A Review and Analysis of the Effectiveness of Alternative Teaching Methods on Student Learning in Economics

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Abstract

Drawing largely on educational literature outside of economics, we provide a survey of perspectives on alternative teaching methods. We then report results regarding the effectiveness of various alternative methods such as cooperative learning, class discussions, and the use of multimedia sources compared to lecture-only instruction. A difference-in-means test is utilized to compare gains in learning between control classes and treatment classes. Alternative teaching methods were not shown to increase student performance in a statistically significant manner.

Keywords: active learning; lecture; discussion

JEL Codes: A10; A21; A22

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1 Introduction

The past seventy years have seen continued emphasis on improving economic education within the economics profession. In the 1950s the American Economic Association (AEA) created the Committee on Economic Education (CEE) with the mandate to improve college teaching. The Journal of Economic Education was established in 1969 in order to provide a forum for scholarly work in economics education. In the 1970s, the Teacher Training Program (TTP) was created for new PhDs and new teachers to help them become more effective in the classroom. In recent years the CEE has hosted the national Conference on Teaching and Research in Economic Education (CTREE) in addition to its regular session at the AEA annual meetings.

With the creation of The Journal of Economic Education, more economists have become interested in studying the teaching of economics. Siegfried and Fels (1979) produced the first landmark survey of economics education. One of their main findings was that different students learn economics in different ways. This suggests that the best teaching strategy would be to use various alternative teaching methods. However, because most economics professors do not receive formal training in educational methodology and because many professors are rewarded more for research than teaching (Bach and Kelley 1984), students might not be receiving an optimal education (Terregrossa and Englander 2001).

Relevant for our paper is the longstanding indifference to learning theories from educational psychology (Bach and Kelley 1984). Even though there is information and research on various student learning styles and even though this research shows that there is no single
right way to teach and that students learn differently, the traditional lecture method is still the primary method of teaching inside and outside educational institutions (Bligh 2000; Bonwell and Eison 1991). Economists, in particular, love “chalk and talk” (Siegfried et al 1996; Becker and Watts 1996; Becker 1997; Bligh 2000; Becker and Watts 2001) although there have been recent efforts to change that (Salemi 2002; Hall et al. 2008; Hall and Lawson 2008; Lawson et al. 2008; Mixon 2010; Mateer and Stephenson 2011; Hall 2012; Crisp and Mixon 2012).

Alternative teaching methods such as cooperative learning, class discussion, and teaching through multimedia sources have been used in the classroom across different levels of education and different disciplines in order to improve student learning. While prevalent at the elementary and secondary levels and in other college subjects, these types of active learning are typically not used in economics courses at the college level as often as they are in other disciplines or at the elementary and secondary levels (Sax et al. 1996). This is in spite of research showing that active learning improves student learning and makes students more committed to learning (Becker 1997).

In this paper we report on our study of the effectiveness of adding alternative teaching methods such as simulations, group activities, and audio-visual presentations of material (videos and video clips) compared to a strict lecture/chalk and talk learning method of teaching. Our analysis is based on information collected from one-semester introductory economics classes taught by the same instructor at three different types of institutions: a college-preparatory high school, a junior college, and a large city university. The similarity of the student populations at each institution allowed the instructor to utilize the same notes and readings across all three institutions. Further information regarding the control and treatment groups and the testing approach is presented in the third section.
This paper proceeds as follows. Section 2 provides an extensive overview of the pedagogical literature on economic education in general and on alternative teaching methods specifically. Close attention is paid to literature outside of economics. Section 3 provides background on the classes and approach employed to test the effectiveness of alternative methods and presents the empirical results. Section 4 summarizes and ends with some concluding thoughts on alternative teaching methods and economic education.

2 Literature Review

The lecture is the primary teaching method used by teachers at both the secondary and university level. Though the majority of economists still use this method to teach economics, there are numerous problems with excessive lecturing, which have been known about for quite some time. To cite but one example, Johnstone and Percival (1976) found that students start losing attention 10 to 18 minutes into a lecture with lapses becoming worse as time passes. They therefore recommend active learning methods as a supplement to the lecture.

