Role models, school improvement and the 'gender gap' - Do men bring out the best in boys and women the best in girls?

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Abstract

A number of countries are running role model recruitment drives under the assumption that like is good for like: ethnic minority teachers should teach ethnic minority children, women should teach girls, and so on. The empirical basis for this would appear to be case study and personal reflection. This paper will examine quantitative data to test the hypothesis that male teachers produce more positive attitudes amongst boys and female teachers amongst girls. Using data from the Performance Indicators in Primary Schools (PIPS) Project, information from 413 separate classes for 11 year olds were examined. One hundred and thirteen were taught by males and 300 by females. All the pupils completed questionnaires that were designed to measure attitude to school, reading, mathematics and science. In addition, background data on those pupils were collected, including cognitive measures, attainment scores, ability measures and home background measures. The data were examined to look at attitudes using multilevel models controlling for background factors. The analysis concentrated on interaction effects between the gender of the teacher and the gender of the pupil and the results gave little support for those who advocate recruitment drives with role models in mind.

Introduction

In recent years, policy-makers in various countries (e.g. Australia, Canada, England, Finland, Scotland and the United States) have voiced concern about the under-representation of men in teaching, especially in primary or elementary schools (Mills, Martino & Lingard, 2004; Carrington & Skelton, 2003; Tinklin *et al* 2001; Francis, 2000; Lahelma, 2000; Arnot, David & Weinar, 1999). In official discourse, the relative dearth of male teachers is often associated with boys' underachievement and apprehensions about male disaffection from school: the 'gender gap' in school performance is held to derive from the so-called 'feminization' of the teaching profession and the consequent lack of role models for boys. Thus, the drive to recruit and retain male teachers may be seen as a constituent element of wider policies directed towards the goal of school improvement.

Various studies lend support to the view that a gender gap in achievement is present during the years of primary education. For example, Tymms (1999), drawing on data from the assessments in reading and mathematics across primary schools in England, has shown that girls and boys are very similar in their attainment levels

throughout their primary school careers. There can be no doubt that the average girl consistently outperforms the average boy in reading but the key issue concerns the size of the difference rather than its consistency or statistical significance. The difference is typically small (Effect Size = 0.2). At the age of 11, boys beat girls on a test of non verbal ability[1] by a similar small margin. In mathematics the average scores are generally the same but the spread of scores for girls is smaller which means that more boys will be amongst those identified as having special needs and as being gifted in mathematics. At this stage, girls were found to have significantly more positive attitudes to school overall than the boys (Effect Size = 0.4) and, generally, more positive attitudes to reading (Effect Size = 0.3). These differences were neither so apparent for 7-year-olds nor for 11-year-olds in mathematics and science.

A similarly circumspect viewpoint is echoed by Gorard, Rees, & Salisbury (2001) in a subsequent analysis of gender differences in national test results in Wales. Voicing concern about the so-called 'moral panics' surrounding public debate about the gender gap, they argue that:

> Twenty years ago the problem that exercised the education establishment was the under-achievement of girls. […] By early 1998, there were fears that the gender gap in favour of girls was out of control, although several commentators were also quite reasonably asking why the same 'moral panic' was not evident when it had been the boys who were ahead. […] By the end of 1998, failing boys were being described as the "public burden number one" and "one of the most disturbing problems facing the education system" by the Office for Standards in Education's Chief Inspector for Schools in England (Gorard *et al,* 2001, p. 126).

The most recent official data in England come from the 2004 end of Key Stage statutory tests. In mathematics there was little difference (Effect Sizes < 0.2) by gender at Key Stages 1, 2 and 3[2]. The same held for Science at Key Stages 2 and 3. In English, at all three Key Stages, the advantage to girls amounted to an Effect Size of

[1] POP Problems of Position
[2] At ages 7, 11 and 14 respectively.

about 0.3 for reading and for writing 0.4. The larger of these differences (0.4) is modest.

