The argument in brief:

- Girls, for a variety of reasons, learn differently
- Girls face pressures to conform to gender stereotypes – pressures which are stronger in the presence of boys
- Girls need and deserve space in which to develop their full potential, and to make informed and unconstrained choices about interests, subjects and careers
- ‘Simply’ separating girls from boys is limited in its effect
- In girls-only schools their needs, styles and preferences can be fully accommodated within a dedicated learning environment
- Successful girls’ schools are those in which a dedication to girls’ education is reflected in their physical structure, curriculum and co-curriculum offer, teaching and learning approaches, and indeed in their whole-school culture
- GDST schools serve to subvert, rather than support, gender stereotypes and a priori assumptions, by offering an education designed for and dedicated to the development and empowerment of successful, confident and adventurous girls.

Executive summary

Excellent schools encourage and assist individual pupils to realise their potential, and are designed to equip them for success and fulfilment in the world beyond.

This is not easy to achieve, because every school accommodates a diversity of pupils with particular needs, styles and preferences. Excellent schools design their structures, curricula, activities and pedagogy in response to that diversity of needs; and one of the ways in which they do this is by organising pupils into sensible groupings. The most obvious way of sorting pupils out is by age; another is by ability – or streaming. Less obviously, there is the dimension of curriculum structure and subject choice, within schools or between types of school. But an equally fundamental dimension, a way of sorting pupils into purposeful learning groups, is by gender.
The purpose of each of these methods of organising pupils is to provide the best possible environment for focused and targeted teaching and learning, on the grounds that pupils within the defined group share a number of characteristics with regard to learning styles, interests, needs and preferences. By organising pupils according to learning styles and preferences, differentiation in the classroom can then focus much more sharply and effectively on individuals as individuals.

In what sense is it useful to treat girls as a group, and as a basis for differentiation in education? Girls differ from boys not on any substantial intellectual or cognitive dimension, but in a number of attributes and dispositions that, crucially, have their greatest impact in childhood and adolescence, and which mean that girls’ learning needs, styles and preferences are different from those of boys.

Girls also experience the external environment differently from boys. In particular, even today gender stereotyping and gender differences in expectations and, often, self-definition, tend to affect girls’ behaviour, attitudes and choices, unless they are checked and challenged at school.

Girls should have the opportunity to be educated separately, not because they need protection as such, but because they deserve a level playing field.

This is not to suggest that all girls are different to all boys, or that all girls are the same. Far from it; but typical attributes, behaviours and needs differ, and typically girls behave differently in the presence of boys. Accommodating this in single-sex settings allows teachers and schools to focus even more effectively on the needs of individual girls.

There is evidence that girls achieve more when they are given their own dedicated space in which to develop. In single-sex schools, girls:

- are less likely to conform to a priori gender stereotypes
- are less constrained in their choice of subjects
- show a greater propensity to take risks and innovate
- perform better in examinations
- have more opportunities to show leadership
- tend to be more successful in the job market.

These effects do not follow inevitably from the separation of the sexes in education. Single-sex education, to be successful, must be more than an organisational device – it needs to be underpinned by a set of principles, and articulated in a set of practices, whereby girls can be nurtured, challenged and empowered.

GDST schools are able to offer an ideal learning environment dedicated to girls’ learning needs, styles and preferences, and free of gender-stereotyping, distraction and harassment.
It is difficult to see how everyone’s needs may be properly and fairly addressed in coeducational contexts, given that, typically:

- Girls prefer cooperative, discussion-led learning environments
- Girls adapt better to coursework tasks and collaborative, project-based activities
- Girls respond to different forms of curriculum content
- Girls have a greater propensity to disengage from co-ed sports activities.

In coeducational classrooms, boys tend to monopolise discussion, and take more domineering roles in group work and in practical exercises. There is pressure on girls to conform to prejudicial gender roles. Teachers tend to adopt styles and use content that seek to maximise boys' engagement and regulate their behaviour. (Girls are assumed to be less problematic, and their motivation and attitudes to work do tend, typically, to be less dependent on external factors.) However, in girls-only environments, girls’ needs and preferences come to the fore.

Girls appear to favour science content that puts concepts into context, engaging in case studies with some relevance, rather than dealing with purely abstract ideas. Girls appear to respond better to tasks that involve coursework, leading the Chief Executive of one exam board to suggest gender-specific forms of assessment at GCSE.

Teachers in all-girl classrooms can focus on working with, but also challenging, girls’ tendency to seek security in structures and schedules. Teachers find that younger girls are particularly keen on explicit agendas (e.g. in terms of learning objectives, and for young pupils a clear schedule for the day), and gain confidence from the rehearsal of past understanding at the start of lessons, and explicit links to next steps at the end. But girls-only classrooms also provide the opportunity to push at these boundaries, to challenge risk-aversion, and to encourage adventurousness, within an affirming environment.

In mixed-sex settings, girls often adopt roles that reflect others’ views of them, and which tend to narrow their choices, both academic and non-academic. Girls at GDST schools are empowered to reject gender stereotyping, for example in sports, subject and (later) career choices. Girls in single-sex settings show a much greater propensity to choose what are otherwise seen as ‘masculine’ subjects – like maths, physics and (later) engineering.

In coeducational contexts, girls are more likely to participate, but less likely to assume, leadership roles in extra-curricular groups and activities. In GDST schools, girls show less reticence in adopting leadership roles, and respond well to the opportunity to explore a wider range of possible ‘niches’ within the school community.

GDST schools are designed to maximise opportunities for girls to realise their potential. They do this through:

- the design of the schools themselves, including not just the classrooms but also the other areas, including social spaces and informal learning areas
- the timetable (length of lessons and structure of the school day)
• curriculum content and classroom interaction
• subject choice and co-curricular opportunities
• girls-only sports and fitness activities
• a whole-school culture conducive to girls’ education.

Single-sex education actually serves a subversive purpose: GDST schools seek to challenge traditional gender stereotypes, give girls space to develop a strong sense of themselves and their value, and nurture the confidence to make their own choices, free of any sense that the script has been written for them. As day schools, they offer a girls-only space to complement the rest of a girl’s life-world – which by all accounts does not exclude boys.

GDST all-through day schools provide a learning environment specifically designed and dedicated to the development of confident, courageous, composed and committed girls.

The key ingredients of the learning environment in GDST schools might be summarised thus:

1. A commitment to excellence as schools: the non-negotiable starting point

2. Design of purpose-built learning spaces with girls in mind

3. Every curriculum and co-curriculum opportunity available to girls as a matter of course

4. Teaching and learning focusing on girls’ learning styles, needs and preferences

5. A whole-school culture which respects, nurtures, challenges and empowers girls.

GDST girls are secure in their knowledge, and unwilling to take things for granted. Motivated by a spirit of enquiry, they seek to explore and evaluate ideas and arguments in a generous, critical and constructive way. They are able to reflect on, communicate and defend their own views, and are respectful of the views of others. They are equipped to grapple with big ideas and make connections.

