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Can group composition effects explain socioeconomic and ethnic achievement gaps in primary education?

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ABSTRACT

This study investigates whether group composition effects (GCE) can help to explain why achievement gaps encountered by low-SES students with or without migration background are not fully reduced or even widen in the course of their primary school careers. The study used data from a longitudinal study with mathematics achievement as dependent variable. Higher proportions of low-SES students with migration background were found to be associated with lower math scores at the start of Grade 1 over and above the effects of students' individual backgrounds. But group composition was not negatively associated with learning gains. The results indicate that desegregating schools will not by itself raise low-SES minority students' achievement levels.

1. Introduction

Since the Coleman report (Coleman et al., 1966), group composition effects (further referred to as GCE) have been widely examined in school effect studies (e.g. Belfi, Haelermans, & De Fraine, 2016; Driessen, 2007; Hattie, 2002; Hornstra, van der Veen, Peetsma, & Volman, 2015; Rjosk et al., 2014; Rumberger & Palardy, 2005; Van Ewijk & Sleegers, 2010). The term refers to the statistically observed additional effect, over and above the effects of students' individual characteristics, that can be found when those individual characteristics are aggregated at a higher level, such as class or school (Driessen, 2007; Dumay & Dupriez, 2008). This study focuses on GCE related to proportions of students from families with a low socio-economic status (SES) with or without migration background. Those students tend to achieve less at school than native, high-SES students do, not only for language skills but also for mathematics and science (e.g. OECD, 2010, 2016).

There is a real potential for additional composition effects since, in most cases, students are not randomly assigned to schools (Harker & Tymms, 2004). In areas where school choice is a real option for parents (e.g. urban areas) or in areas with high concentrations of particular social groups, for instance, the composition of the school population may differ considerably from a country's average school. A common hypothesis is that class groups with high proportions of low-SES students or students with migration backgrounds in a class group have detrimental effects on student learning. Hence, GCE are assumed to play an important role in the achievement gaps faced by students at risk.

However, it appears that this hypothesis cannot easily be confirmed. In his study, Driessen (2007) presents an overview of meta-analyses and reviews of studies on composition effects. He concludes that, no matter from which perspective group composition was studied (ability, gender, social and/or ethnic background), at most small effects have been found. Even the cumulative effects across a whole school career appear to be small. The main reason for not finding GCE, Driessen (2007) argues, is probably that they are simply not there. Another reason could be that different GCE act simultaneously in opposite directions, making each other invisible.

The present study used data from a longitudinal research project in primary schools in the Dutch-speaking area of Belgium (Flanders). The Flemish educational system is characterised by free parental school choice, and relatively high socio-economic and ethnic-cultural school segregation (Danhier & Martin, 2014; Jacobs, Rea, & Teney, 2009). Among the wide diversity of students with a migration background, students with Turkish or Moroccan roots appear in relatively high proportions in Flemish inner-city schools. For most of them, their home language differs from the instruction language. In a study based on population data, Wouters and Groenez (2015) showed that in the period our longitudinal study took place, the amount of segregation in Flemish primary education, as measured with the Hutchens index, on

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the average showed a yearly increase of more than 5%.

Since the 1980s, in order to foster more equal educational opportunities, the Flemish Ministry of Education has set up a number of programs, including additional funding of schools with higher numbers of students with migration backgrounds or low-SES students. Those programs focus on within school and within classroom activities to prevent or remediate lower achievement. Complementary, the *local concertation platforms* installed by the Flemish Government in 2003 focus on cooperation between schools and school boards at the local level to create more equal educational opportunities for socially disadvantaged children. Among the issues those local concertation platforms have to address, are school enrolment policies and the social composition of the school population. Promoting school desegregation through local agreements between schools is one of their tasks.

2. Theoretical framework

Group composition may affect student learning and outcomes in different ways (e.g. Rjosk, Richter, Hochweber, Lüdtke, & Klieme, 2014):

2.1. GCE as peer effects

Group composition can affect social interactions among students within the class group. Such *peer effects* can be positive or negative, with students' motivation or levels of conversation being enhanced or lowered. Less exposure to and less active use of the instruction language is also pointed out as a possible peer effect (Driessen, 2007), as well as fewer opportunities for students to learn from high-achieving students, or to compare with positive models (Richer, 1976).

2.2. GCE as teaching effects

Teaching effects can explain GCE in a similar way. In the case of low intake groups, an (over-)adaptation to perceived student ability may lower students' opportunities to learn (e.g. Rjosk et al., 2014; Rumberger & Palardy, 2005). Both peer and teaching effects can extend to all kind of subject matters, including mathematics and science.