A broadly comparable picture of the gender gap at primary level has emerged in a review commissioned by the Scottish Executive Education Department (Tinklin, Croxford, Ducklin & Frame, 2001). The work has indicated that girls' literacy skills in primary schools not only tend to be more highly developed than boys, but their early reading skills – as revealed in baseline assessments on entry to the sector - are significantly higher than those of their male peers. The evidence marshalled by Tinklin and her colleagues demonstrates that girls retain their advantage in language-based activities throughout their primary and secondary education. However, the authors also point out that 'the pattern of gender differences is less clear for numeracy and mathematics' (2001, p. 32). Their survey revealed that school staff tended to attribute the gender gap in achievement to the dearth of male role models in the primary sector:

> Respondents expressed concern about the lack of male role models in primary schools. The gender imbalance was seen as exacerbating problems for those boys who did not have appropriate male role models within their own families. It was also seen as having implications for behavioural problems, and in some cases, unwillingness by boys to accept the authority of female teachers (2001, p. 110).

Analogous rhetoric has been employed in recent years by public figures in England to justify measures to bolster male recruitment to primary teaching. For example, Anthea Millett, the former Chief Executive of the Teacher Training Agency (TTA), offered this observation in her valedictory speech in 1999: 'The feminization of the profession leads to an absence of male role models for many of our pupils, particularly those from the majority of one-parent families' (TTA, 8 December, 1999). Subsequently, David Blunkett, as Secretary of State for Education and Employment, made these speculative remarks about the factors underlying working class male underachievement: 'Underachievement is linked to a "laddish" culture which in many

areas has grown out of deprivation and a lack of both self-confidence and opportunity'. He went on to state: 'We need better role models in our schools and society more generally' (DfEE, Press Notice, 2000/0368). [It should be noted that similar rhetoric has also been employed to justify parallel policies to increase ethnic minority recruitment to teaching, both in England and the United States (Carrington, 2002b).]

The Role Model Argument – its Empirical Basis

Despite apparently widespread acceptance of the view that the gender gap in achievement stems from the dearth of male role models in schools, research in Finland by Lahelma (2000) has suggested that high school students attach relatively little importance to the teacher's gender. Drawing upon interviews with ninety 13- and 14-year-olds, she found that although the students often commented on the lack of male teachers in their schools, the issue of gender did not figure prominently in their observations about the quality of teaching that they had experienced. For the large part, the teacher's gender was perceived to be irrelevant. Her findings indicate that students tend to value teachers who – regardless of gender - are able to maintain discipline in the classroom in a friendly, sensitive and impartial manner.

In the United States, Ehrenberg, Goldhaber & Brewer, (1995), analyzed data from more than 18,000 students and 15,000 teachers made available through the National Education Longitudinal Study of 1988 and concluded that matching teachers and students by gender and ethnicity has little effect on educational achievement. However, they note that such matching does influence the teachers' subjective evaluations of their students. For example white female 10th grade teachers rated white female students more highly than did white male teachers.

Dee has followed up many of the issues raised by Ehrenberg and his colleagues in two recent articles (Dee 2004, 2005). In the first, he draws upon test score data from Tennessee's Project STAR class-size experiment to assess 'the conventional wisdom among educators that minority students are more likely to excel educationally

when matched with teachers who share their race or ethnicity' (2004, p. 197). In the second, he returns to the 1988 National Education Longitudinal Study dataset to consider the effects of matching (by 'race', ethnicity and gender) on the teacher's 'subjective evaluations' of 8th grade students' behaviour and performance (Dee, 2005, p. 2).