GDST girls welcome new challenges, and meet them with resourcefulness and resilience. They are enterprising and adventurous, willing to take the initiative, and not afraid to aim at tough targets. They can apply their knowledge and skills in unfamiliar contexts, are creative and can adapt to situations requiring new ways of thinking. They have experience of and aptitude for leadership.

GDST girls are intrinsically motivated, are self-directing, and take responsibility for their own learning. They value fairness and act with integrity, are aware of themselves and their impact, and are aware of and respectful towards others. They are sensitive to and appreciative of culture, context and community. They are collaborative and supportive in team situations.

GDST girls are collaborative, and put value on connectivity – in creating and sharing knowledge. They are receptive to new ideas and are keen to learn new things and new skills. They seek to participate critically, considerately and constructively in their community, society and environment. They tend to be engaged in life-enriching interests and activities, and are determined to see things through.

Confident
Courageous

Composed
Committing
**Introduction: education, excellence and empowerment**

For many parents choosing schools, single-sex education is not at the top of the agenda, and in the case of those thinking about where to send their daughters in the junior phase, and of pupils and parents thinking about whether to stay on into the sixth form, sex-segregation might be not be perceived as an advantage at all. At every stage, the key criteria are academic excellence, pastoral care, co-curricular opportunities and prospects for progression. But dedication to the development of girls is key to the success of GDST schools in delivering absolute excellence across all of these criteria.

*This paper presents the evidence that the single-sex character of GDST schools serves to reinforce their strength in offering an outstanding education for their pupils.*

For many parents, the choice is not simply between single-sex and mixed schools: many coeducational schools offer single-sex classes at particular stages (in a so-called ‘diamond’ pattern) and/or in particular subjects (usually science, technology and mathematics). In fact, there is evidence that the effectiveness of single-sex education is considerably diminished when it is introduced within an otherwise coeducational context. Indeed, even wholly girls-only schools do not in themselves guarantee effectiveness.

*This paper identifies the corollaries of single-sex schooling – necessary co-conditions that together make GDST schools work and which give them their distinctive character, even among girls-only schools.*

The argument developed here is that:

- Girls, for a variety of reasons, learn differently
- Girls face pressures to conform to gender stereotypes – pressures which are stronger in the presence of boys
- Girls need and deserve space in which to develop their full potential, and to make informed but unconstrained choices about interests, subjects and careers
- In girls-only schools their needs, styles and preferences can be fully accommodated, within a dedicated learning environment
- Successful girls’ schools are those in which a dedication to girls’ education is reflected in their physical structure, curriculum and co-curriculum offer, teaching and learning approaches, and indeed in their whole-school culture
- GDST schools serve to subvert gender stereotypes and *a priori* assumptions, by offering an education designed for and dedicated to the development and empowerment of successful, confident and adventurous girls.

Half a century ago, arguments for all-girls schools rested on the need to address girls’ academic under-performance compared to that of boys. This is no longer an issue. The contemporary argument for girls-only education is grounded in the desire to offer every opportunity to girls by fashioning an environment and a culture that encourage development and realisation of their potential as individuals, by tailoring education to girls’ learning styles, needs and preferences; and by offering activities and academic opportunities free of constraints imposed by gender-stereotyping. For GDST schools, excellence in education means all of these things.
All schools seek to identify and develop the potential of individuals, and this, perhaps counter-intuitively, usually involves a series of steps in grouping pupils according to a number of criteria – among which are age, ability and interest (e.g. subject choice). Gender is another dimension along which grouping occurs. Logically, in sorting pupils into groups in this way, teachers can concentrate on much more sharply focused differentiation in the classroom, tailoring teaching to the needs of individuals as individuals.

The emphases on excellence in education and on the empowerment of girls come together in GDST schools to ensure outstanding academic results; but it goes much further, in nurturing each pupil’s potential and in developing her as an individual.

Successful single-sex schooling is that which prioritises girls’ education in an environment that strives for excellence, and which puts equal value on academic achievement, co-curricular engagement, and the formation of character.

**Key Caveats**

The discussion that follows is framed by three important caveats that should be entered before embarking on any discussion of gender issues in education.

The first is that it would be pointless to base any discussion of single-sex schooling on assumptions of gender differences in the brain’s structure and function, or in cognition. Such arguments are too easily caricatured or simply refuted, and in any case they collide with the generally-accepted fact that differences among girls are as important as those between boys and girls (Campbell and Sanders, 2002; Hyde, 2005).

Arguments for the separation of the sexes in education can and should be based on other factors that affect empirically-verifiable differences in perceptions, behaviour, needs and preferences in childhood and in adolescence.

The second caveat follows from the first: the argument can be made for sex-specific schooling independently of any position on whether the differences that give rise to the argument are due to biological or to socio-cultural conditioning. But the ramifications are not irrelevant: there is some debate over whether separation of the sexes in schooling serves to reinforce, or to challenge, prevailing gender stereotypes.

This review will argue that single-sex schools can be effective in subverting traditional gender stereotypes – but that, as in GDST schools, this subversive and challenging agenda needs to be a clearly articulated part of the plan.

The third caveat is that, although single-sex schools tend to dominate exam league tables, it is notoriously difficult to come to any definite conclusions regarding the impact of single-sex schooling on academic achievement. This is simply because of the sheer number of interconnected factors, such as academic ability, prior achievement, family circumstances, socio-economic status, and school type and history, all of which have an influence on individual and aggregate educational outcomes (Smith, 1984).

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1 It is probably wise to avoid straying onto such contested – almost sectarian – ground. Discussions among natural and social scientists on brain differences and their significance for gender identity are fraught with difficulties in the interpretation of evidence, but also in the interpretation of each others’ ideologies, as a recent review (Rose and Rose, 2011) of a major new study (Jordan-Young, 2010) inadvertently demonstrates.
Taking examination results alone, and treating all girls’ schools as a single category, leads only to unnecessary obfuscation. In the UK most single-sex schools are selective or independent or both, and this inevitably skews the academic results. But that does not mean that single-sex environments don’t have an independent effect – it just means that not all of them do. But then, not all single-sex schools self-consciously seek to design and deliver a distinctive girls-only experience (in and out of the classroom); and certainly not all succeed.

In any case, the criteria for success in education go well beyond immediate test scores. Successful girls’ schools address girls’ whole education, and are built on distinctive values and principles, curriculum and pedagogy (in other words, the overall school environment, cultural and physical).

