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Gender Differences in Gifted Achievement In Britain and the USA

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Abstract

In Britain, the academic achievements of gifted girls in grade school are surpassing those of gifted boys in almost all areas of study and at all ages, whereas this does not appear to be the case in the USA. The evidence suggests two major reasons for this difference. Emotionally, British girls are now showing greater confidence in their abilities. Educationally, changes in the style and content of British curriculum and assessment may favor female study patterns, along with a national system of inspection which checks for equal gender opportunities in the classroom. Although this managed change in gender equality of opportunity in schools is seen to be highly effective, female school advantage has yet to make a significant difference in the workplace.

Putting the Research to Use

The relatively lower achievement of American gifted girls in the sciences and mathematics compared with American gifted boys is not a universal characteristic, as international comparisons have shown, and so cannot be due to the innate abilities of either sex. In Britain, and reflected in other countries, the continually rising superiority of gifted girls in every school subject area is associated with socio-emotional and educational changes. Although the situation is complex, the essential steps that appear to have been effective in altering the British gender achievement balance include changes in the following educational procedures.

- Administrative planning: An explicit school policy and whole school support are most effective with some form of continuous monitoring.
- Teaching practice: Changes include, for example, teaching sciences in single sex groups, making the curriculum content more real-life based, and the encouragement of learning which is more thoughtful than memory based.
- Assessment: Moving way from the dominance of multiple-choice responses towards greater inclusion of more deeply considered essays and student projects helps rights gender balance.
- Counselling-type teaching: Promoting girls' understanding of their fear of "male" subjects as difficult, encouraging coping strategies and general assertiveness is helpful.

However, school achievement is not life achievement and there is still an international need to broaden gifted girls' selection of study areas, which affects their career prospects, as well as improving equal opportunities for gifted women in the workplace.

In Britain, throughout their school lives, girls' results are now surpassing those of boys, not only in the "soft" subjects such as English, art and history, but also in the "hard" sciences, such as physics, chemistry and mathematics (Department for Education and Skills, 2000; Equal Opportunities Commision, 2001). This includes the curriculum-based Standard Attainment Tests (of general school progress), which all children take at the ages of 7, 11 and 14, and almost all the nation-wide public examinations taken at 16, 17 and 18. A consistently higher proportion of girls than boys score in the top three grades (receive an A, B, or C), and girls have a lower rate of failure (9%, compared with 11.9% for boys). According to a British overview of research in gender achievement, this trend "emerged at the end of the 1980s; within four years the position had changed from one of rough equality between the sexes to clear disparity" (Arnot, Gray, & Rudduck, 1998, p. 11). However, boys are still better at physical education.

At the university level, more women are gaining relatively more top grade (summa cum laude) degrees than men. This has trebled in just ten years, with women now taking the lead in 12 of the 17 university fields reported by the Higher Education Statistics Agency (2001), including medicine, law and business.

The British educational system is triangular, in the sense that the bases are wide and thorough, but become sharply subject focussed in the teen years. From age 5 to 14 years, every child follows the National Curriculum, with the exception of physical education, where girls have fewer team games and boys have less gymnastics and dance. Every child until the age of 10 has two mandated daily study hours, one on literacy and one on numeracy, cutting across any nascent gender bias in these basics. Students who achieve well at 16 and want to continue their education can study for Advanced level (A-level) examinations from a choice of 76 independent subject areas. Without passes in at least two examinations there is no possibility of university entrance; and as there are more applicants than places, A-level results are extremely important. In 2001, of all the 17 and 18 year-olds in the country, 33.7% passed two or more A-levels and 18.5% of these passed three. (Department for Education and Skills, 2002). There are no private universities in the UK (Oxford and Cambridge included), and the drop-out rate is very low.

Although the standard of learning in the areas so intensely studied from 16 to 18 years of age is extremely high, those teenage decisions about what to study certainly restrict choice at university (Colley, Comber, & Hargreaves, 1994). The major division in subject area choice between males and females is still usually between the sciences and the arts (Higher Education Statistics Agency, 2001). Women are more likely to choose English, biology and French, and less likely to choose economics, physics, computer studies, technology or business studies, which usually lead to better-paid and higher-status careers. Government research has found that a preponderance of one gender entering a subject does not inevitably result in a gender gap—with respect to achievement—in favour of that sex. Males, for example, may achieve higher grades in French at A-level and females in physics (Department for Education and Skills, 2000). However, in spite of overall superior results in all national examinations, of those girls who do choose the "hard" sciences, more boys still specialize in them and more girls are still overrepresented in the traditional female subjects.