Dunn and Griggs (2000) explain that students process information analytically, globally, or some combination. Analytic learners use the inductive method while global learners learn deductively. According to Dunn and Griggs, most learners are global learners who like to learn through humorous anecdotes combined with real-life applications and who also learn better when provided pictures and illustrations. Terregrossa and Englander (2001) point out that the typical academic economist uses the traditional lecture method, which favors the analytic learner while concomitantly ignoring the majority of students with alternate learning styles.

Bligh (2000) summarized comparisons of lectures with other teaching methods (discussion, programmed learning, reading/independent study, projects, and other—audio, TV,
computer-assisted learning) using information acquisition as the standard of effectiveness. There was no significant difference. Lecturing therefore is effective in transmitting information. However, if other standards of effectiveness are used, the effectiveness of lectures declines. For example, lectures are ineffective compared to class discussions in promoting independent thought because students are not actively engaged. Bligh thus concludes that lectures do not stimulate active thought and, therefore, students do not learn to think. Bligh also argues that lectures are not effective in generating student enthusiasm in a subject. For teachers of economics who hope to attract students to the subject, this is an an important point to consider.

*Effectiveness of Cooperative and Active Learning Compared to Lecture*

According to Abu and Flowers (1997) there are three teaching/learning methods: individualistic, competitive, and cooperative. An individualistic structure is where students are given individual goals and are individually rewarded—everything is based on what they do themselves. A competitive environment is a zero-sum environment where students succeed at the expense of others. Here we focus on cooperative learning, which according to Slavin (1980), “refers to classroom techniques in which students work on learning activities in small groups and receive rewards or recognition based on their group’s performance.” Artz and Newman (1990) also add that cooperative learning involves “small groups of learners working together as a team to solve a problem, complete a task, or accomplish a common goal.”

Meyers and Jones (1993) find that active learning “involves providing opportunities for students to meaningfully talk and listen, write, read, and reflect on the content, ideas, issues, and concerns of an academic subject” and this quote from Bonwell (1992) reminds us that, “Learning is not a spectator sport. Students do not learn much just sitting in class listening to teachers,
memorizing prepackaged assignments, and spitting out answers. They must talk about what they are learning, write about it, relate it to past experiences, apply it to their daily lives.” The move to active learning methods can be costly, especially to the economist who traditionally uses the lecture method (Becker and Watts 1996) and who does not use class discussions, case studies, simulations, or cooperative work (Siegfried, et al. 1996).

From the review of the literature, the consensus is that cooperative and active learning methods have statistically significant and positive effects, compared to traditional lecture methods, in improving student achievement, information retention, and student attitudes toward learning in various fields and at various educational levels (Barr and Carr 1979; Slavin 1983; Sherman and Thomas 1986; Johnson et al. 1998; Yamarik 2007). Moreover, when cooperative and active learning methods are utilized, students are more willing to ask questions when concepts are unclear (Johnson and Johnson 1975). Yamarik (2007) gives three reasons why students in cooperative learning groups performed better on exams than the students in the traditional lecture group: (1.) Student-teacher interaction was increased, (2.) Group studying was increased, and (3.) Greater interest in the material was “sparked” by working in small groups.

Salemi (2002) points out that educational psychologists and instructional specialists (Bonwell and Eison 1991; and Johnson et al. 1991) agree on involving students actively in the learning process. He notes that active learning helps economics majors become proficient in “doing” economics in the manner suggested by Hansen (1986). However, there is also evidence showing that students working together does not lead to significant improvement in student learning (Abu and Flowers 1997; Marburger 2005). That said, it is worth noting that even in these studies where student learning did not significantly improve, students enjoyed the
cooperative classes more, dropped those courses less frequently, and engaged the professor more in and out of class.

