

Experiential Learning in Economics through Classroom Experiments

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Abstract

In this paper I use a model of experiential learning to systematically analyze the processes at work when classroom experiments are conducive to the learning of economic concepts. In addition, I show how this analysis can be used to inform best practices in the area of teaching economics with classroom experiments.

Keywords: experimental economics, experiential learning

1. Introduction

Experimental economics is a relatively new research field in economics, as it has really taken-off in the 1980s (Guala, 2008). As noted by Holt (1999, p.604) ‘traditionally, economics has not been an experimental science’, as it relies mainly on logical deduction, and mathematical and statistical modeling as methods of inquiry. Economists however, are increasingly making use of laboratory experiments to test theories, inform policy making, design market institutions or establish behavioral norms. Economics experiments are based on observing how human subjects interact according to well established protocols in carefully controlled environments. In order to prevent ‘experimenter effects’, subjects are not told the purpose of the experiment and in most cases are provided with financial incentives.

While initially used as a research tool, experiments have made their way into the classroom as well, and are now widely used for teaching economics. Holt (1999) provides an overview of the differences between research experiments and classroom experiments in economics. Experiments in the classroom seek to involve students in a decision making environment and allow them to explore the outcomes of their decisions. They allow students to experience firsthand the economic forces at work by being an integral part of the economic environment studied. For example, students can learn about markets converging to the competitive equilibrium by playing the roles of buyers and sellers in a simulated market and then further experience the effects of economic policies such as price controls or taxation. Two important questions arise regarding the use of classroom experiments in teaching economics. First, does it work? Proponents of this pedagogy based on classroom experiments argue that it can potentially increase student engagement and overall learning. Several studies (Ball, Eckel & Rojas, 2006; Emerson & Taylor, 2004; Frank, 1997) documented the positive impact of classroom experiments on student academic achievement in introductory and intermediate level economics courses. In general, these studies focus on comparing the performance of students exposed to classroom experiments to that of students taught using the traditional lecture methods.

Overall, the consensus in the literature is that classroom experiments lead to students being more engaged, and achieving higher grades. The second question, which I will further address in this paper, is as follows: What are the underlying reasons behind the improved learning outcomes obtained through the use of experiments? That is why are classroom experiments superior to traditional lecturing when teaching economics? In this paper I propose a systematic analysis of the processes at work when classroom experiments are conducive to the learning of economic concepts. I believe it is important to address this question because it is very easy to fall into the trap of using these experiments merely as a diversion from the sometimes tiring routine of a lecture based course, as it is often the case in economics. Students overwhelmingly express a higher degree of satisfaction with the course when experiments are used. Technology has made it so much easier to use classroom experiments with students interacting with each other from computer terminals. Therefore, another danger is that of using technology for the sake of technology. If classroom experiments are to be used efficiently and improve learning, it is important to understand how the process takes place. A good understanding of the underlying causes of the improvements in learning that are reported in the literature can then also inform best practices in the use of classroom experiments. In order to address this question I propose a framework based on David Kolb’s (1984) seminal theory of experiential learning.

The remainder of the paper is organized as follows: in the next two sections I discuss the theory of experiential learning proposed by Kolb (1984) and I illustrate with a case study how it applies to classroom experiments in economics. In the concluding section I present the implications of the model for best practices in using classroom experiments.

2. A Model of Experiential Learning

The idea of experiential learning has been around for a long time. During the past couple of decades, several factors have led to educators increasingly adopting a pedagogical approach based on experiential learning in their classrooms (Spencer & Van Eynde, 1986). Moreover, an increasing number of institutions of higher education are allocating resources for the creation of centers and institutes that promote experiential learning. In many cases, participation in experiential learning activities is a graduation requirement for all students irrespective of their discipline. Numerous definitions of experiential learning can be found in the literature. Sometimes called simply ‘learning by doing’, experiential learning has also been formally defined as learning from ‘direct encounter with the phenomena being studied’ (Borzak, 1981, p. 9), or ‘Acquiring and applying knowledge, skills and feelings in an immediate and relevant setting.’ (Smith, 2001). Kolb (1984, p.41) calls it “the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience”.

Whether in or outside the classroom, through internships, service learning, experiments, simulations or role playing, experiential learning activities are intended to complement traditional lectures by formally integrating students’ academic study with real-life, hands-on experiences. There are several benefits of experiential learning that are widely discussed in the literature on teaching and learning, including increased student engagement and retention, the transformation of inert knowledge into knowledge-in-use, a deeper understanding of the subject matter, application of knowledge in complex or ambiguous situations (inert knowledge becomes knowledge in use) (Eyler, 2009, p.26).

Much of the existing literature on the topic of experiential learning is centered around David Kolb’s (1984) theory of experiential learning, who proposed the experiential learning cycle shown in Figure 1, consisting of four stages. The Kolb model of experiential learning is general in nature as it applies to learning in all settings, not only in the classroom. Spencer and Van Eynde (1986), further detail the stages of the Kolb model in the context of teaching economics through experiential learning in the classroom. The following is their interpretation of the model: The cycle begins with learners being directly involved in a concrete experience which represents the basis for observation and reflection. As noted by Spencer and Van Eynde (1986), in the context of classroom teaching, in the first stage learners are involved in a ‘structured activity designed to generate data related to the class learning objective.’ During the second step, participants reflect on what happened during the concrete experience stage and attempt to explain the outcomes of their participation. Next, as a result of the reflective observation phase, generalizations are made and principles are formulated through activities such as lecturing or classroom discussion. The principles developed and the theories and research findings are meant to be used beyond the classroom, in the final stage that closes the loop. During the stage of active experimentation learners will apply the knowledge acquired to new situations, thus transforming inert knowledge into knowledge-in-use.

