



Teaching Economics With Analogies — Practical Examples¹

According to Merriam-Webster Dictionary, an analogy is “a comparison of two otherwise unlike things based on resemblance of a particular aspect.” This paper presents practical examples of teaching economics with analogies that students can easily relate to in their daily life.

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1. Introduction

For the past two decades, economics educators have advocated innovative teaching methods that shift away from traditional “chalk and talk” (Becker, Becker, and Watts, 2006; Becker and Watts, 1996, 2001; Benzing and Christ, 1997). To make economics “the sexy social science” (Becker, 2003) and better stimulate creative young minds, a rich literature of unconventional teaching methods followed. These teaching innovations include teaching economics with comic books (Hall, 2014; O’Roark, 2017), historical novels (Cotti & Johnson, 2012), music (Hall and Lawson, 2008; Hall, Lawson, Mateer, and Rice, 2008; Holder, Hoffer, Al-Bahrani, and Lindahl, 2015; Krasnozhon, 2013; Mateer and Rice, 2007; Rousu, 2016; Rousu and Conrad, 2017; Tinari and Khandke, 2000), movies (Deyo and Podemska-Mikluch, 2014; Mateer, O’Roark, and Holder, 2016; Mateer and Stephenson, 2011), TV shows (Kuester, Mateer, and Youderian, 2014) and social media (Al-Bahrani & Patel, 2015).

These teaching innovations are fun and great for experienced instructors, but some of them could be costly to adapt (in terms of the instructor’s time, effort, and financial resources). For instance, if an instructor is not familiar with comic books or musical shows, then the opportunity cost of reading/watching/listening to the books or shows might be high. This is particularly true for a newly-minted PhD, who has just landed a teaching position and has to prepare to teach multiple subjects with a somewhat limited teaching experience. This paper provides economics instructors with a teaching technique—teaching economics with analogies—that is relatively less costly to adapt. According to Merriam-Webster Dictionary, an analogy is “a comparison of two otherwise unlike things based on resemblance of a particular aspect.”

Suppose α and β are two concepts resembling each other in a particular aspect. Furthermore, the instructor’s goal is to convey concept α . Students are familiar with concept β , but not with α . The instructor can exploit the similarity between α and β and use the concept of β to explain α .

This paper presents several practical examples of analogies that can be adapted in any classroom at a relatively low cost. Some examples are relevant to students’ daily lives that they can better relate to, such as studying for exams or seeing a physician. Conveying abstract concepts with these analogies can help students grasp the ideas quickly, resulting in better comprehension. It is the author’s hope that the reader finds this technique helpful in the classroom.

The rest of the paper will proceed as follows: Sections (2.1), (2.2), (2.3), and (2.4) detail practical examples of analogies that an economics instructor can apply in teaching introduction to economics, principles of macroeconomics, principles of microeconomics, and international economics, respectively. Section (3) discusses potential challenges and possible methods in testing the effectiveness of teaching with analogies. Section (4) concludes.

2. Teaching With Analogies

A. Introduction to economics

Deadweight loss as “a piece of pie burned in the oven” Deadweight loss occurs due to many reasons, including (but not limited to) positive and negative externalities, monopoly, and tax. If the instructor simply tells students that deadweight loss measures welfare loss, students might find it too abstract.

Instead, the instructor can describe the market as an oven, and the “economic pie” as a

large apple pie baking in the oven. In a “perfect world” with perfect competition, no externalities and no tax, the economic pie is maximized. It is similar to a freshly baked apple pie—fragrant, juicy, and large; ready to be enjoyed. However, if the oven (the market) does not function well, then it could cause a piece of the apple pie to be burned in the oven. No one can eat that piece of apple pie—it is burned, a waste of resources. It is simply regrettable. That burned piece of apple pie is similar to the deadweight loss in the economy.

If the deadweight loss is a result of market failure, such as monopoly or externality, then government intervention to improve efficiency is desired, and perhaps necessary. When market failure occurs, it is similar to a broken oven. For some reason, the oven does not function well, so a piece of pie is always burned in the oven. Therefore, the government would play the role of technician to repair the “market oven.”

For instance, anti-trust laws help to promote competition. The sale of pollution rights reduces negative externality from production. Cigarette tax and gun safety laws reduce negative externality from the consumption of cigarettes and guns. These are the actions that the government takes (or should take) to lower deadweight loss and to maximize the size of the economic pie. The government’s action is similar to that of a technician who repairs the oven to prevent the apple pie from burning, and thus maximizes the size of the apple pie.

