



The effect of supplemental instruction on academic performance: An encouragement design experiment[☆]



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ABSTRACT

Supplemental Instruction (SI) or PASS (Peer Assisted Study Sessions) has been widely offered to students at tertiary institutions in many countries with the aim of improving academic performance. The SI/PASS evaluation literature is extensive, but it has not adequately addressed potential selection bias. We evaluate an SI/PASS program at an Australian university through a randomized-encouragement-design experiment. A randomly selected subgroup of students from first-year courses ($N=6954$) was offered large incentives (worth AUD 55,000) to attend PASS which increased attendance by an estimated 0.47 hours each. This first-stage (inducement) effect did not vary with the size of the incentive and was larger (0.89) for students from disadvantaged backgrounds. Instrumental-variable estimates suggest that 1 hour of PASS improved grades by 0.065 standard deviations, which is consistent with the non-experimental literature. However, this estimate is not statistically significant, reflecting limited statistical power. The estimated effect is largest for students in their first semester at university.

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1. Introduction

Numerous studies suggest that peer learning and student leadership programs at university contribute to student learning outcomes, participation, and retention rates (Blanc, DeBuhr, & Martin, 1983; Kuh, 2003; Pascarella & Terenzini, 2005). One of the more prominent peer learning programs is Supplemental Instruction (SI), which is usually called PASS (Peer Assisted Study Sessions) in Australasia. SI/PASS and its variations are offered to thousands of students worldwide (Arendale, 2002). By 2009, staff from over 1500 tertiary institutions from 29 countries had been trained in its implementation (Martin, 2009).

An extensive literature—reviewed by Dawson, van der Meer, Skalicky, and Cowley (2014)—suggests that SI/PASS is effective. However, this evidence base is almost exclusively observational rather than experimental in design.

Dawson et al. (2014) cite only one experimental study, which had a sample of just 67 students, of which 24 were in the treatment group (Parkinson, 2009). Due to the likely presence of selection bias, experimental evidence in this context is necessary to be able to credibly estimate the program's impacts on student performance.

We address this gap through a large randomized-encouragement design (RED) experiment on the effectiveness of PASS at the University of Wollongong (UOW), a regional Australian university located in the state of New South Wales. RED is a relatively simple—but perhaps underappreciated—alternative to randomized controlled trials.¹ In a RED experiment, a randomly selected subgroup is offered an incentive or encouragement to participate in a voluntary program. The incentive or encouragement can take a number of forms, such as a direct financial transfer or the provision of more information about a program. Empirically, RED is akin to an RCT with imperfect compliance, where consistent estimates of treatment effects can be recovered by standard instrumental-variable regression techniques (Angrist, Imbens, & Rubin, 1996; Bloom, 1984). In the context of the current paper, the randomly assigned incentive is an instrumental variable for PASS attendance.

RED is well-suited for an evaluation of PASS since PASS is a mature and fully-resourced program in which students can voluntarily attend the study sessions. Denying access or compelling participation would be ethically questionable and impractical. Therefore, an RCT is not feasible. Our experiment demonstrates the usefulness of REDs as an evaluation tool, but we also document the associated challenges that researchers face when developing and implementing an encouragement design.

The results suggest that an hour of PASS increases the standardized final grade by 0.065 standard deviations. However, the estimated impact is not statistically significant. If the impact of PASS is constant for each hour of PASS, then an average PASS attendance of 6.25 hours over a session would increase marks by 0.41 standard deviations, although the confidence interval is fairly wide. We provide further suggestive evidence that the size of the impact is contingent on whether the student is on his or her first semester in the university. In particular, we note that the impact magnitude could be larger for those in their first semester.

The remainder of the paper is structured as follows. We describe SI, specifically the PASS program at UOW, in Section 2. In Section 3, we outline the experimental design and estimation approach. We discuss the results in Section 4, and, finally, we conclude in Section 5.

2. The PASS program

This section describes the program that is the subject of the evaluation. We begin with a discussion of peer learning and its implementation as a Supplemental Instruction (SI) or Peer Assisted Study Sessions (PASS) program. We then

describe the specific case of PASS at the University of Wollongong.

2.1. Supplemental instruction or peer assisted study sessions

There are many types of peer learning and student leadership programs at universities. Some are designed solely around pastoral care or transition needs and may take the form of a senior student being assigned to one or several first-year students for a specified period. Others may involve a model of students from a particular background being targeted for assistance, and it may be compulsory for students to participate. Still others offer academic assistance with student leaders as tutors for individuals or groups. These senior tutors may sometimes be involved with grading papers or exams.

SI/PASS is a prominent type of peer learning program. It was developed originally in the US at the University of Missouri–Kansas City (UMKC) in 1973. PASS is a free—in the sense that students do not pay an upfront or direct cost to attend other than their time cost—and voluntary supplementary academic assistance program that utilizes peer-led group study to assist students enrolled in targeted subjects or courses. The program is specific to each subject, and it consists of informal but regularly scheduled sessions.

Each session is independent and is focused on the content- and discipline-specific study strategies in the given subject. PASS is commonly attached to subjects which many students may find challenging, and any student enrolled in that subject is eligible to participate. Marketing and communication of the program stresses that all students are welcome to attend. In an effort to avoid the stigma associated with remedial instruction, PASS is not targeted to specific students or subsets of students. The sessions are facilitated by current students—so-called “PASS Leaders”—who have recently completed (and, in most cases, have excelled in) the subject. The leaders are recruited based on their academic results and interpersonal skills.

The role of the PASS Leader is not to reteach lecture material or to directly answer questions. Using their own experiences and the concerns of participants around challenging topics or questions, they instead facilitate the discussion, utilize the knowledge of participants and resources, such as lecture notes and textbooks, and generally guide the group to arrive at correct answers. Participants are involved in setting the agenda at the beginning of each session, ensuring it meets their learning needs as much as possible. The PASS Leader has no involvement in grading papers or exams, which presumably provides participants with a non-threatening environment to ask questions which they may be hesitant to put to an academic staff in a more senior or formal role (Longfellow, May, Burke, & Marks-Maran, 2008).

2.2. PASS at UOW

PASS at UOW is a highly awarded program. Its accolades include an Australian Learning and Teaching Council Program Award and Most Outstanding PASS Program in

¹ In the working paper version of this paper (Paloyo, Rogan, & Siminski, 2016), we provide a detailed discussion of RED, comparing it with related evaluation techniques. We show that RED is rarely used in economics or in other disciplines.

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