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Ask: NUS Economists

Understanding gender effects of teacher-student interactions

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For The Straits Times

Q Does a teacher's sex matter for a student's academic experience?

A Although we would like to think that a teacher's gender will have no bearing on a child's academic experience, several studies have found that assignment to a teacher of the opposite sex may negatively impact a child's academic experience. On average, teachers are more likely to have negative perceptions of a child's performance if the child is of the opposite sex. Children are also likely to perform worse academically when assigned to teachers of the opposite sex.

Scholars have offered a number of possible reasons for these relationships. First, teachers of the same gender may serve as better role models for students (termed the "role model" effect). Consequently, students may be more motivated, and hence perform better, when they share

the same sex as the teacher.

Second, teachers may consciously or unconsciously prefer students of the same sex (termed the "teacher bias" effect). Consequently, teachers may have higher expectations for them and may engage and reward them more favourably.

In Singapore, no study exists on this subject, partly because data is unavailable. However, it is important to understand whether these teacher gender effects might be operating here as well and, if so, the reasons for it. This is because the effects of teacher gender potentially have far-reaching policy implications.

For instance, one reason more males than females exist in the Stem (science, technology, engineering and mathematics) industries might be due to gender stereotypes, which teachers may be reinforcing unconsciously. If students indeed learn better under same-sex teachers because these teachers serve as better role models, then this suggests a need to relook the female-to-male faculty ratio in Stem departments across institutes of higher learning if we want to encourage more females to

enter these sectors.

Measuring whether a teacher's gender affects a child's educational outcomes is not easy. Conceptually, each child has to be observed simultaneously in two states of the world: In one state, the child has a teacher of the opposite sex. In the other, the same child has a teacher of the same sex. Any difference in student outcomes in these two otherwise parallel worlds would be the effect of teacher gender. In practice, however, it is impossible to observe a child simultaneously in both states of the world.

Fortunately, we can still come close to doing this if we are able to design studies that simulate parallel worlds. One reliable way was proposed by Professor Thomas Dee of Stanford University. In a series of studies, conducted over the years 2005-2007, he estimates the effect of being assigned to a teacher of the opposite sex on students' educational outcomes by comparing each student's outcomes across two different subjects: one in which the student was taught by a male teacher (call this subject M) and another in which that same student was

taught by a female teacher (call this subject F). The student's achievement in subject F is then taken to represent what the student would have achieved in subject M had the student been assigned a female teacher in subject M.

But you might protest, "What if people are innately better in one subject than in the other? Wouldn't we be attributing the difference in outcomes incorrectly to the effect of teacher gender in this case?" Sure enough, if we consider only one student in isolation, any difference could indeed be partly reflecting differences in the student's ability across both subjects. However, it turns out that when these comparisons are averaged across all students, all differences in students' innate ability across subjects get wiped away. Comparing students' outcomes across both subjects would therefore give us a credible estimate of teacher gender.

Prof Dee finds that students are more likely to be negatively perceived by the teacher and to perform worse academically if they do not share the same sex as the teacher. He used the 1988

National Education Longitudinal Study, a nationally representative data set of 24,599 eighth-grade students from the United States. Although the data set is somewhat dated, it was used because it is one of the few which collect information from each student's teachers in two different subjects, making it possible to employ the estimation strategy he uses.

Because Prof Dee's studies are, today, widely regarded as among the most influential and heavily cited in the teacher gender literature, I build on them, by using the same data set but adding additional controls for various teacher and class characteristics. My results support his findings. I find that both male and female students are more likely to be seen as disruptive when they are taught by a teacher of the opposite sex.

More importantly, the academic achievement for both male and female students depends on teacher gender. In particular, assignment to a teacher of the opposite sex as opposed to the same sex reduces test scores by 0.064 standard deviation for boys and by 0.032 standard deviation for girls. To put the numbers in perspective, consider that students who speak English at home perform about 0.11 standard deviation better than students who do not. Hence, the effect of having a teacher of the opposite sex is about 30 per cent to 60 per cent of the effect of speaking English at home.

Prof Dee's findings, particularly that same-sex teachers improve female student outcomes, are also supported by other studies which use randomised controlled experiments, such as those done by Professor Scott E. Carrell and colleagues from the University of California, Davis, in 2010 and those done by Professor Heather Antecol and colleagues from Claremont McKenna College in 2014.

What are the implications of these findings? Does this mean that we should segregate students and teachers by gender? I do not think this is the main takeaway. In fact, the results say nothing about the likely consequences of segregating students and teachers by gender.

The results say only that, all else equal, assignment to a teacher of the same sex has a positive effect on a child's academic experience. However, a policy of segregating students and teachers by gender necessarily means that the learning environment would be so altered that the "all else equal" condition no longer holds. What we should instead take away from these findings is that gender interactions between students and teachers seem to matter and that it would be worthwhile for us to explore whether these teacher gender effects are similarly observed in Singapore.

There are reasons to believe that Prof Dee's studies, which are based on the United States, could apply to Singapore, since the way in which classroom instruction is organised is broadly similar. Having a clear understanding of how teachers and students interact will enable us to formulate appropriate policies to address any potential gender effects.

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