Sales tax as an “on-line transaction fee” Students have a challenging time understanding why it does not matter whether the government imposes the lump sum tax on the buyer or the seller. Specifically, students falsely conjecture that, if the government imposes the tax on the buyers, then the buyers would bear the entire burden of tax; and if the government imposes the tax on the sellers, then the sellers would bear the entire burden of the tax. This fallacy is especially rampant if the instructor introduces sales tax to students without their prior knowledge of price elasticity of supply and demand.

To illustrate this concept, the instructor can ask students to consider a seller trying to sell a painting for \$50 on a website.

Figure 1



The website provides a platform for the seller to post a picture of the painting and charges a flat transaction fee of \$10. There is no bidding on the website. The seller is not seeking to sell the painting for a price higher than \$50, nor would he/she accept a price lower than \$50.

Suppose in Scenario 1 (see Figure 1), the website charges the buyer the \$10 transaction fee. In this case, while preparing to show the picture of the painting, the seller will list the painting as \$50. The buyer's invoice would include \$50 for the painting and \$10 for the transaction fee. The buyer's credit card will be charged for \$60. Therefore, the buyer pays \$60. The website takes away \$10, and delivers \$50 to the seller.

In Scenario 2, the website charges the seller \$10 transaction fee. Since the seller will not accept anything less than \$50, the seller will have to list the price of the painting as \$60 on the website. When the buyer buys the painting, his/her credit card will be charged \$60. After that, the website deducts \$10 from the seller's account for the transaction fee, and then delivers the remaining \$50 to the seller.

The instructor can show students that although the listing price of the painting is different in the two scenarios (\$50 for scenario 1 and \$60 in scenario 2), the outcomes are exactly the same. In other words, the buyer's credit card is charged \$60; the website takes away \$10; and the seller receives \$50. Here, the website is like the government, which imposes a lump sum tax (\$10) that puts a wedge between the price paid by the buyer (in this case \$60) and the price received by the seller (\$50 in this case).¹

B. Principles of macroeconomics

The role of the government and the economy as a physician and the patient A standard textbook in the introduction to macroeconomics typically discusses the role of the government in the economy. Two questions the author found in a standard textbook (Mc-Connell, Brue and Flynn, 2018) are the following:

1. Can the government improve the performance of the economy, such as raising the growth rate?
2. Can the government shorten the duration of a recession and/or reduce the severity of a recession?

The instructor can illustrate the relationship between the economy and the government as the relationship between a patient and his family physician. The economy is the patient and government is the physician.

The patient could be seeing a physician for an annual physical examination. After the patient arrives at the doctor's office, the nurse would take vital signs and collect blood and urine samples. The physician would examine the health of the patient by reading the vital signs, as well as the numbers collected from the blood and urine samples. Depending on the circumstances, the physician might tell the patient that he is healthy, but could do better by following a healthier diet and exercising regularly.

Similarly, the government examines numbers (for example, the unemployment rate and inflation rate) prepared by the Bureau of Labor Statistics. This is similar to that of the family physician reading the vital signs measured by a nurse and blood samples analyzed by a laboratory technician. The economy might be doing well with a decent growth rate and

¹While serving as a teaching assistant, the author learned this analogy from Amihai Glazer. The author did not come up with this analogy.

relatively low unemployment and low inflation rate. However, the government could try to improve the economy's performance by formulating policies that, for example, promote competition and boost growth and/or productivity.

Another scenario requiring a patient to see a physician is when the patient is sick—for example, the patient might be suffering from strep throat. In this case, the physician typically prescribes some medication (for example, amoxicillin) to alleviate the causes and symptoms of the infection, as well as shorten the duration of the illness. The physician's action is similar to that of the government in a recession. The government could carry out an expansionary fiscal policy and/or monetary policy to reduce the severity and shorten the duration of a recession.

Drawbacks of economic indices are like those of vitals signs Almost all macroeconomic indices have their drawbacks. Take the gross domestic product (GDP) as an example. As Robert Kennedy indicated, GDP measures everything “except that which is worthwhile” (The Guardian, 2012). For instance, GDP does not measure non-market transactions, the value of leisure, the joy of families and friends, and so on. Furthermore, GDP does not reflect harmful actions such as pollution, school shootings or inequality that result in negative externality (such as a higher crime rate). Ironically, the sales of semi-automatic rifles that are used to commit mass shootings and shatter families, actually adds to the GDP.