In the United States, the National Assessment of Educational Progress (2001) provides the only national picture of school achievement by subject and populations of students, including trends. It shows, for example, that in July 2001 the percentage of male and female fourth-graders performing at or above *proficient* in math had more than doubled since 1990: The percentage of males increased from 13 to 28%, while the percentage of females increased from 12 to only 24%, still 4% lower than that of males.

High level examination success in the USA shows a very different pattern with regard to gender and subject choice. In Chicago, Hedges & Nowell (1995) analysed mental test scores from six meta-analyses over 35 years using national probability samples. When they examined students whose mental test scores were among the top 5%, they found that on mathematics, science, and vocational (male type) aptitude scales “talented” 17-year-old males outnumbered females substantially. Males scored 8-10 times more frequently within the top 10%, and for several tests no female managed to score at all in the top 3%. Hedges and Nowell wrote: “there are only one half to one seventh as many women as men who excel in the relevant abilities” (p. 45). However, they found the talented males to be at a profound disadvantage in literacy skills, which trailed that of their female counterparts by as much as a year and a half. The overall conclusion was that the differences in innate abilities between male and females across the arts-science divide are large and deep, which is why, according to Hedges and Nowell, men achieve at a higher rate than women in the sciences.

Findings from more than 20 years research in the USA by Benbow & Lubinski (1993) are in accord. Above-level testing (designed for older children) of well over one million 12 and 13 year-olds in the top 3% in intellectual ability on the College Board Scholastic Aptitude Test (SAT), found that males scored higher on mathematical reasoning ability than females, as well as spatial-mechanical reasoning and some lifestyle and vocational preferences. Though the girls scored significantly higher in mental arithmetic and computation, they were much less successful with higher-level problem solving and much less likely to have studied mathematics at a higher level. The researchers suggest that “sex differences in science achievement should be especially pronounced at the exceptional levels” (p. 55), and conclude “mathematical talent seems to have biological co-variates, with the patterns of brain activation and inhibition underlying precocity and its expression differing between at least a subset of males and females” (p.57).

Benbow and Lubinski’s conclusion is underlined in an overview of gender effects in engineering and the physical sciences (Lubinski, Benbow and Morelock, 2000), where although recognizing the effects of cultural influences, the researchers write, “We conclude, that because of sex differences in the configuration of specific abilities, the satisfactoriness for engineering and physical science is less frequently met by gifted females compared to gifted males” (p.641).

There appears to be a major difference between American and British gender achievements. Whereas in America, boys’ overall mathematics scores tend to be superior to those of their female counterparts, in Britain the mathematics scores of girls tend to be superior. Again, although proportionately fewer girls in Britain choose to specialise in physics and engineering, their achievements in those subjects are at least as good as those of boys. It could be expected that boys and girls in the two countries have identical genetic make-up, implying that different cultural influences have produced these contradictory outcomes.

One can think of the concerted British move to equality of opportunity as a grand experiment on a population of about 60 million people, using other countries for comparison. Apart from tests set by teachers in school, public examinations are national; and although there are some differences for Scotland and between the five regional examining boards, there is sufficient similarity for the whole school population to function as a statistically analyzable unit in terms of examination grades. Specific concerns and trends, such as gender achievement, can be identified. The experiment began in the mid 70s with the broadening out of attitudes with respect to education. It is an experiment that is still in progress and while

debate continues on how to interpret the results, much can already be said about the results with respect to examination scores.