One of the main findings to emerge from Dee's earlier study was that matching students and teachers by 'race' in the kindergarten and elementary sectors was 'associated with substantive gains in achievement for both black and white students' (2004, p. 196). He considers possible explanations as to how such matching – especially in the case of minority students – may lead to enhanced achievement. Dee suggests that it may be helpful to differentiate between 'active' and 'passive' teacher effects to understand the seemingly positive benefits of racial and ethnic matching. 'Active' teacher effects refer to the imbalances in classroom interaction (e.g. differences in praise or admonishment, or in the allocation of the teacher's time) that occur when 'teachers are oriented towards students who share their racial or ethnic background'. In contrast, 'passive' teacher effects are 'simply triggered by a teacher's racial presence and not by explicit teacher behaviors' (p. 196). In the case of minority students, the mere presence of a teacher from a similar background may in itself be sufficient to encourage them to widen their educational horizons by making them feel more focussed and comfortable in the classroom. In addition, where mismatching occurs, 'stereotype threat' (Steele & Aronson, 1995) may have an adverse effect on student achievement. However, despite these observations Dee also goes on to note that:

> Although the existence of such role model effects is frequently assumed in commentaries on educational policy, there is actually little direct empirical support (Cizek, 1995).

He emphasises that caution must be exercised when making generalisations about his findings to contexts beyond Tennessee. And while the findings may lend some

support to the role-model hypothesis, there is a downside from the policy-maker's standpoint: increased minority achievement may lead to depressed majority achievement and vice versa.

Almost none of the teachers involved in the Tennessee study were male and, as a consequence, Dee was unable to make any assessment of the impact of matching teachers and children by gender. For this reason, his subsequent analysis of data from 8th grade classrooms sampled in the 1988 National Educational Longitudinal survey warrants particular attention. Working with a large, nationally representative sample (comprising over 41,000 matched student-teacher observations), Dee's analysis shows that both male and female students were more likely to be seen as disruptive by teachers of the other sex. Similarly, both majority and minority students were more likely to be perceived as disruptive by teachers from a different ethic group. In addition, the odds of a student being perceived as inattentive were increased by 33 percent where their racial of ethnic backgrounds differ from those of the teacher. Dee also found social and geographical variations in response: 'the effects associated with race and ethnicity appear to be concentrated among students of lower economic status and those in the South' (2005, p. 11).

There have also been attempts to assess the claims of Ehrenberg and his associates about the limited impact of gender-based role models in a university setting. For example, Butler and Christiansen (2003), 'surprised by the relative lack of attention paid to issues of gender discrimination in undergraduate teaching' (p.781), have attempted to assess the ostensible benefits of matching teachers and students by gender. Working with a sample of 669 political sciences students, taught in small groups by graduate teaching assistants (i.e. in contexts where the interactions between teacher and learner would be more salient than in large lectures), their findings provide, at best, only limited support for the role model hypothesis. While drop-out rates were found to be lower among women students taught by female teaching assistants,

'the actual performance of students is not consistently or significantly affected by the gender of the students' teaching assistant' (2003, p.785).

As well as making often unsubstantiated claims about the benefits of matching teachers and students by gender or ethnicity, policy-makers and academic commentators have also made comparable claims about the value of other types of matching. For example, it has been argued that there is a link between a child's progress in certain areas of the curriculum and the extent to which his or her favoured learning style corresponds to that of their class teacher (Riding & Douglas, 1993). Despite this, extensive research gives little support for such a view. Coffield et al (2004a and 2004b) provide a comprehensive review of the literature and consider in detail the numerous investigations, which have tried to relate the teacher's approach to the learner's preferred style. They comment:

> One possible conclusion is that it is simply premature (and perhaps unethical) to be drawing simple implications for practice when there is so much complexity and so many gaps in knowledge. (Coffield et al 2004a, p.121).

In this paper, we are primarily concerned with one of the largely unsubstantiated claims underpinning contemporary teacher recruitment policies in England (and elsewhere): that matching teachers and pupils by gender has a positive effect on children's attainment levels and attitudes to education. In other words, do male teachers bring out the best in boys and female teachers the best in girls?