This review seeks to explore the wider platform on which girls-only education is based, and seeks to identify the whole range of impacts by which single-sex schooling might be evaluated.

Girls-only education: significant outcomes

The positive impact of single-sex education can be explored with reference to several sets of outcomes, some of which can be measured:

1. **Academic achievement: girls perform better in single-sex schools**

   The outstanding examination performance of girls in single-sex schools is reflected in the disproportionate share of top league table positions taken up by girls’ schools – many of which belong to the GDST. These schools are dedicated to excellence in education, but they are also dedicated to girls.

   It is often argued that where girls-only schools perform more strongly (e.g. in examination league tables) this can be explained by controlling for pupils’ ability, social class and income (Elwood and Gipps, 1999; Leonard, 2006). Many studies across several countries have concluded that there is no clear superiority of either coeducational or single-sex schooling for girls once other factors are controlled for (see for example, Yates, 1993; Hattie, 2009). Of course girls’ schools that are selective will tend to do well because they have able students, irrespective of gender. But in a sense, that is precisely the point: students do better where schools can adopt a more tailored approach to individual students, and where one size doesn’t have to fit all.

   Research in the USA suggests that single-sex schooling has led to higher achievement for girls, and for low-income and ethnic minority boys (Datnow and Hubbard, 2002), although Riordan (2002) argues that, while single-sex schools are demonstrably effective in providing greater equality and greater achievement, there is little evidence that school type affects the academic achievement or development in middle-class pupils.

   However, a study of value added between 2002 Key Stage 3 and 2004 GCSE results in England suggests that pupils in a selective environment do in fact record greater progress in single-sex schools (Malacova, 2007). In something close to a study that controls for factors such as prior ability and background, using a cohort in Seoul that was randomly assigned to high schools (co-ed and single-sex), Park, Behrman and Choi (2012) found that the positive effects of single-sex schools were substantial, even after taking into account variables such as teacher quality, the student-teacher ratio, the proportion of students receiving lunch support, and whether the schools were public or private. They found that pupils from single-
sex schools scored higher on Korean and English tests and were more likely to progress to four-year colleges.

Leonard (2006), in a wide-ranging review, observes that studies tend to demonstrate that single-sex education has a positive overall effect on girls’ attainment in examinations (see also Sullivan, Joshi and Leonard, 2010). The difference is usually small, but ‘... some studies in the UK show clear advantages for girls in maths in single-sex schools and to some extent in science’. (See also Warrington and Younger, 2003). A recent study of physics also suggested that single-sex instruction was associated with more positive outcomes (Jurik et al, 2013).

So even on the narrow ground of attainment in tests, there is a lot of debate but some evidence of a positive independent effect of single-sex schooling. The problem with most studies in this area is that they use a relatively narrow definition of achievement, whereas the impact of education goes far beyond immediate point scores or grades. Some of these sorts of study also seek to disprove something that no-one would want to claim anyway: that positive academic effects follow simply by separating boys from girls.

2. Subject choice: participation in maths, science and technology is greater among girls in single-sex schools

Women are significantly under-represented in mathematics, science and technology (European Commission, 2009; Murphy and Whitelegg, 2006). A 2012 study showed that nearly half of all co-ed maintained schools in England did not have a single girl going on to study physics A level (Institute of Physics, 2012). This is a long-standing pattern in both academic and career spheres, and is arguably rooted in gender-influenced subject choices at school (Elwood, 1999; Riegle-Crumb et al, 2012).

Underlying this phenomenon is the paradox that although girls’ achievement in school science is good, relatively few take these subjects beyond the compulsory phase, and this is especially true of mathematics, physics, engineering and computer science (Calabrese, Barton and Brickhouse, 2006; Boaler and Sengupta-Irving, 2006). Girls thus seem to be opting out of some subjects despite strong secondary school performances in them.

This should come as no particular surprise, however, given gendered perceptions of particular subjects. Mathematics, for example, is widely perceived as a symbolically male domain (Brandell and Staberg, 2008), and it appears that among upper secondary school students, attitudes towards ICT differ markedly by gender (Logan, 2007). It is interesting that other studies have suggested that the impact of ICT on learning is stronger for boys than for girls (Hattie, 2009). This tendency towards gender-stereotyping by subject appears to be stronger in co-educational settings (Smyth, 2010).

Girls’ views of particular subjects might in part be influenced by prevailing stereotypes, and the perceptions of others, but they are also reflected in and reinforced by girls’ own experiences within those subjects in coeducational contexts. A Dutch study looked at cooperative problem-solving among fifteen year olds in physics lessons, and at the influence of the partner’s gender in students’ learning outcomes, and concluded that females do better in all-female groups than in mixed-gender groups, when learning to solve physics problems (Harskamp, Ding and Suhre, 2008).
By contrast, more positive experiences appear to be behind girls’ greater take-up of and achievement in STEM subjects in single-sex schools (Sullivan, 2006; Leonard, 2006; Sullivan, Joshi and Leonard, 2010).

Evidence from GDST schools tends to reinforce the finding that single-sex settings encourage greater diversity of subject choice. Of those studying for A level in 2010, more than 40% took at least one science, and almost 40% took mathematics. 8.6% of all GDST A level entries were in chemistry, compared with 4.8% for girls nationally; and 12.5% were in mathematics, compared with 6.8% for girls nationally.

These figures do not appear *sui generis*: they arise because there is nothing intrinsically odd about girls doing ‘hard’ science subjects. These sixth-formers were among the majority (63%) of GDST girls who opted to study the three separate science subjects at GCSE.

The horizons that are widened at school continue to be explored at university. Again, science and technological subjects are most definitely not off limits to GDST pupils, 8.6% of whom went on in 2010 to read medicine (compared to 1.9% of female admissions nationally); 5.7% to read the physical sciences – including physics and chemistry (roughly double the national girls’ figure, 2.7%, which is in rapid decline); and 2.7% to read engineering (again more than double the national figure, 1.2%).

Up to a point of course, the figures reflect the fact that GDST girls tend to be selected from among the more academically-orientated and high-achieving of the national cohort, and a higher proportion of these might be expected to follow routes into science. But the fact is that these curriculum choices are made in a context in which girls are given every opportunity, without prejudice, to explore and fulfil their potential – there are no such things as girls’ or boys’ subjects in GDST schools.

3. Career progression: *girls from single-sex schools do better in the job market*

Girls achieve better educationally than boys at the age of sixteen, and a higher proportion of girls continue in education to degree level; yet this early success does not translate into career or salary advantages later in life (Ofsted, 2011b; Institute of Leadership and Management, 2011). Ofsted puts this down to the failure of many schools to challenge gender stereotypes in choices of courses and careers. They found that the most positive attitudes were to be found in all-girls schools – although girls in these schools did not always act to realise their wider aspirations.

