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Team-based learning and student performance: Preliminary evidence from a principles of macroeconomics classroom

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ABSTRACT

This paper surveys the evolution of student grades, assessment of student learning, and student engagement in Principles of Macroeconomics over a four-year period, where the method of instruction was changed from traditional lecture to Team-Based Learning (TBL). Findings are that under TBL, student grades were higher, both overall and on a final examination that remained unchanged across the two instructional formats. In addition, TBL students performed better on three measures used to assess student learning of basic course concepts of supply and demand, exchange rates and net exports, and economic policy. Further, students in the TBL sections report more engagement and better ability to think independently, as measured by student course evaluations. Overall, the study suggests that the Principles of Macroeconomics classroom is adaptable to the TBL format, and that TBL is correlated with positive outcomes for students. In addition to these results, this paper includes discussion and examples illustrating the process through which TBL was implemented.

1. Introduction

In economics education, a principles course is often a student's first formal exposure to economics, and presents the opportunity to capture student interest and curiosity which may lead to further study in the discipline. At the same time, principles courses tend to be relatively large and populated by students with uneven preparation. In addition, because principles courses are often required for other majors, it is common for students to approach the class with reluctance and ambivalence. Some typical challenges include a lack of student engagement, a lack of instructor engagement, and, worst of all, poor student learning and performance. This paper explores one instructor's experience with the implementation of team-based learning (TBL) in the Principles of Macroeconomics classroom over the course of several semesters. With the introduction of TBL, the instructor observed an increase in student grades, an improvement student performance on assessment measures, and higher scores on self-reported measures of student engagement.

Despite the substantial body of literature (both theoretical and empirical) suggesting that active learning improves student outcomes in economics courses (and in general), a recent survey of university economics instructors (Watts and Becker, 2008) finds that use of these methods in introductory courses is relatively infrequent. With this in mind, the contribution of this paper is two-fold: first, it provides additional evidence that active learning, specifically TBL, is correlated with improved student outcomes; second, for principles instructors who are aware of the literature in support of active learning strategies, but who have not yet implemented these strategies in their classrooms, this paper offers an easily replicable approach to using TBL to teach Principles of Macroeconomics.

Using various measures of effectiveness, engagement and performance, this study finds that students who took the course in the team-based learning format achieved higher grades, performed better on assessment measures of student learning, and showed increased engagement as measured by two questions on student course evaluations. In addition, the switch to team-based learning

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made the teaching experience vastly more enjoyable for the instructor. Taken together, this study demonstrates that Principles of Macroeconomics can be successfully adapted to use team-based learning, and that this adaptation is correlated with positive impacts, from various perspectives, for both the students and the instructor.

2. Literature review

There is extensive research in the economics education literature about student performance and success in introductory economics courses. Ballard and Johnson (2004) find that basic math skills are related to student success. Earlier studies looked at the role of attendance (Romer, 1993; Fisher et al., 1998) in student performance. Others have looked at the role of the textbook (Pyne, 2007), the importance of living near classmates (Parker, 2012), and verbal reminders of academic standing (Chen and Okediji, 2014).

Many recent empirical studies have focused on the use of various active learning strategies in the principles classroom. Generally, the evidence suggests that active learning strategies have a positive effect on student learning or performance relative to a traditional lecture-based format. Active learning strategies include the use of classroom experiments (Dickie, 2006; Durham et al., 2007; Emerson and Taylor, 2004; Yandell, 2004), the combination of classroom experiments and writing (Cartwright and Stepanova, 2012), cooperative learning using groups (Yamarik, 2007), and the use of web-based tools (Cameron, 2012), among others. McGoldrick (2012) provides substantial evidence illustrating the benefits of various collaborative learning approaches.

Proponents of team-based learning in college teaching identify several potential benefits of the model, including improved student learning, increased student engagement and a more enjoyable teaching experience for the instructor (Knight, 2004). Michaelson (2004) presents the essential principles of the TBL model. In a TBL-based class, students are assigned early in the course to permanent team which are deliberately formed to be diverse and cohesive. Students work within their teams through a readiness assessment process and on application-focused team assignments. Importantly, work done with the team contributes significantly to each student's individual course grade. Fink (2004) outlines two conditions that are necessary for a course to be successfully adapted to a team-based learning format. First, the course must contain a significant body of information and ideas – that is, there must be a substantial amount of course content. Second, a primary goal for the course must be for students to learn how to apply and use the content through problem solving and other activities. Clearly, principles of macroeconomics meets both of these conditions.

Hrynchak and Batty (2012) present a theoretical case for the expectation that team-based learning will improve student outcomes in health education, arguing that TBL follows the principles of constructivist learning theory. Key aspects of constructivist learning theory include a focus on the learner as an active participant in the learning process, a focus on active problem solving, learning through dialog and interaction with others, and active reflection on the learning process. This is in contrast to the traditional behaviorist model in which students are passive recipients of knowledge (797). In addition, the instructor's role in the constructivist model is to facilitate and mediate between curriculum and student (Peters, 2000), creating the opportunity for engagement and learning. Hrynchak and Batty (2012: 799) argue that TBL is aligned with each of these key constructivist ideas. This provides a learning theory-based rationale for the expectations, outlined for example in Michaelson (2004: 25) that TBL will transform the quality of student learning and transform the joy of teaching.

The empirical evidence on the effectiveness of TBL is evolving. McInerney and Fink (2003) provide an example of the effectiveness of TBL in an undergraduate microbiology course, demonstrating improved student understanding and retention. While there are a number of descriptive papers in the literature outlining the use of team-based learning in economics (Espey, 2012; Imazeki, 2015), there are relatively few discussions of the effectiveness of team-based learning in terms of student performance. Hettler (2006) compares TBL and traditional formats in a Principles of Macroeconomics classroom and finds no difference in student performance as measured by the TUCE (Test of Understanding of College Economics). Hettler (2015) shows that TBL is particularly effective for low-income and minority students. Sisk's (2011) systematic review of the research on TBL in focused on health education, and finds evidence that generally, students are satisfied with TBL and student engagement is higher in TBL classes, and that the evidence also suggests that students in TBL classes score higher on examinations. This paper extends these findings and further contributes to the empirical literature relating to team-based learning in economics education.

3. Data and methodology

This study includes fourteen sections of undergraduate Principles of Macroeconomics courses at a small university in the Midwestern United States. A before and after comparison is employed to comment on the correlation between team-based learning and several measures including student grades (both overall course grades and cumulative final examination grades), student performance on assessment measures, student engagement (as measured by student course evaluations) and instructor satisfaction. In total, fourteen sections of the course, offered over seven semesters from Fall 2009 to Spring 2013, are included in the study. In the 2009–2010 academic year, the instructor taught five sections of the course using a traditional lecture-based format, with disappointing student performance results, both course grades and measures designed to assess student learning. Beginning in Spring 2011, over the next five semesters the instructor taught an additional nine sections of the course using a team-based learning model.

Enrollment in the sections ranged from seven to 32, and all sections were taught by the same instructor without assistance from graduate students. Sections followed one of three formats: three 50 min class sessions per week (seven sections), two 75 min sessions (five sections), or one three hour evening session per week (two sections). For all sections of the course, the textbook has been Principles of Macroeconomics by McConnell, Brue and Flynn. The most recent edition of the book is always specified, although students are told that an older edition is acceptable.