To address this question about the salience of same-gender role models, we draw exclusively upon data from the Performance Indicators in Primary Schools (PIPS) Project run by the Curriculum Evaluation and Management (CEM) Centre, University of Durham (see, for example, Tymms, Merrell and Henderson, 2000 and Tymms, 1999). The PIPS Project provides participating schools with feedback on children's attainment and progress, thereby enabling the schools to monitor an individual's development as they move through their primary education.

THE STUDY

Sample

The participants in this study comprised a single cohort of 8,978 children (50.4% boys and 49.6% girls) drawn from English primary schools during the 1997/8 academic year. Information from 413 separate classes for 11 year-olds (Year 6) was examined. One hundred and thirteen of these classes were taught by males and 300 by females. The data on the gender of the teachers were not originally requested. Rather, the names of the classes were recorded and for those analysed for this study it was possible to identify the teacher's gender from the name. We acknowledge the limitations of this procedure and recognise that the sample may not be a perfectly representative one (even though the PIPS sample overall is known to be representative) although we see little reason to suggest bias. The ratio of female to male teachers was 3:1 and the sample was sufficiently large for the exploratory analysis that ensues.

The effect of matching teachers and pupils by ethnicity has been reviewed in the introduction and it should be noted that PIPS assessments did not collect data on either the teachers' or pupils' ethnicity.

Measures

The participants completed their PIPS assessments in January, 1998 (by which time they had been with their teacher for just over four months). The battery of group assessments, which was administered over four half-hour sessions, comprised the following sections: attainment tests in reading, mathematics, science (based upon the English National Curriculum); tests of non-verbal ability and English vocabulary; and questionnaires devised to probe the children's attitudes both to core areas of the primary school curriculum (i.e. reading, mathematics, science) and to school in general (see Appendix 1 for details). To assess the children's vocabulary, they were

presented orally with a list of words and instructed to select a picture that represented each word from a group of five. The non-verbal ability assessment (*Problems of Position*, Moseley, 1976) required the children to identify simple patterns of dots within more complex patterns. [All of the assessments have respectable reliabilities, which can be found at www.pipsproject.org.]

Analysis

Multilevel models were constructed to see if there was any indication that a male teacher or a female teacher had more impact, or if there was an association with higher attainment or more positive attitudes, and whether male or female teachers were particularly successful with children of the same or different gender. And finally, an attempt was made to see if male or female teachers were particularly effective with children of high or low ability.

Results

The multilevel models (given in Appendix 2) for the attainment measures (mathematics, reading and science) with controls for ability measures (picture vocabulary and non-verbal ability) showed that the gender of the teacher was unrelated (not statistically significantly associated with) the attainment of the children even after controls for vocabulary and non-verbal ability. Nor was there any significant interaction term for the gender of the teacher with the gender of the pupil. In other words, there was no indication that male teachers were particularly effective with boys, or female teachers with girls. And there was no indication that effective results were associated with male or female teachers, with particularly high ability children.

For the attitude measures there were no links with the gender of the teacher except when the outcome was attitudes to school. It was clear that children who had female teachers had more positive attitudes. Indeed, it was statistically very significant and the effect amounted to about 0.13 of a standard deviation. There was no indication

for any of the attitude outcome measures of an interaction showing that the female teacher was producing particularly more positive girls or vice versa.

Discussion and Conclusions

In this paper, we have sought to draw attention to the limitations of the role model hypothesis, especially in relation to its claims about the benefits of matching teachers and learners by gender. Focusing on the educational experiences of 11-year-olds in a national sample of English primary schools, we have shown that such matching has no discernible impact on either boys' or girls' attainment, or their respective attitudes to school. Contrary to the political rhetoric often used to justify measures to bolster male recruitment to the profession, we found no empirical evidence to support the claim that there is a tendency for male teachers to enhance the educational performance of boys and, conversely, for female teachers to enhance the educational performance of girls. Of particular note is the finding that children taught by women – both boys and girls alike – were more inclined to show positive attitudes towards school than their peers taught by men. As far as attitudes to school are concerned, our study indicates that women teachers seem to bring out the best in both sexes!