Likewise, the unemployment rate has multiple pitfalls, such as missing out discouraged worker, underemployment where workers involuntarily take a job that requires lower education and skill level, and workers who involuntarily work part-time.

Although these indices do not tell us everything about the economy or the well being of society, they do give us some relevant information. This is similar to the vital signs — our body temperature, blood pressure, and pulse rate — taken during a doctor's visit. While these vital signs do not tell the doctor everything about our health, they do convey some relevant information about our health condition.

Therefore, albeit their shortcomings, macroeconomic indices are important references for policy makers in decision making.

The trade-off between unemployment rate and inflation rate Economists generally agree that there is a trade-off between unemployment and inflation. Expansionary fiscal and monetary policies that lower the unemployment rate tend to raise the inflation rate. In contrast, restrictive fiscal and monetary policies that curb the inflation rate tend to aggravate the unemployment rate. Therefore, policy makers are forced to choose between “the lesser of the two evils.”

To illustrate, the instructor can use the analogy of “pain management.” For instance, an individual can choose to take pain medication to reduce the severity of a headache. While taking pain medication does alleviate the headache, a common side effect of a pain medication is drowsiness and being unable to operate heavy machinery or a motor vehicle. Of course, to avoid the side effect, the individual can also choose not to take the medication and endure the headache. In other words, the individual is forced to choose between “the lesser of the two evils”—whether to alleviate the headache with the side effect of drowsiness, or to suffer with the headache and not experience the side effects of the medication.

The dilemma this individual faces is similar to the dilemma that the policy maker faces—to choose a lower unemployment rate with the side effect of a higher inflation rate or to choose

a lower inflation rate with a higher unemployment rate.²

As most students have experienced headaches and the side effects of a pain medication, they can grasp the idea of the “trade-offs” fairly quickly.

GDP gap and the analogy of “grade gap” GDP gap, by the definition of a standard textbook, can be shown as follows:

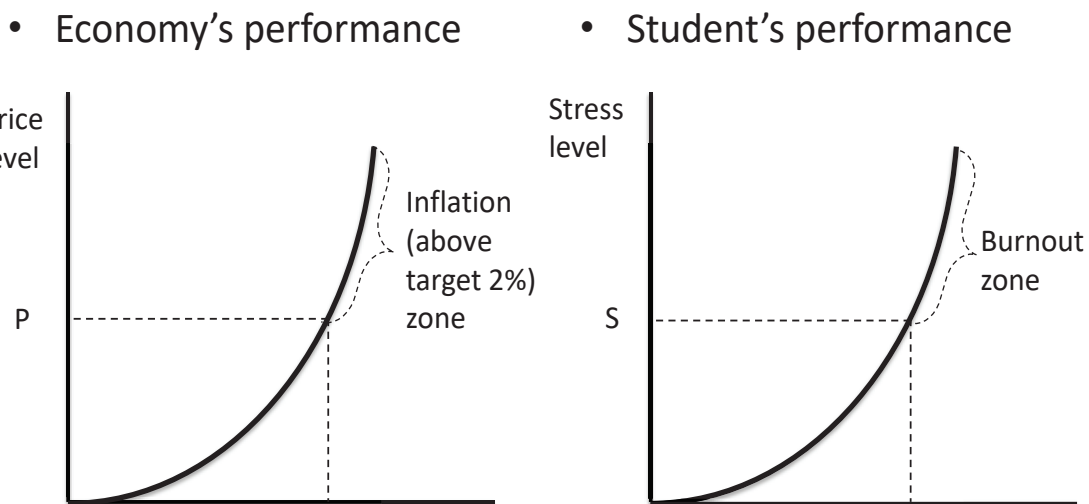
$$\text{GDP gap} = \text{actual GDP} - \text{potential GDP},$$

where actual GDP is the GDP under the current unemployment rate, including frictional unemployment, structural unemployment, and cyclical unemployment. Potential GDP is the GDP under the natural rate of unemployment, which includes only frictional and structural unemployment.

Students are told that a negative GDP gap measures the cost of a recession; that is, the loss of goods and services caused by workers who are cyclically unemployed. Without a recession, those cyclically unemployed “could have” worked to produce goods and services. GDP gap measures this loss of goods and services that could have been produced if there were no recession (and thus, no cyclical unemployment).

