topics to real-world applications. The time needed to implement this technique varies to the extent to which the instructor incorporates the game. Utilizing it as an extra-credit option allowed us to incorporate the methodology with little to no use of class time.

Preliminary results indicate that this technique improves student engagement by stimulating competitive participation and interest. In a recent class where the method was used, 100% of the students participated in The Amazing Race when it was offered as an extra credit opportunity. Numerous student comments reflected that the game encouraged them to engage with the textbook. A mid-semester course evaluation asked students to reply to this statement: "The Amazing Race game encourages me to engage actively in the course." All students replied with either Strongly Agree or Somewhat Agree to that statement. The game also enriches students' understanding of macroeconomic topics by adding a hypothetical travel element. The travel elements contain allusions to global issues and the history of economic thought topics. Furthermore, using assorted cultural elements can foster the development of a worldwide perspective, aiding in university, school/college, or department missions to establish learning materials that include diversity, equity, and inclusion.

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