Slavin (1983) emphasizes that only cooperative learning methods where group rewards are based on group members’ individual learning increase student achievement. In other words, “simple peer interaction was not enough.” (Slavin 1987). He also describes two cognitive theories—the developmental and the elaboration theory. The developmental theory suggests that students learn when they have to explain their own analysis to other members of the group or resolve differences in conclusions (Slavin 1990). The elaboration theory states that students learn best when they must explain material to others.

Johnston et al. (2000) argue that “To learn economics successfully, students need to have ability in both abstract thinking and in application.” They conducted a research project where they had two major educational strategies: problem-based learning and collaborative learning. They found that collaborative, problem-based learning did not yield consistent gains in exam scores and it had no effect on student interest in economics. One reason given by Becker (1982) as to why improved teaching methods do not affect student performance is that since students are utility-maximizers, any improved teaching method leading to more efficiency will be allocated by the student to other classes or to leisure.

How Technology and Multimedia Affect Student Learning

More and more faculty in the social sciences are using information technology (multimedia) such as PowerPoint in the classroom and students expect to learn from multimedia sources (Koeber 2005). Koeber (2005) concluded that sociology students learned more effectively with PowerPoint and a course website such as Blackboard. Stone (1999) implemented a system of computer-based lectures attempting to involve students more in the classroom. He
reasoned that the typical student raised in a video environment would be more actively engaged when technology was incorporated into the teaching process compared to a purely auditory teaching method. The research showed students did benefit by more active involvement. However, there are contrary studies showing that technology does not have an increased effect on student learning or attitudes toward the instructor (Magnuson-Martinson 1995).

**Student Achievement and Using Experiments/Simulations/Games**

The 2002 Nobel Prize in Economic Sciences was given to Vernon Smith for using experiments in economic analysis and the use of experimental economics in the classroom can be traced back to Chamberlin (1948). Dickie (2006) explains that teaching economics through experiments has been increasing and textbooks dedicated to using experiments in teaching have emerged (Bergstrom and Miller 2000; Anderson and Chasey 2002). In addition, he also notes the creation of classroom games intended as supplements for textbooks such as Delemeester and Neral (1995) and Yandell (1999). Cardell et al. (1996) write:

Economics is characterized by well-developed predictive theories of human behavior. A wide variety of empirical tests of models based on those theories have been developed, as well as extensive and reliable data bases to test the theories. Thus, one can experiment with and simulate economic behavior. For these reasons, the conventional lecture-discussion format may be the least effective way to teach economics. Rather, the most effective teaching method may be as a laboratory science.

There is some evidence that the use of experiments and games as a pedagogical tool have yielded mixed success. Some argue that there is little evidence actually showing their effectiveness. Others claim that any positive effects are only anecdotal (Siegfried and Fels 1979; De Young 1993; Williams and Walker 1993; Brauer and Delemeester 2001) and Emerson and Taylor (2004) point out that some studies only used a single experiment.

However, there is evidence that experiments do positively affect student learning. Gremmen and Potters (1997) tried to address the criticism that any positive effects have been
merely anecdotal in nature and they attempt to show that the utilization of experiments and games as tools within the classroom have been beneficial to the educational experience of students. Their study showed that students in the experimental group (where games were used as the primary method of teaching) performed significantly better than the control group (lecture only) even after controlling for student grade point average and gender. Cardell et al. (1996) refer to a study concluding that by adding a laboratory component to the teaching of intermediate macroeconomics, students improved their understanding of the subject matter, as demonstrated by comparing pre- and post-test scores of the control and experimental groups. Emerson and Taylor (2004) studied a principles of microeconomics course consisting of nine sections (300 students), where two sections made use of experiments and the other seven did not use experiments. They found that students in the experimental sections achieved significantly higher gains on the Test of Understanding in College Economics (TUCE) across various content, cognitive, and difficulty levels than the students in the traditional lecture classes.