For various reasons, caution should be exercised when drawing conclusions from this study. Firstly, as we have already acknowledged, we did not analyse or control for the consequences of teachers and children being matched by ethnicity (Dee, 2004; Carrington 2000b; Weiner, 2000; Quiocho & Rios, 2000; Gordon, 2000). As we pointed out earlier when discussing Dee's (2004) research, students may feel more focussed and comfortable working with a teacher of the same ethnicity – at least in Tennessee. Secondly, the teachers sampled, while representative of Year 6 teachers across English primary schools, may not be representative of all teachers in the primary sector. For example, with the immense pressure on schools to secure and

maintain a competitive position in Government league tables, it is conceivable that the more effective teachers in primary schools may find themselves channelled into Year 6 positions, where they assume responsibility for preparing children for the national tests. There are also other reasons why it may not be possible to generalise from our teacher sample to all primary teaching staff. Although men are generally underrepresented in primary schools, they are more likely to be found working with older children in this age range. Indeed, as a consequence of gender stereotyping, men may be deterred from taking up teaching positions in the lower primary sector (Carrington, 2002a; Skelton, 2002; Cameron, Moss & Owen, 1999; King, 2000). As Carrington has noted:

> Despite the flurry of official measures to persuade men to take up a teaching career in the primary sector, the prevailing image of the primary school—as a characteristically feminine domain—continues to act as a major impediment to change. Whereas working in the upper primary sector may be more readily reconciled with dominant notions of masculinity, teaching younger children tends to be associated with nurturing and construed in popular consciousness as a 'woman's job'. Thus, men taking up teaching posts in the lower primary sector, particularly in the early years, are seen, at best, as 'unusual' or 'odd' and, at worst, as potential threats to the children (2002a, p.301).

Although, as we have indicated, matching teachers and pupils by gender would appear to have no significant impact on educational outcomes in Year 6, it cannot be assumed that the teacher's gender will be similarly inconsequential with younger children. Conceivably, male teachers could have greater salience as role models for boys in the lower primary school, where men are generally conspicuous by their absence. No data about the gender of previous teachers and the length of time spent with those teachers were available for the sample of pupils analysed. The data collection for our study took place at roughly the mid-point in the academic year (i.e. January 1998), when the children had been with their present teacher for just over 4 months. It is possible that the outcomes of the research may have been different had the data collection taken place later in the year. There are a host of other factors that could have influenced the outcomes, such as the personality and the effective-

ness of the teacher. This type of analysis will always be open to such limitations and in an ideal world the random assignment of teachers to classes, as in the STAR project, would be employed to investigate the issue more rigorously.

Leaving aside the limitations of our study, how are current teacher recruitment policies to be assessed in the light of its findings? If the overriding concern of policy-makers is to devise effective measures to reduce the so-called 'gender gap' in achievement (and attitude), then it could be argued that current attempts to persuade more men to take up teaching posts may be somewhat misplaced. As Hattie (2003, p. 9) has shown in his analysis of factors leading to variance in achievement, teachers have a crucial influence on school outcomes:

> They account for about 30% of the variance. It is what teachers know, do, and care about which is very powerful in this learning equation. And it is the one source of variance that can be enhanced with the greatest potential of success.

However, while Hattie is correct to underscore the importance of teachers' pedagogical knowledge and skills, attracting more men into the profession cannot provide a cast iron guarantee that such recruits will have the necessary aptitudes and dispositions needed to develop and sustain an effective learning environment. We would suggest that the policy goal should be to recruit effective, high calibre teachers, whatever their gender. The implications, both for initial teacher education and training and for continuing professorial development, are self-evident.