Cultural Influences on Achievement

Not everyone agrees with Hedges and Nowell (1995) or Benbow and Lubinski (1993) that there are significant difference between the innate abilities of males and females. From the USA, Golombok and Fivush (1994) have written, "Careful statistical analyses across hundreds of studies have demonstrated that gender differences in ability in math and language are so small as to be virtually non-existent for all practical purposes" (p.177). They concluded that the measurable sex differences in aptitude are due to "a complex interaction between small biological differences and larger gender differences in socialisation experiences" (p.176). Concurring, Heller & Ziegler (1996) in an international review of research on gender differences in mathematics and natural sciences, failed to find any reliable evidence that girls are inherently less able than boys. They suggested that girls and boys can consequently act as experimental controls for each other to gauge the power of social effects, probably best seen in career outcomes. They pointed out, for example, that even on present tests of spatial abilities at which boys do better, one would expect only twice as many male engineering graduates as females, whereas there are 30 times as many. Wilson, Stocking, and Goldstein (1994) reported that in the USA female and male adolescents generally selected courses that followed traditional gender stereotypes, males generally preferring mathematics and science.

Gifted girls, Heller and Ziegler (1996) found, were more influenced by social pressures than gifted boys, that is by the “unfemininity” of subjects such as physics, as well as much less early practice and fewer adult role-models. In contradiction, Csikszentmihalyi, Rathunde, and Whalen (1993) suggested that the high level of "androgynous traits" in gifted girls give them a stronger resistance to gender role pressures than girls of more average ability. Yet if this were so, one would not expect to see the significantly higher grades in the sciences for boys in the United States, where this work was done. In her UK government overview of international research on gifted education, Freeman (1998) concluded that although both gifted boys and girls were sensitive to societal gender pressures, strength to overcome them came from their upbringing and personality. This was also seen in her 27-year comparison study of 210 gifted and non-gifted children in Britain: higher socio-economic status (SES) students were normally more successful in education and careers than lower SES students (Freeman, 2001).

Not only do the current British examination results seem to refute innate ability differences between boys and girls, but they also highlight strong cultural influences. Such influences clearly affected gifted achievements in a 38-country investigation of 8th grade mathematics achievements (Third International Mathematics and Science Study, 1999). That report states that, across the whole ability range, “in most countries the gender difference was negligible” (p. 48). But among the highest scoring 25% of students there were significant differences. Within that group only three countries showed sadistically significant male superiority: “In Israel, Tunisia, and the United States, the percentages of boys reaching the upper quarter level were significantly greater than the percentages of girls reaching this level” (p. 48). For those three countries, there appear to be considerable cultural differences, such as gender expectations, gender role models and provision, affecting gender achievements in high-level mathematics, which was not seen in the others. Further study of the Third International Mathematics and Science Study (TIMSS) report by Fox, Engle and Paek (2001) indicated that in the United States “girls’ lower levels of confidence in mathematics become

even more problematic in the middle school years"—just the time of the "Ophelia years", which Pipher (1994), drawing on her years of psychotherapy with adolescent American girls, describes as a "sexualized" culture which "limits girls' development" (p.47). As Noble, Subotnik, and Arnold (1999) point out, the lives of adolescent American girls have more often been molded by gender roles of family and cultural group than by encouragement to be true to themselves. Yet this is just the age at which British girls are obliged to choose their academic specialization.

Interestingly, at the Weizmann Institute of Science summer school in Israel for scientifically gifted teenagers, the Israeli participants are normally heavily male dominated; however, the early-90s wave of Russian immigrants brought a temporary change. The gifted youngsters fresh from Russia were accepted, based on their school grades, in equal gender proportions for the courses. But, as the newcomers became aculturized into Israeli society, this gender equality at the Institute faded away and males regained achievement dominance (Freeman, 1996). As further evidence of cultural effects, Chinese- and Japanese-American children show up the doubtfulness of the gender stereotype as both girls and boys within these Asian cultures present a "spectacular case of overachievement" (Flynn, 1991. p. 125) on both the mathematics and the verbal portions of the Scholastic Aptitude Test (SAT) compared with non-Asian-Americans of the same IQ.