A longitudinal study undertaken by the Institute of Education in London found that girls who attended all-girls’ schools went on to earn higher wages than girls from mixed schools, even allowing for socio-economic origins and abilities as measured in childhood (Sullivan, 2006; Sullivan, Joshi and Leonard, 2011)².

Girls in single-sex schools are thus making less constrained choices based on genuine interest and ability, rather than on *a priori* gender stereotypes. Leonard (2006) argued that, ‘Girls from mixed schools make more traditional career choices ... so in this respect ... coeducation appears to increase differentiation between the sexes’.

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² The longitudinal study tracked the British Birth Cohort 1958 through to age 42, and found a positive premium (5%) on the wages of women (but not men), of having attended a single-sex school. This was accounted for by the relatively good performance of girls-only school students in post-16 qualifications.
This refusal to conform to stereotypes goes beyond the classroom and the narrowly academic sphere. And it goes beyond merely participating in a wider range of activities. Leadership and character development opportunities for girls are more readily available in single-sex settings (Datnow and Hubbard, 2002).

4. Relationships

The longitudinal study of the 1958 birth cohort studied by Sullivan, Leonard and Joshi (2012) found a marginally significant positive association, in the case of women, between single-sex schooling and reported relationship quality. At the very least this suggests that it is not necessary to experience mixed schooling in order to prepare for a fully functional (and happy) life in later years.

Factors underpinning girls-only education

The evidence on academic outcomes, subject choice and career progression suggests that girls benefit from being educated separately. Girls themselves seem to understand and appreciate the advantages of single-sex environments (Elwood and Gipps, 1999). According to one review, in mixed-sex schools girls tend to favour single-sex classes, while boys evidently prefer mixed-sex classes (Leonard, 2006).

Girls and boys seem to differ in ways that make it desirable to design separate educational provision for them.

• Are girls’ brains different?

Gurian (2011) and Sax (2006) have made a lot of relatively small neurological and cognitive differences between genders. Sax reviewed the evidence for sex differences in sensation and perception, arguing the need for different teaching styles for boys and girls. He suggests, for example, that the ideal ambient classroom temperature is lower for boys than for girls.

Christine Skelton (in Francis and Skelton, 2005) accepts that there is some evidence of important differences in the way that cognitive abilities are organised in the brain, but stresses that gender differences are nevertheless largely socially constructed.

This constitutes contested ground. Fine (2011) pours scorn on the idea that boys and girls have differently wired brains, and warns that differences between the sexes (and she doesn’t deny their substance or their significance) should not be put down to neurological or cognitive differences.

Others counsel caution in ‘cherry-picking’ data to claim that girls and boys have differently-wired brains: ‘There are many sound reasons to advocate single-sex schooling, but sex differences in children’s brains or hormones are not among them … the argument that boys and girls need different educational experiences because “their brains are different “ is patently absurd. The same goes for arguments based on cognitive abilities, which differ far more within groups of boys or girls than between the average boy and girl’ (Eliot, 2009).

There is a lot of support for the ‘gender similarities hypothesis’, which proposes that males and females are similar on most, but not all, psychological variables – that they are more
alike than they are different (Hyde, 2005). Hattie (2009) argues that this is reflected in educational studies. However, the research that he reviews does show gender differences in, for example, academic achievement in some subjects, motivational orientation, perceptions of particular subjects, self-concept, and the age at which certain developmental milestones are reached. The debate seems to be more about the size and significance of these differences. It also seems clear from his review that the differences are greatest at secondary school age.

Kane and Mertz (2012), in reviewing gender differences in performance in TIMSS and PISA tests, conclude that greater male variability and the gender gap in maths outcomes are largely the product of a complex variety of socio-cultural factors rather than intrinsic differences between genders.

Baron-Cohen (2004) argues against reverting to the view that all human behaviour is culturally determined. He does not dispute that culture is important in explaining sex differences, but he argues that it can't be the whole story, and asserts the need to recognise the interaction of social and biological factors. Although sex differences don't apply to all individuals of one sex, it is the case that in some traits (e.g. empathy) women do tend to be found towards one end of the spectrum, while men tend to gravitate towards the other.

Steven Pinker summarises the overall situation thus: ‘Many psychological traits relevant to the public sphere, such as general intelligence, are the same on average for men and women, and virtually all psychological traits may be found in varying degrees among the members of each sex. No sex difference yet discovered applies to every last man compared with every last woman, so generalisations about a sex will always be untrue of many individuals.’ However, he argues, ‘to ignore gender would be to ignore a major part of the human condition’, and asserts that the minds of men and women are not identical, giving rise to some ‘reliable differences’ (Pinker, 2002).

In terms of academic ability as defined by test scores, there does seem to be a basic gender effect. There is plentiful evidence that, in general and across a range of tests at the secondary stage, boys are relatively more represented at either extreme of the ability range. This is particularly marked in mathematics.

Gilligan (1982, 1988, 1990) puts forward the idea of gender differences in self-definition and ethical evaluation. She argues that females tend to define themselves through their relationships with others, while males follow ‘traditional masculine’ lines of self-definition – according to their occupational selves (see also Grosskurth, 1991). On the basis of a study of girls at a selective single-sex school in New York state, Gilligan asserts that women speak in a different voice, but that that voice is often muted by gendered stereotypes in the dominant culture.

Psychologists at Warwick University have found marked gender differences in the way that people go about conceptual classifying or categorizing. They found that men tend to leap to black-or-white conclusions, whereas women tend to see shades of grey, or indeterminate categories.³

These approaches tend to reassert the biological basis of some cognitive and affective gender differences, albeit mediated by social and cultural conditions. Claims for the efficacy of single-sex education do not stand or fall on this ground, but there is one cognitive area which is of direct relevance...

- **Girls and boys have different maturation rates**

  This might be one major cause of evident motivational and interpersonal differences between the sexes at primary and secondary level, and the resulting need for protected time in the formative years, as advocated even by those otherwise sceptical of the more outré claims of single-sex schooling (cf. Eliot, 2009).

  PISA results for 15 year olds in reading highlight significant gender gaps across OECD countries (Marks, 2008). Burgess, *et al* (n.d.) examined gender differences in performance at age 16, both in terms of GCSE results and in terms of the value added between the ages of 14 and 16. The consistency of the difference – marked in English, less so in maths and science – regardless of context, in their view reflected the different cognitive demands and processes required by the subjects; and the authors suggest that the gender gap is rooted in the different pace of cognitive maturation between boys and girls.