Of course, the GDP gap could be positive; that happens, for example, when the economy is overheated and the current unemployment rate is lower than the natural rate of unemployment.

Figure 2. GDP Gap and “Grade Gap”



To illustrate GDP gap in a way that is easier for students to understand, the author introduces the concept of a student’s “grade gap” (Franz, 2017). “Grade gap” can be defined as follows,

²Of course, the trade-off exists only in “normal times.” When the economy is in a liquidity trap, a monetary policy no longer works.

Grade gap = actual grade - potential grade,
where potential grade (G_p) is the grade the student would achieve if he or she spends all the time available to study. Actual grade, however, is the grade that the student actually receives. If the student did not use all the time available to study the day before the exam—say, the student was partying until 2am the night before the exam and had a hangover during the exam—then the actual grade would be lower than the potential grade.

For example, if the potential grade (G_p) is 96, and the actual grade is 80, then there is a grade gap of -16. This grade gap, -16, reflects the loss of points due to the student not using the time available to study. This is similar to cyclical unemployment, where the economy does not utilize the workers available to produce goods and services.

On the contrary, the student could “overstudy,” and achieve an actual grade of 98 that is higher than his or her potential grade ($G_p = 96$). For instance, the student could be studying so hard that he or she does not eat, sleep, or take bathroom breaks. After the student uses the maximum time available to study, the additional study hours do not raise the grade much higher. At the same time, the student’s stress level increases drastically and the student suffers “burn out” (see Figure 2).

This is a situation similar to an overheated economy, where the current output is higher than potential output (see Y_f in Figure 2) The economy has already utilized all its available workers to produce goods and services. At this time, if aggregate demand continues to rise, then the economy would be overheated with an inflation rate higher than the target (say, higher than 2%) with only a slight increase in the output. Here, the higher inflation rate is similar to the student’s raised stress level and the small amount of output increase is similar to the small improvement in the student’s grade.

One can also use the analogy of grade gap to explain Okun’s law. Okun’s law suggests that 1% of cyclical unemployment would cause about 2% of negative GDP gap. For the student, it could be that each non-studying hour (a week before the final exam) causes a negative grade gap of 2 points.

Most students study as well as party, so using the concept of “grade gap” conveys the concept of GDP gap efficiently.

C. Principles of microeconomics

Price elasticity of demand is like pulling on a rubber band Price elasticity of demand, as defined in a standard microeconomic textbook, measures the responsiveness of quantity demanded when there is a change in price. This concept is straightforward to economists, but not so much to students.

The instructor can use the analogy of pulling on a rubber band to illustrate this concept.³ Pulling on the rubber band is like the change in price. The responsiveness of the rubber band is like the responsiveness of the change in quantity demanded. If the rubber band can be pulled all the way back, then the rubber band is very “elastic.” In contrast, if the rubber band is old and has lost its elasticity, then it will not expand too much and then we say that the rubber band is “inelastic.” The same concept applies to price elasticity of demand.

When teaching the chapter of elasticity, the author typically brings a new rubber band (very elastic) and thread (inelastic) to the class to illustrate this concept. The author demonstrates

³Many instructors have tried this analogy. This analogy is included for the sake of completeness.

their different levels of elasticity by pulling on the new rubber band as well as pulling on the thread in front of the students. The author lets the students observe the responsiveness of the rubber band and the thread. Students quickly grasp the concept of elasticity with this demonstration.

Marginal utility per dollar as “marginal points per study hour” Basic microeconomic theory suggests that to maximize utility given a budget constraint, two criteria must be satisfied: 1. the entire budget is spent; 2. marginal utility per dollar must be equal for all goods at the last dollar spent.

From the author’s teaching experience, most students find the first criterium straightforward. However, students typically find the second criterium relatively challenging. The concept of marginal utility is rather abstract and the concept of marginal utility per dollar is even more so. To illustrate, one can use the analogy of studying for final exams. Utility maximization is similar to “total points maximization” in studying for final exams. To maximize total points, two criteria must be met: 1. the student uses all the time available to study; 2. marginal points per study hour must be equal for every subject at the last study hour (Franz, 2018).

Students often think about “marginal points per study hour” in the back of their mind without even realizing it. The instructor could tell the students that “marginal points per study hour” is decreasing in study hours. The more study hours a student invests on one subject, the more one is familiar with that subject and the fewer additional points the student could earn from investing one additional study hour on that subject. This is “the law of diminishing points” in study hours, which is similar to the law of diminishing marginal utility: the more of a certain good one purchases, the less marginal utility one derives from that particular good.