Dweck and Licht (1980) have presented and researched the idea of "learned helplessness", a state in which people have come to believe that success and failure depend on circumstances beyond their control. Because they think their fate depends on luck, they give up their goals too easily, offering a variety of excuses for failure. Dweck and Licht concluded that the American girls they studied had greater learned-helpless orientation in mathematics and science than boys. In Britain too, there is evidence that some females may be so ego-defensive that they become self-handicapping (Thompson & Richardson, 2001). Females are more likely than males to offer excuses, such as inherent handicaps, test-anxiety, or recent traumatic events, prior to beginning a task, especially if the task is personally threatening. And parents and teachers, Dweck (1999) suggests, can foster adaptive (mastery), rather than maladaptive (learned helplessness) motivational patterns.

There are further American studies that support Dweck and Licht (1980). For example, Weinburgh (1995) conducted a meta-analysis of gender differences in attitudes toward science and the relationships between attitudes toward science and science achievement. Weinburgh reported that boys are more likely to have a positive attitude toward science and achievement in biology and physics, as did Terry and Baird (1997) when they questioned mixed-gender high school students about women in biology.

In spite of the differences in examination results, parents and students still appear to hold similar gender attitudes towards areas of study in both the USA and Britain. Taking a long-term look at giftedness in mathematics in the USA, Jacobs and Weisz (1994) found that parents held somewhat fixed and conventional gender expectations, which influenced girls' self-esteem more than their actual performances, and so inhibited their ambitions. In accord, teachers questioned in 722 schools and 136 colleges in England and Wales, reported that the main reason relatively fewer students chose to specialize in advanced mathematics and science was the perceived difficulty of the subject. This was more often the case for girls than for boys, and for girls there was the added factor of the lack of women teachers as role models in these subjects (Sharp, Hutchison, Davis & Keys,1996). Confidence, at least in mathematics, has been found to predict achievement, and so where ability is equal, it is

probable that more confident students would select mathematics for study (Fox, Engle & Paek, 2001).

The negative influence of expectations, attitudes and media influences on young females in North American society has been well documented (see, e.g., Noble, Subotnik, & Arnold, 1999; Pipher, 1994; Wilgosh, 2001). Indeed, the relatively poor performance of American adolescent girls in “boys’ subjects” is attributed by Kerr (2000) to cultural gender effects and described as “intractable, excluding gifted women from colleges and academic opportunities” (p. 649). However, girls’ cultural exclusion is contended by selections from American research that either claim cultural discrimination to be against boys (Hoff Summers, 2000) or that there is no cultural exclusion because many innate gender biases in brain function (in favor of science for boys and in favor or the arts for girls) inevitably limit their choice of education (Gurian, 2001). Yet differences in cultural attitudes are clear. Evidence from international surveys (e.g., Stetsenko, Little, Gordeeva, Grasshof & Oettingen, 2000; Third International Mathematics and Science Study, 1999) shows a distinct and measurable cultural variation in gender attitudes and achievements in different areas of study. It is probable that American results are not representative of all boys and girls. After all, tests tapping the abilities of teenagers are bound to include a significant loading of cultural learning.

Programs for the Gifted

There are neither gifted programs, as such, in Britain nor specially designed lessons, though there are some scattered, locally based provisions, such as pull-out groups and attempts at differentiated teaching in mixed-ability classrooms (usually by teacher-judged grouping). But there has always been a great variety of stimulating, non-classroom activities available within and outside school hours, such as discussion groups during the lunch break, school trips, and art classes in museums. A small proportion of (mostly private) schools are selective, in that the applicants have to pass high-level examinations to be accepted and so could be considered schools for the gifted, even though the teaching is not essentially different from that in other schools. However, since the new Labour government took office in 1998, there has been a sharp educational policy thrust to nurture the development of untapped gifted potential (Freeman, 2003). The main effort is via enrichment schemes which emphasize networking facilities for study support such as funded homework clubs, mentors and the use of educational partners such as museums, galleries, libraries, sports clubs, theatres, universities, etc.

Gifted provision is very different in the USA, where a report from the Office for Educational Research and Improvement (1993) states that in "1990, 38 states served more than 2 million gifted students" and since then "the number of programs for gifted and talented youngsters has grown substantially" (p. iii). Winner (1996) writes that when girls start school they are identified in equal proportion to that of boys for gifted programs, but as they get older there is a striking decline in the proportion of girls selected for gifted education. Although girls make up half the gifted population in kindergarten, this proportion shrinks to less than 30% in junior high school, and even lower at high school. But there is evidence that it is possible to affect the relative proportion of boys and girls in gifted programs. For example, an experimental intervention program in Indiana provided teenage girls “directed enrichment”, after which they were able to reach much higher levels in a variety of talent areas (Moon, Feldhusen & Dillon, 1994). One might question the purpose, selection procedures, and effects of the gifted programs, particularly if they appear to be losing so many bright girls.