  Lenroot *et al* (2007) point out that nearly all of the disorders encountered in developmental neuropsychiatry have different ages of onset, prevalence, and symptomatology between boys and girls.

  In curriculum development, there is a chronic tension between age and stage when specifying appropriate content and attainment targets. There is evidence that ‘stage’ may need to be defined at least partly in gender-specific terms.

  The relationship between gender differences and single-sex education is not a straightforward one, and arguments for the latter do not rest on success in proving the former. Indeed, if we accept that there are few, if any, psychological and related gender differences, then we are left having to explain the very obvious gender disparities in, for example, the take-up of particular subjects at school and later career patterns. If there really is no difference between boys and girls in the propensity for engineering or enterprise (say), then the evidence would suggest that social and other factors are influencing girls’ choices. The argument for single-sex education would then rest very firmly on the need to avoid prejudging girls’ interests and trajectories, ensuring a level playing field.

- **Gender stereotyping appears to be culturally universal**

  Across cultures, gender-stereotyping appears to be near-universal, in its occurrence but also in its direction (Sternberg, 1999).

  Boys are typically described or perceived as adventurous, enterprising, individualistic, inventive and progressive. Girls on the other hand tend to be described as cautious, dependent, fault-finding, shy and submissive. This is important because socialisation tends to reinforce and reproduce perceptions, and there is a danger that, in mixed gender contexts, girls will be rewarded for particular styles (categorised by Sternberg as judicial, external and conservative). This tendency for behaviour and practice to reflect and in turn to
reproduce structural asymmetries, has more than a passing similarity to the theory of structuration put forward by the sociologist Anthony Giddens ⁴.

The tendency of young people to police (often quite ruthlessly) assumed gender differences is very marked (Skelton and Francis, 2005), as some examples provided by Nicole Allen in *The Atlantic* magazine make clear: in 2006 students in two NYU classes read case studies about a tech entrepreneur who in some versions was named Heidi and in others, Howard. The students rated Heidi and Howard as equally competent, but liked Heidi less and didn’t want to work with her.⁵

Studies have shown that children start constructing gendered identities very early, with gendered play being observable in pre-school and Early Years settings. Given the choice, pupils usually sit in same-gender groups and, typically, friendship groups are composed of pupils of the same gender (Francis and Skelton, 2005).

Asymmetries abound in mixed-sex settings, even when teachers are not consciously seeking to reinforce them. Reference has already been made to the gender bias in career aspirations, and in subject choices, evident in co-educational contexts. Studies referred to by Murphy and Whitelegg (2006) suggest that teachers’ *a priori* judgements about pupil ability are influenced by gender. Francis and Skelton (2005, p.113) observe that ‘behaviour that teachers see as acceptable in one gender is sometimes problematised in the other.’

Datnow and Hubbard (2002) argue that gender bias is deeply embedded within wider systems of oppression, and that reform efforts in education therefore need to go beyond eliminating sex bias in language and curricula: educators should therefore strive to implement alternative pedagogies that challenge the unequal power relations inherent in traditional education and society.

A girls-only environment might encourage more positive self-concepts, and a consequently higher uptake of science subjects, for example, as well as a more general willingness to take on and subvert gender stereotypes. Eliot (2009) asserts that, ‘the strongest argument for single-sex education is that it can counteract the gender stereotyping that boys and girls impose on each other, especially during adolescence, when everyone’s sorting out his or her sexual identity.’

Eliot is generally sceptical of the claims made for single-sex education, but she argues that the greatest asset of successful single-sex schools is the gender composition of their staff: ‘At all-girls’ schools, one finds strong, dedicated women serving as role models in maths and science.’ Campbell and Sanders (2002) argue that at college level, benefits follow from having a greater proportion of teachers who are female, and a positive learning environment which validates women’s scholarship and women’s issues: ‘The content, practice and organisation of an educational setting matter greatly when student achievement is being assessed’.

It appears, then, that co-educational contexts tend to entrench culturally-universal gender stereotypes (Francis, Skelton and Read, 2012; Fuller, 2011). The crucial question is whether such stereotyping is likely to be underwritten or undermined by single-sex schools. It is worth rehearsing Leonard’s (2006) observation that, ‘Girls from mixed schools make more

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traditional career choices ... so in this respect ... co-education appears to increase differentiation between the sexes.

- **Girls and boys have different needs, preferences and styles**

Differences between girls and boys are evident in the classroom on a day to day, lesson by lesson basis. There is general agreement on this, but much less on explaining the causes of these differences (Francis and Skelton, 2005).

(1) **Assessment**

A gender-specific response to forms of assessment is reflected in a variety of studies and at a variety of stages. One reason for the lower proportion of Firsts awarded to females at the University of Cambridge appears to be the tendency for the examination system there to reward particular (adversarial, assertive, generalising) styles adopted in answering questions (Leman, 1999). There is evidence that boys and girls prefer different learning styles and adopt different learning strategies, which influence their subject choice and attainment at A Level. Elwood (1999) points to research on differential performance at GCSE and A Level, which has identified a connection between the ways in which assessments are structured, and gendered preferences for ways of working, knowing and communicating.

Machin and McNally (2005) identified differences in learning styles as explanatory factors in the emergence of gender gaps in pupil achievement, particularly at secondary school. They argue that boys’ relative under-achievement is due to the impact of changes in the examination system. In particular, the introduction of criterion-referencing, an end to the rationing of top grades, and the establishment of coursework, all appear to favour girls’ learning styles (see also Northern Ireland Assembly, 2001).

It has been observed that girls are more likely to perform well on sustained tasks that are open-ended, process-based, and related to realistic situations, and that require pupils to think for themselves (Arnot et al, 1998). Gender differences in assessment structures were, ostensibly, behind the AQA Chief Executive’s suggestion that GCSEs might in future be offered in two forms – with coursework orientated options more suited to girls.

However, the widespread view that girls prefer sequential assessment methods that reward consistent application rather than ‘sudden death’ exams relying on last-minute revision, has been challenged (Francis and Skelton, 2005). Girls appear to outperform boys in both coursework and terminal examinations. Research evidence suggests that boys are in fact more likely to take advantage of changes towards a modular assessment structure, (Vidal Rodeiro and Nadas, 2010; McClune, 2001).

The structure of assessment is one thing; content of exam questions is another. Some concern has been expressed about the degree of gender-bias in Key Stage 2 SAT tests, in particular in the use of texts in the literacy strand that appear to have been chosen with the interests of boys in mind.
(2) Curriculum content

A recent survey suggests that ‘A large part of women’s progress in the educational and occupational sectors is in domains that do not violate gender roles; and even when they do enter male-typical domains, women are more likely to choose those subjects within them that seem consistent with their tacitly gendered notions of their interests and their “true selves”’ (Riegle-Crumb, 2012, page 1067; see also England, 2010).