Having said this, we nevertheless recognise the importance of contemporary measures to make teaching a more inclusive profession and accept that attempts to bolster male (or ethnic minority) recruitment can be justified on other (arguably less pragmatic) grounds. For example, increasing the availability of male role models to children (in all age groups) across the primary sector may help to break down endur-

ing gender stereotypes, by conveying an unequivocal message - to children and parents alike - that learning is 'an acceptable masculine activity' (Mulholland & Hansen, 2003). In other words, the policy measures in question are broadly compatible with the wider goals of social justice and equity.

As well as highlighting various lacunae in the evidence-base of current policies to address the gender gap in achievement, our study also offers a number of pointers for future lines of enquiry. First, it would be useful to know whether matching teachers and pupils by gender in primary schools has differential effects according to the age of the children. For example, are teachers more likely to bring out the best in younger children of the same gender as themselves than older ones (such as the 11 –year-olds examined in the present study)? With the overwhelming preponderance of female teaching staff in the lower primary sector – and concomitant dearth of male role models – a comparative, possibly longitudinal, investigation of this type is long overdue. As well as taking account of possible age-related differences in response, any future study would also need to take cognisance of the potential impact of matching teachers and children by ethnicity. Furthermore, in view of Dee's (2005) observation that the influence of teacher ethnicity may be more pronounced among 'students of lower economic status', consideration would also need be given to the following question: Does the teacher's gender or ethnicity matter more in the case of less advantaged children in English primary schools?

Finally, the effects of various other contextual issues could also be explored. For example, under what circumstances do primary school children come to identify with their teachers? To what extent does the teacher's gender, ethnicity or age have any bearing upon the children's expressed preferences? In those circumstances where children are found to identify with their teacher as a role model, how do they account for and articulate their inclinations? For example, is the teacher seen as a 'symbol of

special achievement', as an 'advocate' or 'mentor', or simply as 'an ethical template'[3]

(Allen, 2000)?

References

Allen, A. (2000). The role model argument and faculty diversity. Available: http://onlineethics.org/abstracts/fac-diverse.html

Arnot, M., David, M. & Weiner, G. (1999). *Closing the Gender Gap?* (Cambridge: Polity).

Butler, D. M. & Christensen, R. (2003). Mixing and Matching: The Effect on Student Performance of Teaching Assistants of the Same Gender, *Political Science and Politics,* 36, 781-786.

Cameron, C., Moss, P. & Owen, C. (1999). *Men in the Nursery,* (London: Paul Chapman).

Carrington, B. & Skelton, C. (2003). Re-thinking 'role models': equal opportunities in teacher recruitment in England and Wales, *Journal of Education Policy*, 12, 3, 353-265.

Carrington, B. (2002a). A Quintessentially Feminine Domain? Student Teachers' Constructions of Primary Teaching as a Career, *Educational Studies,* 28, 3, 287-303.

Carrington, B. (2002b). Ethnicity, "Role Models" and Teaching, *Journal of Research in Education,* 2002, 12, 1, 40-49.

Coffield, F., Moseley, D., Hall, E., & Ecclestone, K. (2004a). *Learning styles and pedagogy in post-16 learning: a systematic and critical review* (No. LSRC 575), (London: Learning & Skills Research Centre).

Coffield, F., Moseley, D., Hall, E., & Ecclestone, K. (2004b). *Should we be using learning styles? What research has to say to practice* (No. LSRC 559), (London: Learning & Skills Research Centre).

Cizek, G. (1995). On the limited presence of African-American teachers: an assessment of research, synthesis and policy implications, *Review of Educational Research,* 65, 1, 78-92.

Dee, T. S. (2004). Teachers, race and student achievement in a randomized experiment, *The Review of Economics & Statistics,* 86, 1, 195-210.

Dee, T. S. (2005). A teacher like me: does race, ethnicity or gender matter? Paper presented to the AERA 2005 Conference, Montreal.