Reasons for the Increase in British Girls' Achievement Level

Teachers and academics in Britain are struggling to understand exactly what lies behind the continuing increase in female high-level examination achievements, while at the same time to devise special programs for boys that will entice them back into learning. To date, the most likely reasons seem to be the following: inspections, style of education and assessment, emotional changes and socio-economic influences.

Inspections

In Britain, there is not only formal commitment to gender equality of opportunities at all levels of education, but also statuary procedures designed to ensure that it happens. A highly trained force of national school inspectors checks for gender bias (among other things) in daily classroom teaching, such as making sure the waving hands of girls are responded to as frequently as those of the boys. This directed effort appears to have been effective. Investigations by the government's Equal Opportunities Commission considered that improved school inspection was to a large extent responsible for female examination superiority (Arnot, Gray & Rudduck, 1998).

Style of Education and Assessment

Female advancement first became noticeable in the late 1980s at the time when more coursework was introduced for credit as part of the nationwide examination for the General Certificate of School Education (GCSE), taken at about age 16. Such coursework is often composed of independent projects of the student's own choice which take weeks of dedicated work to produce. Of all students gaining A, B, or C grades on the GCSE, by 1993, girls were scoring higher in mathematics and all science subjects, and some education authorities reported a gap of five grades between males and females in all subject areas (Office for Standards in Education/Equal Opportunities Commission, 1996).

Possibly these results reflect deeper changes in the way different kinds of knowledge are currently valued in education. There has been a move away from teaching facts towards having pupils produce written portfolios, extended prose, and research projects. This sort of learning requires high levels of sustained attentiveness both within and outside the classroom, at which girls are supposedly better, rather than the boy's style of last minute revision. For example, gifted boys have been found willing to sacrifice deeper understanding for correct answers achieved quickly, according to research at London University (Boaler, William, & Brown, 2000). This work has found that many girls, and some boys, are alienated by fast-paced and technique-orientated mathematical teaching, particularly the most gifted girls, who react less positively to pace, pressure and competitiveness, often wanting time to think and discuss their understanding. Consequently, gifted girls may have benefited from changes in teaching towards less didactic and more involving teaching styles.

The mandated literacy and numeracy hours (from age 5 to 14) may have further diminished gender stereotyping, particularly with the obligation of a "benchmark" of minimal standards which all normal children must reach. No longer can girls claim they are no good at math. In May 2001, the United States Congress debated whether to introduce a similar scheme in the USA for all sudents from third grade through to eighth grade (Sheffield, 2002).

Generally, women at the university level have been found to study for longer hours and show a higher "work ethic" than men, but men take greater risk**s**, such as leaving

preparation for examinations to last minute memorizing**,** but nonetheless expect to get better results (Mellanby, Martin, & O'Doherty, 2000). These researchers conclude that men benefit from multiple-choice examinations (more common in the USA) and from their more confident style in written examinations which may be deemed worthier of a higher grade than the more tentative, balanced answers produced by many women (Stobart, Elwood & Quinlan, 1992). But the traditional examination system is on its way out at British universities: there are fewer timed examinations which draw on high-risk last minute strategies and more emphasis on the continuous accumulation of credit from projects and written work.

Emotional Changes

Research on the academic performance of high-achieving students over their school careers by Power, Whitty, Edwards, and Wigfall (1998) found boys somewhat resistant to study. As one boy put it, "You were supposed to make it look easy and never get caught working." Almost all the students interviewed said that boys could do as well as girls if they worked as hard. But it was difficult for the boys because their peer group roles obliged them to be rebellious, and they believed other boys might laugh at them if they behaved like "teacher's pets", which is thought to be unmanly. Sadly, many boys in British schools are now saying that they are less intelligent than the girls.