Science subjects are typically perceived as ‘masculine’, and in policing behavioural norms peers tend to project particular characteristics onto girls who choose such subjects (Archer, 2013; Jurik et al, 2013; see also Paechter, 2000).

Girls appear to respond more positively to physics when the curriculum is context-based or humanistic, and anchored in relevant problems or case studies; whereas boys tend to prioritise the more abstract aspects of the subject (Murphy and Whitelegg, 2006; see also Kerger, Martin and Brunner, 2011).

A recent Ofsted (2011a) report on the teaching of design and technology pointed to the need to challenge gender stereotyping in pupils’ choices of subject and what they choose to design. At Key Stage 4, choices of design and technology options (e.g. electronics versus food technology and catering) were found to be markedly different for male and female students. The problem is that in teaching whole classes, very often choices have to be made, and typically it will be boy-friendly content that is chosen, for reasons discussed below.

The perception of particular subjects as ‘masculine’ or ‘feminine’ might be related to the nature of their demands on learning (Francis and Skelton, 2005). Mathematics and science might appeal to boys because of the stress on memorisation of abstract facts and rules, and the need for responses that privilege episodic, factual commentative detail. By contrast, English, languages and the humanities might be more appealing to girls because of their focus on open-ended tasks related to realistic situations, and their dependence on an elaborative, broader context in responses.

(3) Learning styles

Francis and Skelton (2005, p. 83) assert that ‘... there is a recognition of gendered tendencies in pupils’ preferred ways of learning’.

Warrington and Younger, in a series of papers, looked at the effect of single-sex classes within co-educational comprehensive school environments (Warrington and Younger, 2001; 2003; Younger and Warrington, 2002). They found that girls and boys benefit from having their own learning spaces, and that single-sex modes of teaching are effective in contributing to higher achievement levels, but only where the teaching reflects the gender differences in learning styles.

A review of research into reading comprehension attainment identified gender differences in reading strategies and learning styles, concluding that the ‘ideal learning environment’ will be different for boys and girls (Logan and Johnston, 2010).

These differences in learning styles appear to be rooted in gender differences in what have been called ‘ways of knowing’. In the mathematical sciences, for instance, boys more strongly identify with ‘separate knowing’ (logic, rigour, abstraction, deduction), while girls tend to identify with ‘connected knowing’ (intuition, creativity,
hypothesising, induction) (for mathematics, see Bevan, 2004). These differences are closely connected with particular learning styles: girls often prefer cooperative and discussion-based learning environments, rather than individualised or competitive environments (Boaler and Sengupta-Irving, 2006; Northern Ireland Assembly, 2001; see also Phoenix, 2004). In terms of learning objectives, it has been observed that boys typically appreciate ‘big picture’ introductions, whereas girls often prefer more disaggregated, stepwise instructions (Bevan, 2004).

As Elwood (1999) observes, the existence of gendered styles and preferences itself says nothing about whether they are ‘hard-wired’, or themselves a response to gendered socialization. The fact is, though, that without doubt these differences affect and influence what and how girls learn.

(4) Participation in sports and fitness activities

Recent concern has been expressed about the tendency for girls to disengage from sport as a consequence of negative experiences at school: ‘Social norms related to being female and feminine are still affecting girls’ attitudes and behaviour. Notably, being “sporty” is still widely seen as a masculine trait’ (Women’s Sport and Fitness Foundation, 2012). Girls, it is claimed, are put off by too much focus on traditional competitive sport, and by the tendency to reserve attention for the very sporty elite. The WSFF report recommends, inter alia, a greater choice of activities and the opportunity to take part in girls-only groups.

(5) Pedagogical practice

There is general agreement on the existence of gendered learning preferences, with girls typically preferring collaborative group-work, reflection and discussion, and teaching in small groups; while boys typically prefer competitive situations and whole-class teaching (Francis and Skelton, 2005).

Teachers in mixed-sex classes generally agree that boys are more likely to dominate verbal interaction: ‘In the classroom, boys quite simply take up more space than girls’ (Francis and Skelton, 2005, p. 115; see also Francis, 2004). Even in primary school boys tend to adopt a more active, dynamic, assertive role, while girls are observed to adopt facilitating roles, like sorting out arguments or helping with homework. The challenge for teachers is to resist reinforcing this tendency by expecting and rewarding the behaviour of ‘good, sensible girls’ – behaviour which leads to girls deferring to boys in the classroom and beyond; and to avoid a self-fulfilling expectation of different behaviour of boys and girls.

Studies confirm that boys are more apt to cause disruption in the classroom, and that boys receive both more negative and more positive attention from teachers. Girls appear to be consistently under-represented in classroom interactions, a disproportionate amount of attention going to a small subset of more demanding boys (Beaman et al, 2006; Kelly, 1988)

The evidence therefore suggests that differentiated teaching approaches need to be systematically planned and explicitly implemented, monitored and evaluated, as Warrington and Younger’s work makes very clear. But in a co-educational context, this is easier said than done. Whyte (1985) looked in detail at the ‘Girls into Science and
Technology’ (GIST) project, pointing out that ‘the GIST teachers managed to interact for equal amounts of time with girls and boys, but only with effort’.

Boys’ and girls’ learning needs, styles and preferences differ at any given age. Notwithstanding the success of girls in tests, it would also appear that the educational agenda in coeducational settings is set by the needs of boys, with teachers’ pedagogical strategies necessarily being calibrated towards the learning styles and curriculum preferences of boys.

- **Girls behave differently in the presence of boys**
  
  o **Anxieties over image**

In recent years, educational policy on gender has concentrated on the problem of boys’ underachievement, frequently contrasting it with the academic success of girls. This has encouraged a perception of girls as the ‘winners’ in the educational stakes, and assumes that they no longer experience the kinds of gender inequalities identified in earlier decades (Skelton, Francis and Read, 2010). Skelton (2010) argues that the recent trend of girls doing better than boys in school is not a result of any change in girls’ behaviour over time. Gendered classroom expectations and the performance of girls seem to have been translated from ‘failure’ to ‘victory’ without any actual change in behaviours on the part of girls. Amongst even the highest achieving pupils, girls remain anxious about doing well, and concerned about their relationships with other pupils.

Writers have variously pointed to the ‘curse of the good girl’, whereby girls are pressured to be nice, polite, modest and selfless – which tends to curtail girls’ potential. Girls are pressured to be compliant, accomplished and driven – to project a kind of ‘effortless perfection’. Commonly, girls are expected to behave non-confrontationally and to be sensitive to the needs of others. They don’t like to be wrong or to make mistakes, and they avoid situations where they have to defend opinions. Many argue that at around age 12, girls go from being ‘real’ to being ‘good’ – giving up a connection with their full range of feelings in favour of fitting in (Simmons, 2009; Flanagan, 2012; Robert, 2012).

