

Secondary Quantitative Analysis of Core Research Data (2004–2010): A Multilevel Study of Academic Achievement and 21st Century Competencies

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KEY IMPLICATIONS

- Increasing educational quality by reducing school differences in student outcomes is an important educational goal so that every student can receive high quality educational experiences and opportunities that enables them to reach their fullest potential, regardless of prior ability and family background.
- Substantial within-school student effects on student achievement suggest that policies aimed at raising academic and learning outcomes (of low achieving students, for example) are likely to be more effective if implemented within the school, taking into account students' learning profile and school culture, rather than a system-wide approach.
- While Primary school ranking was associated with better PSLE performance, it had little influence on current academic performance (Secondary 3). Student success may depend less on which school students attend but more on which class students are allocated to, the compositional characteristics of the classroom and the intellectual quality of the classroom instruction.

BACKGROUND

The overall objective of this study was to undertake secondary quantitative analyses of student achievement (English and mathematics) and 21st century learning outcomes using

existing datasets from the Core Research Programme (Panel 2, 2004 and 2010; Panel 6, 2007). Students involved were in Primary 5 (P5) and Secondary 3 (S3) (Panel 2), and Primary 6 (P6) (Panel 6). Using a multilevel analytical approach, we examined the proportion and shifts in variation of student achievement and background characteristics at different levels of analysis — by student, classroom and school. Next, we constructed a longitudinal dataset by linking two cross-sectional datasets (P6 in 2007 and S3 in 2010) that involved the same students. Using this dataset, we investigated the influence of Primary 6 students' background and schooling characteristics on their S3 academic and non-academic outcomes.

KEY FINDINGS

School and classroom effects on student achievement

Secondary schools were more different with respect to English achievement. Over a six-year period, the attribution of Secondary 3 English achievement to differences between schools remained substantial (20% in 2004 and 22% in 2010), after taking into account classroom effects. School effects in mathematics achievement dropped from 15% (2004) to 9% (2010). Overall, between 2004 and 2010, there was a substantial increase in classroom effects (i.e., instruction, teacher) on student achievement.

The effects of persistent but shifting social class towards the individual

Although between-school social class effects on student achievement remained strong (24% at the P5 and 19% at S3), our findings indicate that, over a six-year period, and possibility on the backdrop of the progressive implementation of various reform initiatives, attributions of student outcomes by classical social class differences may be shifting to one in which individual abilities (e.g., prior achievement) and characteristics (e.g., gender, learning dispositions) are beginning to matter more. Importantly, the 2010 study (compared to 2004) highlighted not only a stronger effect of variables related to learning dispositions and instructional practices on student outcomes, but the association between instruction and achievement was often mediated by students' learning dispositions (e.g., self-efficacy). These findings are consistent with the educational effectiveness literature that classrooms matter more than schools (Hattie, 2009; Kyriakes & Luyten, 2009).

In the 2004 study, the strongest predictor of achievement at the school level was classroom behavioural management (i.e., a collective sense that teachers in the school ensure the good behaviour of students, create a conducive classroom environment for learning, correct misbehaviour and are in control of the class). In 2010, two important instructional practices stood out: structure & clarity and instructional coherence (i.e., teachers provided well-structured, organised instruction and ensured relevance of academic tasks). However, compositional effects due to students' family background and prior achievement (PSLE) continue to have a sizeable impact on student academic outcomes. This could be reinforced by stream effects and allocation of students to classes on the basis of prior achievement, which are common school practices in Singapore (at least between 2004 and 2010).

Stronger influence of secondary (than primary) schools on academic achievement

Based on the two-wave longitudinal dataset (P6 and S3), a cross-classified multilevel model was specified to examine the contribution of Primary and Secondary school variance on S3 mathematics achievement. Students who belonged to the same primary school attained varied levels of S3 mathematics achievement. Examining the relationship between overall Primary school ranking and S3 mathematics achievement, students who performed at least 0.5 SD above the grand mean (i.e., the top achievers) came from Primary schools that ranked from 24 to 71 (with

1 being the top school). Importantly, differences at the Secondary level (e.g., student background, dispositions, classroom/instructional effects) explained stronger variation in S3 achievement, after taking into account key P6 student background characteristics. Therefore, the Primary school effect in Singapore is not as large as previous studies have indicated (e.g., Goldstein & Sammons, 1997), as public discourse suggests, and other factors may be in play, for example, proximity to family home, affiliation or values.

SIGNIFICANCE OF FINDINGS

Implications for policy and research

First, we utilised value-added multilevel models to examine the proportion of observed variation in student achievement and background factors that can be attributed to differences across schools, classrooms and students. We confirm existing criticisms of school effect models and suggest that education and policy researchers pay greater attention to what goes on within schools. Second, our comparative analyses confirm that school progress is not static. While input and process indicators remain stable, others can vary in effectiveness over successive cohorts and periods. Therefore, regular evaluations of research findings and their relevance to ongoing policy reforms can help policy researchers make better sense of what has changed and whether the possible causes of those changes are in line with the expected outcomes. Third, this study provides available data that expands and deepens our understanding of the various socio-cultural effects on educational processes and outcomes. While the (inequitable) impact of social class on educational outcomes is often inevitable, our comparative analyses showed that desirable shifts can be reached by focusing on malleable individual competence and adaptive learning dispositions.

Implications for the community

The primary school effect on secondary school outcomes is not as large as previous studies have indicated (e.g., Goldstein & Sammons, 1997) and as public discourse suggests.

POPULATION

In the Panel 2 studies (2004, 2010), the number of primary and secondary schools sampled was 39 and 32, respectively. Within each school, all Primary 5 students were involved. Similarly, all Secondary 3 students were surveyed. In the 2007 (Panel 6) study, 39 primary schools were surveyed and involved all Primary 6 students.

RESEARCH DESIGN

Repeated cross-sectional and longitudinal study was involved. Multilevel and cross-classified regression analysis was carried out.

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