2.3. Indirect GCE through less facilities

Under the heading *facilities*, Harker and Tymms (2004) point to a third way group composition can affect student learning. Differences in the social composition of the school population may lead to differences in (additional) funding arising from different income levels in local communities, leading to differences between schools with respect to teaching facilities, but also with respect to the recruitment of teachers and teachers' motivation and commitment (e.g., Rumberger & Palardy, 2005).

The common element in those three sets of explanations for GCE (peer effects, teaching effects, facilities) is that the unfavourable group composition is assumed to have an impact on interactions in the classroom, which in turn affect student learning processes.

2.4. Parental networks, neighbourhood and other selection effects

A very different type of explanation for GCE relates to selection effects. Such effects may for example appear when children with a specific background attending the same school share the same parental network that distinguishes them from other children with similar backgrounds but attending other schools (Driessen, 2007). That would constitute an unobserved common factor that already existed before students started school, and thus before any interaction between students or with teachers took place.

Hence, such a selection effect may become visible in statistically observed GCE associated with students' initial achievement status (e.g. at the start of Grade 1). Similar effects may also be expected from other unobserved common factors, such as living in the same neighbourhood.

So, a crucial difference in the way GCE can be explained relates to the question whether or not classroom interaction processes are assumed to have played role. This is clearly the case for explanations pointing to peer, teacher or facilities effects. They only constitute a reasonable explanation for a statistically observed GCE if a clear link with students' learning gains over some period of time can be shown. If a statistically observed GCE cannot be linked to students' learning gains, selection effects are a more likely explanation.

3. Methodological concerns

3.1. Phantom effects

It has been pointed out before that, from the mere statistical observation of GCE, one cannot infer that group characteristics affect students' learning (Harker & Tymms, 2004). The only thing known for sure when finding a GCE is that within some groups students appear to have something in common that is not (sufficiently) yet captured by any of the student-level variables in the model, while it becomes statistically visible through the effect of some aggregated variable. Apart from real GCE, such as the abovementioned peer, teaching, or facilities effects, a statistically observed GCE could also be a statistical artefact. Harker and Tymms (2004) demonstrated that adding unreliability (measurement error) to a predictor variable can create quite large GCE. They also showed how GCE can disappear by adding relevant student characteristics. The latter phenomenon is often referred to as the *omitted variables bias* (Hanushek, Kain, Markman, & Rivkin, 2003). Harker and Tymms (2004) use the term *phantom effects* to cover all kinds of statistical artefacts that become visible as GCE, also including the artefacts that arise from unreliability or other sources. In fact, the abovementioned parental network, neighbourhood and other selection effects may be considered as a particular case of the *omitted variables bias*. If the shared parental network, the shared neighbourhood or other pre-existing common factor could be identified and represented accurately in the model, the corresponding GCE associated with the students' initial achievement status would disappear.

3.2. Linking GCE to student learning processes

Having ruled out statistical artefacts by using proper data and proper modelling, what remains as a statistically observed GCE still needs to be linked to students' learning gains. In this respect, as has been pointed before, an important problem in most studies on GCE relates to their cross-sectional design (Driessen, 2007; Luyten, Schildkamp, & Folmer, 2009). In such studies (e.g. Agirdag, Van Houtte, & Van Avermaet, 2011; Danhier & Martin, 2014; Jacobs et al., 2009), only the cumulative effects at a certain moment can be estimated without any possibility to make a distinction between effects that can be linked to processes during the period of schooling, and pre-existing (social selection) effects. A similar problem characterizes studies that rely on achievement scores from only two measurement occasions, with the first score entered as covariate (predictor) for the second one. The results of such analyses are often interpreted in terms of effects on students' growth. As Luyten et al. (2009) point out clearly, they actually do not allow any conclusion about effects on growth. Both single measurement studies as well as studies in which prior achievement is treated as a covariate (e.g. Dumay & Dupriez, 2008; Lauder, Kounali, Robinson, & Goldstein, 2010; Van der Slik, Driessen, & De Bot, 2006) are bound to be inconclusive about the nature and the meaning of the GCE found, because in such studies the effects associated with initial achievement and the effects on learning gains are collapsed. In order to draw conclusions on the effects of group composition on students' growth, one needs to separate GCE associated with initial achievement (e.g. at the beginning of primary school) from GCE on subsequent