Dickie (2006) extended the previous research by introducing experiments apart from other teaching methods (“innovations” to use his term) and using the same instructor. He also extended previous research by testing whether or not giving grade incentives made a difference in student achievement. Dickie found that the use of classroom experiments without grade incentives resulted in statistically significant improvement in mean test scores on the TUCE microeconomics exam. He also argues that, “Results validate Frank (1997) that tests of single experiments conducted in isolation understate beneficial effects of making more extensive use of classroom games or experiments and support the recent findings of Emerson and Taylor (2004) that classroom experiments improve learning of microeconomics but run counter to the findings
of Cardell et al. (1996) that classroom experiments coupled with other innovations do not increase achievement among micro- and macroeconomic students.”

3 Data Analysis and Results

To take a further look at the effectiveness of alternative teaching methods on student learning in economics an experimental approach was employed during the teaching of supply and demand in principles of economics classes at three different levels: high school, junior college, and a four-year university. All classes had the same instructor but at each level classes were divided into a control and a treatment group. There were a total of ten control classes and ten treatment classes and they were roughly of equal size. In both the control and treatment groups a traditional lecture-based teaching method was utilized in addition to assigned textbook chapters.

In the treatment classes, however, three different alternative teaching methods were used. First, the supply and demand simulation “In the Chips” by The Foundation for Teaching Economics was added.\(^1\) Second, students were divided into groups and given supply and demand worksheets from the National Council on Economic Education. Third, students were shown supply and demand-related video segments from the Stossel in the Classroom series. To make sure the time spent in class was the same for both groups, the same amount of time required to show video clips and allow for discussion in the experimental groups was allotted to the control groups. During this time concepts were reviewed via repeated lecture, oral review, and individual practice questions. In order to avoid self-selection bias, classes were chosen at random to be control groups and experimental groups.

\(^1\) Available at: http://www.fte.org/teacher-resources/lesson-plans/efllessons/in-the-chips-a-market-in-computer-chips/
This was done because previous research has examined the effectiveness of alternative teaching methods when utilized as substitutes for traditional teaching methods. However, this experiment was designed to observe the effect of the additional stimulus provided by alternative teaching methods on student learning when these methods were utilized as complements to traditional teaching methods. Because professors have traditionally used the lecture teaching method of “chalk and talk” (Johnson et al. 1984) this experiment sought to test the effects of a low-cost method of supplementing that primary style. This complementary approach would be more likely to be embraced by traditional professors who are open to engage in differentiated instructional methods rather than to have them completely replace their lectures with problem or activity-based learning.

Both groups were given a 30 question supply and demand test at the beginning of the supply and demand class. This same exam was administered again at the conclusion of the teaching period to determine the effectiveness of the traditional method versus the traditional supplemented with alternative teaching methods. The topics that were evaluated were the law of supply, the law of demand, equilibrium, and an application of supply and demand analysis – price controls. To ensure maximum student effort on both tests, extra credit was offered if students answered all questions correctly.

To determine the effectiveness of the alternative teaching methods, the difference between the pre-tests and post-tests were compared between the control and treatment groups. Our results from the supply and demand assessment are presented in Table 1. They show that the difference between the control groups and the experimental groups is statistically insignificant. Students under the control groups had an improvement of 22.2 percent while the treatment group increased by 24.2 percent. Although the treatment classes had a larger increase in mean scores on
the supply and demand exams, this difference was not statistically significant at conventional levels.