In the next section I use a concrete example to illustrate how the Kolb model described above can be used to understand why classroom experiments can benefit students of economics.

3. A Case Study: The Price Floor Experiment

One popular classroom experiment in economics is the price floor experiment. In this experiment, students play the roles of buyers and sellers in a simulated market in which a central authority imposes price a price floor, that is a minimum price at which transactions are allowed to occur. The experiment can be deployed using Aplia, an online course management system, which gives students access to several experiments. In order to participate in the experiment students need to use Internet connected computers, preferably laptops in the classroom. In the beginning of the experiment students are randomly assigned roles as buyers and sellers in a virtual market for used textbooks. Participants are given buyer values (i.e the maximum price that buyers are willing to pay) and seller costs (i.e the minimum price for which sellers are willing to sell). The experiment consists of 5 rounds, each lasting two minutes. During each round buyers and sellers are required to engage in transactions that maximize their gains. For example buyers can submit a bid price, and if accepted, the buyer’s gain is the difference between the buyer’s value and the price paid. Similarly, sellers submit ask prices. Buyers and sellers are automatically matched based on the submitted prices in this virtual market and gains are recorded.

Another peculiarity of this market is the minimum price for which sellers are required to sell, that is a price floor is imposed. During the experiment, participant can visualize the prices at which transactions take place in the market as well as the current ask and bid prices. Going back to the model of experiential learning presented in the previous section it is obvious that participants in the experiment are in the 'concrete experience' stage.

When all rounds are complete the instructor can show graphically the prices and times when all the transactions took place. Moreover, given that the price floor was set above the market equilibrium price (known in advance by the instructor), participants can clearly see how in every single round after a few transactions took place, no buyers were left in the market but only sellers. At this point participants enter the reflective observation stage when the outcomes of the experiments are discussed and explained. These discussions can then serve as the starting point of the next stage in the cycle when a simple theoretical model of supply and demand with a price floor can be introduced. Generalizations are now made from the outcomes of the experiment, and the instructor can show using a simple but abstract model, how a price floor can lead to a surplus, therefore explaining from a theoretical perspective what the participants have already experienced and visualized. It is at this point that the value of using the experiment to illustrate the theoretical concept becomes clear.

The author's previous experience suggests that introducing students to the concept of price controls through an abstract graph with a price floor illustrated on a supply and demand diagram is less effective compared to having students participate in the experiment first. Moreover, students are more likely to answer the follow-up question that closes the experiential learning cycle, in the active experimentation stage. Students are asked to explain the potential effects in the labor market when the minimum wage is increased. In tackling this question students can now rely not only on the theoretical model introduced by the instructor during the lecture but also on their personal experiences as participants in a market where a price floor was imposed.

3. Implications

Having shown how the experiential learning cycle can be used to illustrate the process through which learning occurs when experiments are used in the economics classroom, several implications that are relevant for teaching with experiments become apparent.

First, the timing of the classroom experiment is important. As shown in Figure 1, in the experiential learning cycle, the concrete experience stage precedes the reflection and the generalization stages. Therefore, students should be immersed in the economic environment by participating in the experiment, without any a priori knowledge of the concepts to be studied. That way, when abstract concepts are introduced either through discussion or lecturing, the instructors and students can use the concrete experience as a common reference point for reinforcing the theory. The benefit of this approach is that students are able to see how theory can explain the real world (i.e. outcomes that they experiences firsthand).

Second, when using classroom experiments, sufficient time should be allowed for all stages of the experiential learning to occur. For example, it might be tempting, in the interest of time, for the instructor to move from running the experiment straight to lecturing. However, the reflective observation stage is essential, as students need to reflect and attempt to explain the outcomes that they witnessed during the experiment and their meaning.

Another prerequisite for the use of classroom experiments to be effective is that the link between the experiment and the economic concepts taught to be clear. Not all research experiments can be adapted to be used in the classroom for teaching purposes. Sometimes experiments are designed such that it is hard for participants to see the connection between the actions they perform and the concepts conveyed in the lecture. A high degree of abstraction in the experimental design can hamper the transition from the first to the third stage of the experiential learning cycle and therefore should be avoided for pedagogical purposes.

One issue that instructors can encounter when using classroom experiments has to do with the willingness of students to fully engage in the concrete experience. Subjects used in research experiments are usually provided with financial incentives in order to ensure that their behavior mimics that of rational utility maximizing individuals, but this solution is not feasible in a classroom setting. Holt (1999) discusses different strategies for incentivizing student participants in experiments (e.g. offering extra credit) and he concludes that in general, students tend to want to do well in experiments regardless of incentives, due to their competitive nature. Empirical tests of the implications above could be the subject of further research on the efficacy of classroom experiments as a pedagogical tool in economics.

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Figure 1 An Experiential Learning Model (Adapted from Kolb (1984))