Skelton (2010) argues that trying to balance academic achievement with being seen as a ‘proper girl’ presents girls with difficult challenges, particularly in terms of being accepted and approved of by classmates, and securing the attention of teachers. She explored the views of a group of high achieving 12- to 13-year-old girls, who implied that being regarded as ‘clever’ continues to be negotiated within acceptable frameworks of femininity.

Studies of girls who are both high-achieving and popular suggest that they tend to adopt stereotypically ‘girl’ behaviours, effectively underplaying their academic ability (Francis, Skelton and Read, 2012; Fuller, 2011). This leads Francis and Skelton (2005, p.108) to assert that for girls, “the route to “success” is less a path than a tight-rope”.
While not removing the deep-rooted basis for these anxieties, single-sex environments do offer some respite from gender-stereotyping peer pressures, and to offer girls a wider range of possible niches to occupy.

- **Self-concept (relating to ability and strengths, and informing subject choice)**

Studies suggest that boys’ and girls’ aspirations, similar during the primary phase, tend to diverge between Year 6 and Year 11, with girls’ aspirations falling below those of boys in comparable contexts (Richards and Posnett, 2012).

Students’ views of their own abilities (‘academic self-concept’) are highly gendered (Sullivan, 2006; 2009), with girls more likely to see themselves as good at English, while boys see themselves as good at maths and science – even controlling for prior test scores. However, research shows that this gender gap in self-concept is significantly smaller in single-sex schools.

There is a tendency for boys consistently to over-estimate their ability and performance, while girls lack confidence and tend to underestimate their academic ability (Bevan, 2004). This is very marked among very able girls, on whom expectations are particularly pressing, and for whom the achievement of anything other than ‘excellent’ grades can be perceived as failure. This is associated with high levels of anxiety and self-doubt (Francis and Skelton, 2005).

A gap also exists between girls’ own perceptions and those of their teachers. Girls tend to rank themselves lower in ability than do their teachers (Leonard, 2006). This tendency of boys to overestimate and girls to underestimate, their respective abilities, has worrying implications for differentiation in mixed-sex classes.

Belfi et al (2012) find that single-sex classes are advantageous for girls’ well-being and academic self-concept (the results are more inconclusive for boys). They review evidence that girls tend to behave differently, and indeed are treated differently, in different settings; and find that girls are more likely to conform to gender stereotypes in mixed classes: ‘Gender is more salient in mixed sex groups than in single-sex groups’.

There is a complex relationship between attainment, self-concept and motivation. Logan and Medford’s (2011) study of children aged 7-11 found that boys’ beliefs about their own competence in reading and their motivation were found to be more closely associated with their actual level of skill. Less able boys are more likely to ‘give up’ when results don’t follow, setting up a vicious circle of under-achievement. By implication, girls on the whole are more likely to be motivated to learn even when results are not encouraging (see also van de Gaer, et al, 2007).
Girls tend to defer to boys in whole-class interaction, desk-based group work, group work around computers, and oral assessment (Howe, 1997):

- Contributions from boys tend to predominate both physically and verbally during classroom interaction. This is attributable to boys' tendencies towards hand-raising, restlessness and possibly their reputation for misbehaviour – all of which tends to encourage teachers to give more air-time to boys. Boys ensure their dominance by establishing themselves as a source of help. Boys are asked for help more than girls are.

- In small-group work independent of direct teacher moderation, boys typically have the upper hand. This is evident in the control of mouse and keyboard in computing, and in oral discussion – where boys tend to interrupt more (see also Riordan, 2002; Harskamp, Ding and Suhre, 2008).

- Boys are more likely to contribute to discussion, and to volunteer for demonstrations and role-plays. They appear to have more experience than girls of having their contributions evaluated during classroom interaction.

These research observations are supported more anecdotally by Eliot (2009): ‘In some mixed-sex lab groups, boys take over the fiddling that’s inevitably required to get an experiment to work. Girls stand back, reading the instructions or acting as scribes but less often handling the chemicals, equipment or slimy specimens – which impairs their confidence. So while girls understand the scientific concepts, they don’t actually do science, a big handicap when it comes to exploring technical fields down the road.’

Myhill (2002) suggests that high-achieving girls typically show a tendency to be compliant, conformist and willing to please. Cornwell et al (2012) observe that girls show more positive behaviours with respect to learning (attentiveness, task persistence, eagerness, independence, flexibility, organisation) – all of which might explain why teachers do not feel the need to spend as much time in them – a connection made explicit by Beaman et al (2006, page 354): ‘it may be that compliant girls are more of a benefit to their teachers than they are to themselves’.

The tendency for girls and boys to behave differently in mixed classrooms is a well-known one – girls being discouraged from speaking up or taking the initiative out of fear of looking either stupid or too smart (Campbell and Sanders, 2002).

Of course, many teachers in co-educational contexts make huge efforts to give a fair crack of the whip to girls. But giving due attention to the range of styles, needs and preferences in mixed classrooms puts a huge onus on the teacher, as Sadker and Sadker (1990) identified in their discussion of the inequalities implicit in college classroom interactions (see also Whyte, 1985).
○ **Reticence around adopting or assuming leadership roles**

It is not just in classroom activities that boys tend, on the whole, to assert themselves and their learning styles over girls, and thus to set the agenda. There is a marked tendency for girls to be more likely than boys to participate in extracurricular activities, but for boys to be disproportionately represented in the leadership positions associated with those activities (Campbell and Sanders, 2002; Datnow and Hubbard, 2002). It seems self-evident that more comprehensive leadership and character development opportunities are made available to girls in girls-only schools.

○ **Risk-taking**

Part of the ‘curse of the good girl’ (cf. Simmons, 2009) is the tendency to strive for perfection in everything, which in itself militates against the taking of risks (Barker, 2012). A study by a teacher in GDST school has focused on the central problem that ‘students are reticent during class discussions and reluctant to give opinions on historical issues, particularly when unsure of the “correct” answer’ (Gibbons, 2012).

In a study by three Essex University economists (Booth, A. et al. 2011), undergraduates were put in a situation where they could choose between a safe and a risky choice (the latter potentially bearing greater reward). They found that after a period of time, females in all-female groups tended to act more adventurously than their counterparts in mixed groups. The authors suggest in conclusion that observed gender differences in behaviour partly reflect social learning rather than inherent gender traits.