Table 1. t-Test: Two-Sample Assuming Equal Variances: Supply and Demand

<table>
<thead>
<tr>
<th></th>
<th>Controlled</th>
<th>Experimental</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>22.2</td>
<td>24.2</td>
</tr>
<tr>
<td>Variance</td>
<td>52.62222222</td>
<td>24.84444444</td>
</tr>
<tr>
<td>Observations</td>
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<td>10</td>
</tr>
<tr>
<td>Pooled Variance</td>
<td>38.73333333</td>
<td></td>
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<tr>
<td>Hypothesized Mean Difference</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>df</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>t Stat</td>
<td>-0.718575757</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) one-tail</td>
<td>0.240813411</td>
<td></td>
</tr>
<tr>
<td>t Critical one-tail</td>
<td>1.734063592</td>
<td></td>
</tr>
<tr>
<td>P(T&lt;=t) two-tail</td>
<td>0.481626822</td>
<td></td>
</tr>
<tr>
<td>t Critical two-tail</td>
<td>2.100922037</td>
<td></td>
</tr>
</tbody>
</table>

While important evidence regarding the efficacy of alternative teaching methods on learning economics, we feel the results presented here should be interpreted cautiously. Ideally, we would have liked to have employed student-level data and controls for important factors like the type of institution and class time and day of the week. Our results above assume that the baseline and treatment classes are identical except for the use of alternative teaching methods in the one group of classes. While they are close in terms of size, approach, and instructor, they do differ in terms of institutional type, class time, and perhaps student background. These

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2 We are indebted to a referee for this important point and we regret that we did not have the foresight (or his/her guidance) to collect the necessary individual-level data ahead of time in order to conduct a more thorough analysis. We were unable to conduct even a basic individual-level analysis since the instructor of record in all courses has subsequently moved on to new employment and no longer has access to non-aggregate data from his previous courses.
differences might be confounding our results presented here. In the future we hope to revisit this topic with student level data.

4 Conclusion

There is conflicting evidence on the effect on student achievement of alternative teaching methods versus traditional lecture classes. That said, the data presented here shows no statistically significant improvement on student post-test scores when traditional teaching methods are supplemented with alternative teaching methods.

However, teaching methods remain an important factor in how students learn and therefore it is vital that economics education research continues to explore what works effectively in the classroom and what does not. Those who voluntarily claim the title “professor” have a responsibility to teach their students well. Moreover, economics professors should want to show their students how important and applicable economics is to their everyday life. As Morton and Renzy (1971) argued, “Economists must do more than promote traditional courses. They must promote progressive teaching techniques that will instill a lasting interest in the subject.” Economists should want their introductory courses to create an appreciation for “the economic way of thinking” and, hopefully, these courses will have lasting effects.

Barr and Carr (1979) concluded that the results of their study “seem to indicate that beginning courses in college economics should be taught with fewer lectures and more student involvement…” We tend to concur with Dickie that there are many positive externalities to be gained by using games and simulations in the classroom, including students learning how to test theories and enjoying their economics classes more. The latter of which benefits not only the student’s economics education but the Economics Department in general by driving higher
student enrollment. While a formal analysis of student attitudes or desire to further their economics education after taking these classes was not undertaken, higher student evaluations were received in courses where alternative teaching methods were utilized, and students in experimental classes reported higher satisfaction.

It is clear that students do learn differently; therefore, it is essential to have a teaching philosophy that uses a multi-faceted “attack.” As Fels (1993) explained:

I shall assume that a strong candidate for the most important idea in an introductory micro course is allocative efficiency and inquire how it might be taught thoroughly without neglecting other important ideas like marginal analysis and supply and demand...Learning theory tells us that different students learn in different ways and all students benefit from having an idea approached from several angles. Repetition of an idea within a variety of contexts is vital. This suggests that allocative efficiency should be taught by a mixture of lecturing, discussions, reading, writing, cases, and games.

Even if some students might not benefit from a particular teaching method, “mixing it up” by addressing auditory, visual, and kinesthetic learners will not only teach to the entire class but it, at the very least, could reinforce what students already have learned via another method.

If all that is different is that students enjoy and value economics and their education more when alternative teaching methods are used in the classroom, this in itself is a strong enough reason for a professor to evaluate his or her teaching pedagogy and make changes where necessary. If students do not come to understand the power of the economic way of thinking nor come to the realization of how interesting, applicable, and even fun economics can be in their everyday life after taking a principles class, then that is a teaching failure.
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