Consider a student, Mary, who has to study two subjects for the final exams, accounting and economics. Suppose Mary uses all the time available to study, but the marginal points per study hour were not equal in the two subjects. In particular,

$$\frac{MP_A}{hour} = 1, \quad \frac{MP_E}{hour} = 5$$

where $\frac{MP_A}{hour}$ and $\frac{MP_E}{hour}$ are marginal points per study hour for accounting and economics, respectively. $\frac{MP_E}{hour} > \frac{MP_A}{hour}$, most likely because Mary has already spent lots of time studying accounting, but not quite enough time studying economics. If one is already familiar with a certain subject (in this example, accounting), studying even more would not raise the points too much. However, if one did not spend much time on a subject, then studying more would bring up the points quite a bit (in this example, economics).

Mary can raise her total points by shifting the last study hour from accounting to economics. In this example, total points will go up by 4 points (the grade of accounting will decrease by 1 point, while the grade of economics will increase by 5 points). After shifting the last study hour from accounting to economics, $\frac{MP_E}{hour}$ goes down, and $\frac{MP_A}{hour}$ goes up, due to “the law of diminishing points” mentioned above. Suppose after shifting the study hour, Mary’s marginal points per study hour are the following,

$$\frac{MP_A}{hour} = 3, \quad \frac{MP_E}{hour} = 3.$$

Now Mary can no longer raise her total points by shifting studying hours between the two subjects. In other words, her total points have been maximized. This “total points maximization” is similar to utility maximization, where one could increase total utility by shifting monetary resources from the goods with lower marginal utility per dollar to goods with higher marginal utility per dollar.

Students can relate to this analogy well, as most students have to study multiple subjects during the final exam period. A rational student typically spends more time on the subjects that he/she is the least familiar with, as the marginal points per hour is higher than that on a subject that the student is already familiar with.⁴ To maximize total points, the student will continue to do so until marginal points per study hour for every subject is equal at the last study hour.

Cost of production as a student’s grades Principles of microeconomics covers the topic of firms and their cost productions. Students who have no prior working experience find this concept challenging. Furthermore, for students who are relatively less prepared in math, cost curves are confusing, if not intimidating.

To illustrate, one can use the analogy of grades. Average total cost and average variable cost is similar to a student’s grade point average (GPA). Marginal cost—the cost of producing one additional unit—is similar to the grade the student received from taking “one additional class.”

If the grade of this one additional class is higher than the grade point average, then the grade received from this one additional class will “pull up” the grade point average. However, if the grade received from this one additional class is lower than the grade point average, then the grade of this one additional class will “pull down” the average. This is the reason why marginal cost curve always goes through the lowest point of the average total cost curve as well as the average variable cost curve.

Most students have calculated their high school GPA before. Therefore, illustrating cost curves with the analogy of grades could help students to understand the relationship between marginal cost and average cost (average total cost or average variable cost).

D. International economics

Absolute advantage and comparative advantage Although the concept “absolute advantage” is straightforward, students typically find the concept of “comparative advantage” challenging. In particular, in a “two-country-two-good” model, students find it difficult to understand how a country with absolute disadvantage in both goods can possibly still gain from trade.

To illustrate, the author uses a comic with a couple, “Gregor and Iris.” They both have a PhD in economics. However, Gregor has a private industry job, whereas Iris is an economics professor in a liberal arts college. Although Iris is very happy teaching economics, Gregor makes a lot more money than Iris does. In addition, Gregor is a better cook than Iris. Further more, Gregor is more patient with the kids than Iris is, so the kids generally prefer to hang

⁴Unless, of course, if the student is entirely lost in a subject and has no idea what is going on in the class anymore—perhaps he/she skipped too many classes—then the student “gives up” this class and is prepared to fail the final exam. In this case, the student would not invest any study hour on this subject. This is also a rational choice. For instance, if the marginal points per study hour at the last study hour is 25—increasing from 0 to 25 points in the final exam—then the letter grade goes from an F (0 points) to another F (25 points). Therefore, the marginal benefit of studying this particular subject is zero. As such, it is a rational choice to give up the subject entirely.

out with their daddy rather than their mommy. Combining cooking and childcare together as “homemaking service,” one can see that Gregor is a more efficient homemaker. The skills of Gregor and Iris can be summarized in Table 1.