Surveys have shown that British girls are becoming more confident in their own abilities and that their construction of femininity is no longer at odds with educational achievement (Arnot, Gray, & Rudduck, 1998). In America, though, gifted girls have been found to be more depressed than gifted boys, often underestimating their abilities because of conflicts between success and "femininity" (Luthar, Zigler, & Goldstein, 1992).

High-achieving girls in Britain are feeling some strain because of their successes. As Lucey and Walkerdine (1996) found, girls' teenage career planning can be a cause of stress which also delays rather than resolves potential conflict between family and work. Their study found low SES girls were more likely to aim higher than their mother's traditional, "feminine" occupations, and that these ambitions brought with them some mother-daughter relationship problems, such as the anger bright girls felt towards their mothers for having accepted relatively lowly occupations.

Socio-economic Influences

Although gender is one of the key factors affecting educational performance, it always functions in relation to other social variables such as social class, ethnic origin, and local context (Arnot, Gray, & Rudduck, 1998; Plummer, 2000). Domestic work is still likely to constrain working-class girls' academic achievement (Adkins & Leonard, 1996); the girls most able to make non-traditional choices had the double advantages of the best material provision and the best qualifications. On the whole, it is middle-class girls who are becoming so successful. For both boys and girls, when one looks more carefully at the examination results, it is the lower SES girls who are still not doing quite as well as their male counterparts. This is true in the USA too.

There have also been overriding social changes in Britain. Traditional routes into work have collapsed, and about 70% of new jobs in the 21st century are expected to be in areas traditionally dominated by women (Office for National Statistics, 2000). While many boys retain the old-fashioned notions of the male-headed family with mothers at home caring for the children, girls' attitudes have changed: they are less attracted by a man as a meal-ticket and more attracted to having a career of their own. Girls no longer suffer from the

belief that brains aren't sexy, while too many boys still appear stuck in a “macho” peer culture. Possibly in an effort to reaffirm their masculine identity in the face of academic failure and poor job prospects, boys play at being “cool guys”, taking pride at courting trouble and challenging authority. This means that it isn't “cool” to do well at school, and rough behaviour such as getting drunk and being generally anti-social, which meets with the approval of their male peers, is growing (Adkins & Leonard, 1996).

Higher Education

In 1999/2000 the British student body in post grade-school education was approximately 54% female, compared with 51% in 1995/6, with women less likely to drop out than men (Higher Education Statistics Agency, 2001). But at the university level, gender stereotyping in subject choice is still significant. For example, more men study computer science, the physical sciences, mathematics, engineering and technlology, and more women studying creative art and design, education, and the biological sciences.

Men are also more likely to aim for a higher degree beyond a bachelors degree. In the UK, this can be through a dissertation alone or through a combination of teaching, examination and a shorter dissertation. Twice as many women as men choose to take a teaching qualification. There has been a huge change in medicine and law—fields, which were until very recently dominated in numbers by men, but are now well over 50% women. It remains to be seen whether in time this will be reflected in senior positions in those professions, which are currently filled by only a small minority of women. Similarly in 1970, women made up only 13% of medical students and 8% of practising physicians in the USA, but by 1999, those figures had risen to 50 % and 22 % respectively (Dworkin, 2001). These changes may have far-reaching consequences, such as style of practice and increasing flexibility of working hours.

The Workplace

In spite of British girls’ excellent school and university results, it is men, not women who still hold most of the high status, high power, high reward jobs in Britain, as elsewhere. Men generally outperform women in their later careers. The glass ceiling (that invisible barrier to advancement described by Morrison, White & Van Velso, 1992) remains in place, although there has been some improvement towards equality.

Most pertinently for intellectually gifted British women, some of the worst places for equality in employment are the universities (Equal Opportunities Commission, 2001). In 2000, women lecturers were paid on average about $12,000 less than men doing the same job in the same field; 84% of universities have no equal opportunity plan, and two thirds do not monitor appointments or promotion by gender or race. Women in all forms of post grade school education, who make up 51% of staff, are also on average much less well paid than men, not least because only 25% of senior staff are women. The slow increase in women full university professors has raised the proportion to almost 7%.

