

CORE 2018: A Quantitative Study of Teaching and Learning in Singapore Classrooms

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KEY IMPLICATIONS

- To determine the true impact of instructional effects, there is a need to account for compositional effects of peer characteristics as these factors can affect outcomes over and above students' own characteristics.
- Academic self-schemas are useful concepts that can inform teachers if students view learning as personally desirable or fearful and what factors trigger these belief systems.
- The stability of ineffective classroom management over time and its association with lower academic achievement raises a concern that is structural in nature and that such classrooms require more targeted support.
- The direct but differential impact of supportive climate and cognitive activation indicates that these instructional factors exhibit long-term transfer effects, but the lack of stability suggests that their effectiveness varies across teachers at different levels.

BACKGROUND

Over several decades, the bulk of research evidence continue to be motivated by two fundamental questions: Do schools have measurable effects on student outcomes? And if they do, which effects matter most? As simple and obvious they may be, these questions direct attention to identifying key factors and process components that contribute to what practices works best in schools and classrooms to promote educational excellence, both for whom and when. Relevant to this line of inquiry, research often shows that there is no one best instructional strategy that works in all situations for all students. However, certain practices have a greater likelihood of enhancing learning outcomes.

To model learning effects, the study drew on self-regulation and identity theory, operationalized through the hierarchical construct of academic self-schema (Garcia & Pintrich, 1994). Academic self-schema reflects a salient and accessible cognitive

frame of subject-based identities that are malleable and can be valenced positively or negatively. To model instructional effects, the study used the core dimensions framework of instructional quality (Nilsen & Gustafsson, 2016) comprising *classroom management* (noisy, disruptive classrooms), *supportive climate* (proactive teacher care), *instructional clarity* (clear, structured and relevant instruction) and *cognitive activation* (process and concept-based instruction).

FOCUS OF STUDY

This study aims to provide a systemic examination of what factors matter and what works to support learning and achievement outcomes in Secondary 3 English and Math.

KEY FINDINGS

Results point to strong class level effects, thus highlighting the positive contextual effects hypothesis related to classroom composition of social characteristics, particularly, prior achievement and socio-economic status. These compositional factors explained about 60% of class-level variance in achievement, beyond effects contributed by student level characteristics.

Positive English and math self-schemas were associated with higher achievement while students who held negative self-schemas had lower achievement. Aggregating these constructs as contextual classroom factors yielded differential insights across subjects. Classrooms with higher math self-schema were associated with higher achievement. In English, a negative contextual effect was found. Students whose English self-schema fell into the below class-average range were associated with lower English achievement. This finding aligns with the social comparison hypothesis which supports the negative influence of higher academic schema on lower schema among students in the same class, but not vice versa.

Among the four dimensions of instructional quality, disruptive classrooms predicted lower achievement and self-schema. These classrooms were also associated with lower class-average academic ability. On the other hand, teachers who used cognitively activating instruction predicted higher achievement and positive self-schema.

Classroom management and instructional clarity were positively correlated over time, suggesting stability in their associations across Secondary 1 and 3. Supportive climate and cognitive activation were not correlated over time, which suggest varied experiences among students as they progress through school. However, these practices exhibited long-term transfer effects (i.e., higher levels in Secondary 1 predicted Secondary 3 achievement). Instructional clarity was most effective at reducing classroom compositional effects and past academic performance.

SIGNIFICANCE OF FINDINGS

Findings in this study addressed core issues of learning and instruction that impact student outcomes and underscore the utility of large-scale multilevel and longitudinal data. This study attends to contemporary challenges and gaps identified in the school effectiveness literature, particularly, where the bulk of educational effects are and what works.

Implications for practice

Positive learning environments are powerful enablers, particularly those that focus and build upon students' strengths and interests. Possible interventions include promotion of mastery goals and effort expenditure to alleviate the negative consequences of feared self-conceptions in learning. Articulate nuanced practices that help students to make sense of their learning and cutting away aspects that don't (features of instructional clarity). Given the educational importance of cognitive activation, strengthen aspects that are transferable across contexts and time.

Implications for policy and research

Future initiatives aimed at maximizing learners' outcomes ought to consider unintentionally introducing composition effects related to students' social characteristics. As instructional effects are often conflated with compositional characteristics of the classroom, school improvement analyses and efforts need to account for them separately to identify how much of student outcomes is caused by effective instruction and how much by peer effects.

PARTICIPANTS

A total of 22 secondary schools, 165 classes and 5560 Secondary 3 students participated in this study, of which 2857 were involved in Math.

RESEARCH DESIGN

Multilevel design comprising student surveys of learning and student ratings of classroom instruction. The study also involved achievement tests in English and Math.

REFERENCES

- Garcia, T., & Pintrich, P. R. (1994). Regulating motivation and cognition in the classroom: The role of self-schemas and self-regulatory strategies. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulation of learning and performance: Issues and educational applications* (pp. 127–153). Lawrence Erlbaum Associates.
- Nilsen, T., & Gustafsson, J. E. (2016). *Teacher quality, instructional quality and student outcomes. Relationships across countries, cohorts and time*. Springer.

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