Table 1. Absolute Advantage and Comparative Advantage

	Earning Ability	Homemaking Service Quality
Gregor	\$\$\$\$\$\$\$\$	☺☺☺☺
Iris	\$	☺☺

In Table 1, one can see clearly that Gregor has an absolute advantage in earning ability and homemaking service. However, Iris has a comparative advantage in homemaking service. To provide one smiley face for homemaking service, Gregor has to sacrifice 2 dollar signs, while Iris only has to sacrifice 1/2 of a dollar sign. Therefore, as the students’ intuition suggests, Gregor should specialize on bringing home a paycheck, while Iris should cook and take care of the kids (poor kids?).

Welfare effects of an import tariff as sharing ice cream with a younger sibling An import tariff is a form of trade barrier to protect competing import industries. After a tariff is levied on an imported good, consumer surplus shrinks. This is true for both a large and a small country. According to a standard international economics textbook (Carbaugh, 2017), the loss of consumer surplus can be cut into four pieces:

1. the redistributive effect;
2. the revenue effect (tariff revenue);
3. the consumption effect;
4. the protective effect.

The redistributive effect is the part of consumer surplus that is “redistributed” to producers. Revenue effect represents tariff revenue collected by the government. Although these two pieces of “economic pie” are taken away from the consumers, they are not lost. One piece (the redistributive effect) is given to the domestic producers and the other piece (the revenue effect) is taken by the government. Assuming that the government is not corrupt, it would use the tariff revenue to provide public goods for the individuals in the country. Therefore, neither piece is lost.

However, consumption effect measures the loss of consumption due to a higher price faced by domestic consumers. Protective effect measures the loss of welfare caused by replacing efficient foreign producers with inefficient domestic producers. Both consumption effect and protective effect are deadweight loss—a loss of welfare.

To illustrate, the instructor can ask students to imagine the cartoon “Peppa Pig.” Peppa Pig (representing the domestic consumers) had a large scoop of ice cream, but her little brother George (representing domestic producers) only had a small scoop of ice cream. George was whining and wailing loudly “unfair!” (similar to the complaint of domestic producers), so the parents ordered Peppa to share a portion of her ice cream with George (the government imposed a tariff to increase the welfare of the domestic producers). While the parents scooped off Peppa’s ice cream, a large part melted (deadweight loss). The parents then cut the remaining ice cream into two parts: one piece is given to George (redistributed effect), and the other piece is stored in the freezer—the parents plan to use that piece of ice cream to make a milkshake for

both kids some other day (tariff revenue).

3. Discussion: Effectiveness Of Teaching With Analogies

The effectiveness of this teaching technique, teaching with analogies, remains to be quantified.

One way to test the effectiveness of a teaching technique, in theory, is to have an experimental group (the experimental class) and a control group (the control class). Ideally, students are to be randomly assigned to these two classes. Moreover, the students will have the same instructor and the classes will be held at the same time. This way the students in both the experimental group and the control group will have the same level of alertness during the class. The only difference between these two classes is that one is taught with analogies (the experimental group) and the other one is taught without analogies (the control group). After that, the students will take a pop quiz and the quiz results from both classes can be compared. This way, we can have a meaningful comparison and make inferences on whether or not teaching with analogies is an effective method.

One has to be Hermione Granger with the Time Turner (Rowling, 1999) to run the “ideal test.” In practice, this test could be challenging but not impossible. Emerson and Taylor (2004) tested the effectiveness of experiments using different sections of economics classes taught by various instructors. Although self-selection bias and an endogeneity issue exist, a certain level of “randomness” was preserved as students were not aware of the different teaching methods when signing up for the classes. Students were tested before and after the classes with the Test of Understanding in College Economics (TUCE), and the results of the experimental group and the control group were compared to quantify the effectiveness of teaching with experiments. The effectiveness of teaching with analogies can be tested in a similar manner.

4. Conclusion and Future Research

This paper presents practical examples of teaching economics with analogies that are ready to be used in any classroom at a relatively low cost.

The effectiveness of this particular teaching technique remains to be tested. The author has limited evidence on the effectiveness of this teaching method.⁵ Future research includes quantifying the effectiveness of each analogy.

⁵The analogy of “GDP gap as student’s grade gap” in a YouTube Video has been watched over 6,900 times since it was first posted in fall 2016. See <https://www.youtube.com/watch?v=liieM1Ff1E&t=41s>.

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