Outside the universities, discrimination is also prevalent, with an average gap of 18% between male and female earnings. The UK remains at the bottom of the European Union’s equal pay league table, although there is progress, particularly among women entrepreneurs, and a government review of corporate discrimination is now under way.

Women working in grade-school education also earn less than men, being seriously underrepresented in senior positions (Equal Opportunities Commission, 2001). In all the Local Education Authorities of England and Wales, only 12.6% of Chief Education Officers are women, and this low proportion is general throughout all the policy-making bodies (Office for National Statistics, 2000). In high schools, 54% of classroom teachers are women, though only 26.85% make it to become a principal. In elementary schools, though men make up only 11.7% of classroom teachers, 42.7% of the principals are men. Schools also rely on an army of casual and part-time workers, such as classroom assistants and school meal supervisors, most of whom are women, and such work is low paying.

Yet even in the toughest businesses it is possible to right such imbalance. In 1991, the accounting firm Deloitte & Touche found that their high turnover of women was caused by unpromising career options due to the male-dominated culture (McCracken, 2000). Among other actions, the company held mandatory two-day workshops for its 5000 US managers. The gender gap in turnover has now nearly vanished, and this move is associated with the company's fast growth.

Conclusions

The recent gender reversals in achievement of gifted British school children, the superiority of boys being replaced by that of girls notably in mathematics and the sciences, does not have a simple explanation. The picture is complex and cumulative, and the size and nature of the gender gap varies with different study areas. For example, in physics, in which girls obtained 4% more A-C grades than boys at 16 years old, their advantage at 18 years old fell to 0.4% (Arnot, Gray, & Rudduck with Duveen, 1998).

Comparison of the evidence from Britain and the United States indicates that innate gender differences in gifted children are minimal, and that it is essential to be aware of strong cultural influences on supposedly objective examination and employment achievements. Cultural effects show, for example, in the chasm between the relatively high levels of achievement by British females while in education and their low levels of achievement in the workplace. Ability alone cannot account for the difference.

Some specific actions which have underlined the raised achievements of gifted girls in Britain (adapted from Arnot, Gray, & Rudduck, 1998) are as follows:

- The improvement in girl's scores has been related to schools which have a gender-equity policy and whole-staff support, including maintenance of the practices outlined in the policy. The individual interventions of educational authorities and schools in support for gender changes make a difference to student outcomes.
- Students' progress can be monitored regularly by gender, such as in social behaviour, so that the sources of disaffection can be identified and remedied.
- Changes in teaching practice can counter gender images of subject areas, such as boys' perceptions of literacy as feminine, by introducing more adventure and non-fiction texts into the curriculum. Peer group cultures play a central role in this, sometimes supported by the school.
- Girls' attitudes toward science can be improved by single-sex teaching groups and the presence of role models, such as female science teachers.
- Schools can select syllabi with different coursework for boys and girls. Girls do better on sustained tasks that are open-ended, process-based, related to realistic situations,

and that require students to think for themselves. Boys do better with memorizing abstract, unambiguous facts and rules that have to be aquired quickly.

- Changing assessment methods can affect measured success, including the weighting and type of coursework. Boys, for example, are more likely to perform better on multiple-choice questions and girls on open-ended questions. To be fair to both boys and girls, a variety of assessment modes could be used to allow all children to produce their best performance. Teacher bias in expectations, teaching style and grading can affect student outcomes as well.
- Mentoring, whether individually or in groups, has been successfully used to initiate change, though the effects have been found to wane in a year or two. Students find it helpful.
- No amount of information will produce change in itself. Improving female achievement appears to occur by working with the contradictions of femininity and intellect and by taking feelings, such as fears e.g. of “male” subjects and their perceived difficulty, into account.
- Most, though not all, research on women’s success has focussed on individual circumstances (see, e.g., Noble, Subotnik, & Arnold, 1999; Yewchuk, Seija, & Schlosser, 2001). But this grand British “experiment” to equalize opportunity at school for all girls in education has demonstrated that with administrative planning, an educational structure for teachers to work with, and the will to see it through, it is possible to make a highly significant difference overall in gifted girls’ achievements at school, if not yet in working life. These national differences point to the need for greater understanding of how gender works in the cultural context, including ethnicity and socio-economic status, and the essential need for cross-cultural studies.

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