Students' and Teachers' Perceptions of Single-Sex and Mixed-Sex Mathematics Classes

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This study examines students' perceptions of the learning settings in single-sex and mixed-sex mathematics classes, and teachers' responses to those different classroom contexts. Nearly 300 students in four coeducational secondary schools gave their views of the nature of their participation and interaction in their mathematics classrooms, and data were also obtained from their teachers. There was congruence between students' and teachers' perceptions of the environment in the two kinds of classrooms. Overall, it was perceived that single-sex classrooms provided a more supportive environment for girls, but a rather less supportive environment for boys. Teachers used different strategies with the two kinds of classes and, although many experienced initial difficulty with unruly boys' classes, these problems were overcome. The single-sex environment provided opportunities for teachers to address apparent shortcomings arising from boys' and girls' previous educational experience, which resulted in improved attitudes and performance.

The research reported in this paper is part of a larger study which investigates students' and teachers' reactions to the introduction of single-sex classes in coeducational schools (Parker & Rennie, 1995). Our focus is on the promotion of gender-inclusive classroom practice. We use the term gender-inclusive to describe curricula and learning contexts which incorporate, value and extend the prior experiences and learnings, the current interests, needs and concerns, and the preferred learning and assessment styles of both girls and boys (Hildebrand, 1989). Gender-inclusive curricula and learning contexts also challenge the dominant ways of thinking about mathematics and science and about the kinds of knowledge and behaviours which are valued and legitimated in mathematics and science classrooms.

This paper compares boys' and girls' perceptions of the attributes which distinguish between the learning settings in single-sex and mixed-sex mathematics classes, and examines teachers' responses to the introduction of single-sex classroom contexts. Specifically, this study addresses the following questions:

1. How do boys' and girls' perceptions of the learning settings in their single-sex mathematics class compare with these same students' perceptions of their mixed-sex class?

2. How do teachers vary their instructional strategies in the different kinds of classroom context?

3. What are the implications of the findings for the promotion of gender-inclusive classroom practice in mathematics?
Background to the Study

In Australia over the last two decades, single-sex classroom grouping of boys and girls in coeducational schools has been one strategy employed in an attempt to change the learning environment to one which is more favourable for girls. The National Action Plan for the Education of Girls, 1993-1997 (Australian Education Council, 1993) was released in Australia in 1993, and one of its recommendations was that opportunities should be provided for girls to learn in single-sex groupings or single-sex classes. The Education Department of Western Australia responded by implementing the Single-Sex Education Pilot Project (SSEPP), in which seven coeducational secondary schools chose to introduce some single-sex classroom groupings for either mathematics or science in 1993. In 1994, the project continued in five of these schools, one school returned to mixed-sex classes but teachers continued to be involved in the associated professional development program, and two new schools joined the project. The authors were involved with the SSEPP in dual roles, as co-providers of the professional development program for teacher support, and as researchers monitoring students’ and teachers’ reactions to the project.

The present study was carried out in an educational context where the prevailing rhetoric favours single-sex contexts for girls but the published research indicates ambiguity in the outcomes. Early work, such as that by Dale (1969, 1971, 1974) in the United Kingdom, and Lee and Bryk (1986) in the United States, compared various outcomes for students from single-sex and coeducational schools, and suggested advantages for single-sex schools. However, Yates (1993) concluded from her review of the education of girls that the gender context of the school provided no clear superiority for the achievement of girls once other factors are controlled. As Leder (1990) has pointed out in a review of gender and mathematics, there are considerable differences between single-sex and coeducational schools apart from the gender context, and the methodological problems in comparing such non equivalent groups are difficult to resolve. In fact, Marsh’s re-analysis of the Lee and Bryk data suggests no advantage for school type (single-sex or coeducational) when other variables are controlled (Marsh, 1989). Marsh and Rowe (1996) have concluded that differences between the performance of boys and girls are usually attributable to “the characteristics of the students who attend each type of school rather than school-type effects” (p. 148). An alternative approach was taken by Rowe and his colleagues (Rowe, 1988; Rowe, Nix, & Tepper, 1986) who examined attitudes and achievement in mathematics in a coeducational school by comparing data collected from boys and girls who had been assigned randomly within their school to single-sex or mixed-sex classes. However, the longitudinal nature of the study was complicated in the second year by non-random shifts of students between the different classes caused by timetable constraints. Rowe’s interpretation of the findings that single-sex classes were beneficial, particularly for girls, was challenged after a re-analysis of the data by Marsh and Rowe (1996) which concluded that this interpretation was unwarranted.

Gill (1996) summarised several themes which have been used to focus research comparing single-sex and coeducation. The major themes consider outcome variables such as academic achievement, subject enrolments and confidence and