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Effects of class size and adaptive teaching competency on classroom processes and academic outcome

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Abstract

In many studies of class size effects, teacher characteristics are missing, even though many argue it is not class size that is important but teacher quality. In the present study teachers' effectiveness on the learning progress was assessed while teaching a unit with predefined learning objectives. To measure adaptive teaching competency a multi-method approach was employed (e.g., vignette and video test). There were 49 teachers and 898 students. Smaller classes led to higher academic learning progresses, better knowledge of students, and better classroom processes. Adaptive teacher competency remained relevant in smaller classes, that is, class size and teacher quality were independently important.

Keywords: Class size; Adaptive teaching competency; Teacher effectiveness; Teaching quality; Academic outcome

1. Introduction

There is consensus among many in education that smaller classes allow a better quality of teaching and learning, and this has led to a policy of class size reductions by a number of states in USA, the UK, the Netherlands, and East Asian countries such as China, Hong Kong, Macau, Korea, and Japan (Blatchford & Lai, in press). However, this policy is contentious, with some arguing that the effects of class size reductions are modest and that there are other more cost effective strategies for improving educational standards (Hattie, 2005; Rivkin, Hanushek, & Kain, 2005; Slavin, 1989).

In Switzerland there is also a debate about class size, that is, while in the last two decades class sizes were rather constant with approximately 19 students per class on primary and secondary level (Federal Statistical Office [FSO], 2008b), recently in some cantons class sizes were increased due to financial reasons. Considering the political, public, and scientific debate, empirical evidence is needed to improve knowledge about the value of class size.

There are several limitations of research on class size effects which have informed this paper. One limitation of most class size research is that effects are examined in relation to academic outcomes and, more recently, in relation to classroom processes, but rarely are the effects of class size and classroom processes systematically examined in the same study. Studies also tend to examine effects at a ''macro'' level, for example, in terms of progress over a whole school year, rather than examine effects of class size in terms of specific curriculum units. In many studies of class size effects, teacher characteristics are also often missing, even though many argue that it is not class size that is important so much as teacher quality (Hattie, 2005; Rivkin et al., 2005). The present study, therefore, aimed to extend the literature on class size effects in three ways: (a) to investigate the effects of class size and classroom processes systematically in the same study; (b) to examine class size effects in relation to a specific curriculum area and set time frame (not a general end-of-year test); and (c) to model effects of class size and classroom processes on

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students' academic outcomes while controlling for teacher quality (or competency).

1.1. Class size and academic outcomes

Despite the important policy and practice implications of the topic, there has been a wide gap between professional beliefs – i.e., small classes are likely to lead to better teaching and student academic progress – and research findings which have not always been clear. There have been a number of comprehensive reviews of the class size literature (Anderson, 2000; Biddle & Berliner, 2002; Blatchford, Goldstein, & Mortimore, 1998; Blatchford, Russell, & Brown, 2009; Ehrenberg, Brewer, Gamoran, & Willms, 2001; Finn, Pannozzo, & Achilles, 2003; Galton, 1998; Grissmer, 1999; Hattie, 2005). In what follows, a brief overview will be provided and, then, issues that have informed this paper, will be identified.

In the most widely cited study – the STAR project (Finn & Achilles, 1999) – a cohort of pupils and teachers at kindergarten through Grade 3 were assigned at random to three types of classes within the same school: a small class (around 17 students), a regular class (around 23 students) and a regular class with a teacher-aide. In brief, the researchers found that in both reading and mathematics students in small classes performed significantly better than students in regular classes, and children from minority ethnic group backgrounds benefited most from small classes (Finn & Achilles, 1999). An alternative non-experimental approach, using a longitudinal design, and measuring the effect on student progress of the full range of class sizes, while accounting statistically for other possibly confounding factors, was adopted in a large scale UK study (the Class Size and Pupil Adult Ratio – CSPAR) project (see Blatchford, 2003; Blatchford, Bassett, Goldstein, & Martin, 2003). The study found a clear effect of class size differences on children's academic attainment in both literacy and mathematics over the first year of school (4 or 5 years old).

Taking available information together, the reviews of research cited above tend to agree on a few main conclusions: there is agreement that small class sizes have a positive effect on student attainment in the early years of school, and that they benefit low attaining and disadvantaged students in particular.

One limitation of large scale studies like STAR and CSPAR is that they consider the effects of class size on academic outcomes in a general way, that is, its relation to an end-of-year attainment test. It is argued here that there is also a place for a consideration of class size in the context of a specific curriculum unit and in relation to more focused curriculum-related measures. This can be in a sense more valid and authentic, because it reflects, and can be designed to be part of, normal class work. Examination of class size effects under normal naturalistic, classroom conditions, can also have advantages over experimental manipulations, as in the STAR project; external validity can in a sense be better than in experimental designs.

1.2. Classroom processes

It is now widely appreciated that attention needs to move from studies of the effects on academic outcomes to better understanding of the classroom processes that might be involved (Anderson, 2000; Finn et al., 2003; Grissmer, 1999). Perhaps the most consistent finding that emerges from reviews that have been conducted is that class size affects individualisation of teaching and classroom engagement (Anderson, 2000; Finn et al., 2003). Models have been suggested to account for possible effects on classroom processes but to date research has not really begun to test links between class size, classroom processes and academic outcomes in any formal way.

There are limitations in measures that have been used to capture classroom processes. For the most part these have tended to be informal and subjective (Finn et al., 2003). Where systematic measures have been used they have tended to be restricted to classroom observations (Blatchford, Bassett, & Brown, 2005). Information on other kinds of processes, for example, participation, interest, and teaching quality has rarely been collected. It is argued that there is a place for a systematic approach to processes that have been identified in more qualitative and anecdotal studies of class size effects. One approach that can be employed is the use of student perception of classroom processes (Lüdtke, Robitzsch, Trautwein, & Kunter, 2009). Findings in German studies indicate that pupil reports are highly reliable if averaged on class level and, moreover, they are good predictors of students' learning outcome (Clausen, 2002; Gruehn, 2000).

Most importantly, research has looked at effects of class size on outcomes, and class size on processes, but, with one early exemption (Bourke, 1986), has not shown in a systematic way whether processes mediate effects of class size. Though models like those of Anderson (2000) and Finn et al. (2003) postulate causal direction this is conceptual and based on a review of research and not tested formally in one study. The CSPAR did look at this but found little sign that observation measures like individual attention explained effects on academic outcomes (because observation variables were not related to outcomes; Blatchford, 2003). The CSPAR study was also limited in not including a measure of teacher quality (see below).

There is one other limitation of research on class effects on educational outcomes and processes – it is restricted largely to the primary school years. Overall, there has been very little research on class size effects at the secondary school stage and it is not, therefore, known whether effects are the same throughout school.

1.3. Conceptualising class size – a contextual approach

Many studies involving teaching assume a direct model, with teaching affecting students' achievements and learning in a causal one-directional way, but teachers do not meet students out of context, and class size, or the number of children in the classroom, can be seen as one contextual influence, which