[3] Some of these latter issues are being explored by Christine Skelton, Bruce Carrington, Becky Francis and Merryn Hutchings in an ongoing, ESRC-funded qualitative study of Gender as a Factor in Pupil-Teacher Relations and Perceptions.

Ehrenberg, R. G., Goldhaber, D. D., & Brewer, D. J. (1995). Do teachers' race, gender, and ethnicity matter? Evidence from the National Education Longitudinal Study of 1988, *Industrial and Labor Relations Review, 48,* 547-561.

Francis, B. (2000). *Boys, Girls and Achievement: Addressing the Classroom Issues*, (London: Routledge).

Gorard, S., Rees, G. & Salisbury, J. (2001). Investigating the patterns of differential attainment of boys and girls at school, *British Educational Research Journal,* 27, 2, pp.125-139.

Gordon, J. (2000). *The Color of Teaching,* (London: Routledge Falmer).

Johnston, J., McKeown, E. & McEwen, A. (1999). Choosing teaching as a career: the perspectives of males and females in training, *Journal of Education for Teaching*, 25, 1, 55–64.

Hattie, J. (2003). New Zealand education snapshot: with specific reference to the Years 1-13. Paper presented to *Knowledge Wave*, 20 February, 2003. Available: http://www.knowledgewave.org.nz/forum_2003/speeches/Hattie%20J.pdf

King, J. (2000). The problem(s) of men in early education, in: N. LESKO (Ed.) *Masculinities at School,* (London: Sage).

Lahelma, E. (2000). Lack of male teachers: A problem for students or teachers? *Pedagogy, Culture and Society*, 8, 2,173-85.

Mills, M., Martino, W, & Lingard, B. (2004). Attracting, recruiting and retaining male teachers: policy issues in the male teacher debate, *British Journal of Sociology of Education,* 25, 3, 355-369.

Moseley, D. (1976). Helping with learning difficulties, Course E201 OU: Block 10, (Milton Keynes: Open University).

Mulholland, J. & Hansen, P. (2003). Men who become primary teachers: an early portrait, *Asia-Pacific Journal of Teacher Education,* 31, 3, 213-224.

Quiocho, A. & Rios, F. (2000). The power of their presence: minority group teachers and schooling, *Review of Educational Research,* 70, 485-528.

Riding, R.J. & Douglas, G. (1993). The effect of cognitive style and mode of presentation on learning performance, *British Journal of Educational Psychology,* 63, 297-307.

Skelton, C. (2002). The 'feminisation of schooling' or 're-masculinising' primary education, *International Studies in Sociology of Education*, 12, 1, 79–98.

Steele, C.M. & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans, *Journal of Personality and Social Psychology,* 69, 797-811.

Tinklin, T., Croxford, L., Ducklin, A. & Frame, B. (2001). *Gender and Pupil Performance in Scotland's Schools*, (Edinburgh: The Scottish Executive Education Department)

Tymms, P. (1999). *Baseline Assessment and Monitoring in Primary Schools: Achievements, Attitudes and Value-added Indicators*, (London: David Fulton Publishers).

Tymms, P. B., Merrell, C. & Henderson, B. (2000). Baseline assessment and progress during the first three years at school, *Educational Research and Evaluation*, 6, 105-129.

Weiner, L. (2000). Research in the 90s: implications for urban teacher preparation, *Review of Educational Research,* 70, 369-406.

Appendix 1

Attitude to Reading

- I like reading.
- I enjoy reading stories.
- I am interested in reading.
- I enjoy reading things that are not stories.
- I look forward to reading.
- I like looking things up in books.
- I learn things quickly in reading.

Attitude to Mathematics

- I like doing sums.
- Work in maths is easy for me.
- I look forward to maths.
- I like solving problems in maths.
- I do well in maths.
- I enjoy drawing graphs.

Attitude to Science

- I do well in science.
- I like science.
- I like learning about plants and animals.
- I am interested in science.
- I am not good at science.
- I look forward to science.
- I like doing experiments.

Attitude to School

- I look forward to school.
- I enjoy school.
- People are nice to me in schools.
- I do well at school.
- I learn a lot at school.
- I like my teachers.
- I like the lessons.

Appendix 2

Null models

	Maths	Reading	Science	Attitude to maths	Attitude to reading	Attitude to science	Attitude to school
Fixed							
Cons	-0.03 (0.03)	-0.03 (0.04)	-0.03 (0.03)	0.00 (0.02)	-0.01 (0.02)	0.00 (0.02)	0.00 (0.02)
Random							
Pupil	0.82 (0.02)	0.78 (0.02)	0.80 (0.02)	0.89 (0.01)	0.91 (0.01)	0.91 (0.01)	0.84 (0.01)
School	0.18 (0.02)	0.23 (0.03)	0.21 (0.02)	0.09 (0.01)	0.06 (0.01)	0.07 (0.01)	0.12 (0.01)

Comment: All continuous measures were normalised and had a mean of zero and a SD of 1. Standard errors are given in parenthesis.

The null models, above, which simply partition the variance between schools and pupils, show that the cognitive measures had about 80% of the variance associated with the school and for the affective measures the figures were generally closer to 90%.

Full models

	Maths	Reading	Science	Attitude to maths	Attitude to reading	Attitude to science	Attitude to school
Fixed							
Cons	0.02 (0.03)	0.04 (0.04)	0.05 (0.04)	-0.05 (0.03)	-0.21 (0.03)	0.06 (0.04)	-0.30 (0.04)
Vocabulary	0.45 (0.01)	0.60 (0.01)	0.59 (0.01)	-0.04 (0.01)	0.20 (0.01)	0.04 (0.01)	-0.02 (0.01)
Non-verbal	0.37 (0.02)	0.15 (0.02)	0.23 (0.02)	0.17 (0.02)	-0.10 (0.02)	-0.07 (0.02)	-0.02 (0.02)
Girl	0.14 (0.02)	0.29 (0.02)	0.03 (0.02)	0.01 (0.02)	0.35 (0.02)	-0.16 (0.02)	0.42 (0.02)
Fem. Teac.	0.04 (0.04)	-0.02 (0.05)	-0.02 (0.04)	0.07 (0.04)	0.05 (0.04)	0.03 (0.04)	0.13 (0.04)
G X FT	0.02 (0.03)	0.04 (0.02)	0.02 (0.02)	-0.02 (0.03)	0.01 (0.02)	0.00 (0.03)	0.01 (0.02)
Random							
Pupil	0.44 (0.01)	0.40 (0.01)	0.40 (0.01)	0.87 (0.01)	0.84 (0.01)	0.90 (0.01)	0.79 (0.01)
School	0.06 (0.01)	0.08 (0.01)	0.05 (0.01)	0.10 (0.01)	0.08 (0.01)	0.08 (0.01)	0.11 (0.01)

Comment: In the full models, controls were made for Picture Vocabulary, non-verbal ability, pupil gender (a dummy code 1 for female), teacher gender (a dummy code 1 for a female teacher) and an interaction between pupil and teacher gender.

For the three cognitive outcomes, vocabulary and non-verbal ability “explained” more than half of the pupil level and the school level variances. The girls outperformed boys in reading and maths but equaled the boys in science. There was no difference in the attainment levels of boys and girls according the gender of their teachers and no indication of any interaction between pupil and teacher gender.

For the four affective outcomes picture vocabulary was only important for the attitude to reading measure and non-verbal ability was positively linked to attitude to maths. Girls were clearly more positive towards school and reading and boys to science. There was no difference between the sexes in their attitude to maths. The gender of the teacher was unrelated to the attitudes of the pupils except for attitude to school where the female teachers had more positive children. There was no indication of an interaction between the gender of the pupils and the gender of the teachers.