Academic studies and experience both indicate that girls have a range of learning styles and preferences, as well as needs, which are best addressed on their own terms. And yet, in innumerable classrooms, and indeed in recent government policies, the focus has tended to be on ‘the problem with boys’ – e.g. in perceived under-achievement, and the need to engage and motivate boys. Girls are often treated as unproblematic, whereas there is plenty of evidence that girls’ achievement – and indeed their health and happiness – are differently affected by, for example, anxieties about their performance, their ability, how they interact in mixed groups, how they perceive particular subjects, how they perceive themselves and how they are perceived by teachers and by their peers.

But in co-educational classrooms, as in national policy, the agenda is dominated by the need to raise boys’ achievement through encouraging their greater engagement (Francis and Skelton, 2005). Thus, it could be argued that teaching styles, classroom tasks, curriculum content and assessment form and content, are all being used to address the needs of boys in particular. There have, for example, been criticisms of SATs tests in English at Key Stage 2, where the texts used and the nature of the questions seem to have been part of a self-conscious attempt to re-engage boys in reading.

So concerns about the need to engage and motivate boys have tended to dominate the agenda in terms of curriculum content, assessment forms, and teaching styles in co-educational contexts. More classroom time and attention is given to boys; higher expectations are made of boys; exams are re-structured to put more emphasis on ‘sudden-death’ tests; curricula are skewed to keep boys interested. As a result, boys tend to monopolise teachers and resources. This has an impact in affecting what girls are allowed to do in the classroom and what they are allowed to study in the curriculum. Ironically, the educational strategies adopted to keep boys on side tend to reinforce gender stereotypes and fail to challenge chronic issues faced in the classroom by girls – including...
low-level harassment: ‘The “distraction” provided by the presence of the opposite sex in co-
education is not just a question of romantic interest’ (Leonard, 2006). This seems to be implicitly
understood by girls themselves, who tend to favour single-sex classes, whereas boys evidently prefer
mixed-sex classes (Leonard, 2006).

**Determinants of success in single-sex schooling**

Merely separating boys from girls does not guarantee success (Francis and Skelton, 2005). Indeed,
many would argue that segregation without other changes, in culture and pedagogy for example,
tends to reinforce rather than challenge the gender stereotypes and limited horizons that
constituted part of the original problem. It is therefore necessary to isolate and analyse the range of
factors that, together, constitute a convincing and credible single-sex offer in GDST schools.

1. **The physical design of girls-only spaces**

Individual thought and behaviour, group interaction, indeed all kinds of learning, take place within a
series of physical spaces, that may or may not reflect and reward particular modes of being and
particular learning styles.

Expertise in girls’ education isn’t confined to teachers and school leaders. GDST’s team of architects
are experts in designing spaces to optimise the educational experience of girls of different ages. This
includes the design of social spaces like common rooms and study areas, but also extends to
landscaping. An example would be amphitheatre areas with small groups of seats – for use in
spontaneous play by small groups of girls.

Play equipment is designed to encourage adventure (our junior schools tend to go for pirate ships
rather than fairy castles) and controlled risk (modern climbing frames with modern safety nets).

The girls themselves tend to be closely involved in designing their own environment, and have high
expectations with regard to environmental impact. Girls at several GDST schools have worked closely
with teachers and architects to design new facilities – and environmental sensitivity has been a high
priority.

Lang (2010) refers to Brisbane Girls’ Grammar School, with its new Creative Learning Centre,
designed by Michael Banney to group arts studies, and to serve all students as a meeting place and
technology hub. The building was specifically designed to provide an environment adapted to
teenage girls, and reflects their ways of learning and social interaction (see also Bell, 2007). Designs
for new buildings in GDST schools currently seek to find spaces with supporting technologies for
collaborative learning and small-group work.

Consultation with pupils has been a key part of the process of designing new sixth form centres, and
the result is that they tend to act as a focal point in the social as well as the educational life of the
girls in the sixth form. A notable feature has been the way that girls have taken ownership of new
spaces, spontaneously defining through everyday practice a gradation of learning and recreation
‘zones’ of different levels of formality.
2. Class time and classroom interaction

Girls-only schools can reflect girls’ learning styles in the ways in which timetables are constructed, with schools adopting lesson lengths that are calibrated to the ‘learning arc’ that tends to be slightly longer for girls. Some GDST schools have moved to lessons of an hour – which appears to be the ideal length of time to encourage deep learning. Forty minutes is too short, and the traditional ‘double period’ too long.

Classroom interactions tend to be different in girls-only environments, and teachers are able to give greater equality of air-time to individuals across the whole class. In single-sex classes there tends to be less peer-pressure, and consequent fear of failure – and correspondingly a greater willingness to explore, to ask questions and to take intellectual risks. Francis and Skelton (2005, p.142) argue that, ‘... single-sex classes provide girls a space away from the distractions of boys and they can provide opportunities for teachers to redress stereotypical constructions of particular subjects.’

Some studies suggest that girls’ interest in science can be increased by choosing particular topics over others; by presenting topics in a female-friendly manner, and even by asking questions in particular ways (Kerger, Martin and Brunner, 2011; Murphy and Whitelegg, 2006). In girls-only classrooms procedures and interactions are very different. In lab classes, for instance, the pace can be dictated by girls’ tendency to reflect and deliberate in planning an experiment, rather than by boys’ preferences for leaping in and getting started.

Of course, the quality of classroom interactions depends a great deal on the pedagogical response, and therefore on the ability of teachers to recognise and respond to different learning preferences and styles. Any group of girls will exhibit a range of styles, and clearly a girls-only environment does not invite, nor will it benefit from a ‘one-size fits all’ approach. The purpose of any form of setting or segregation, by ability or by gender, is not to negate differentiation, but to capitalise on it. In single-sex classrooms, girls can be treated as individual girls, and differentiation can be far more focused.

Teachers in GDST Junior Schools observe that girls in Key Stages 1 and 2 tend to exhibit distinctive behaviours, for example in seeking the reassurance of a clear plan. This might involve having the day’s timetable clearly displayed, or in lessons, and in individual lessons, girls engage very positively when teachers set out a summary of prior learning at the beginning, and conclude with an indication of the next steps. There is a dark side to this, of course, of which teachers are well aware: girls tend to be more risk-averse, and will often want to start again if things go wrong. With groups of girls, teachers can address these issues, and exploit the opportunities, more directly. At primary level, teachers will tend to argue that there is nothing really ‘lost’ by not having boys around, because at the primary stage, boys and girls tend to play alongside, rather than with, each other.

The principal of Brisbane Girls’ Grammar School observes that, ‘What the teachers understand is that girls need to feel secure in their environment, they must be encouraged to feel confident about taking risks with their learning and, perhaps most importantly, they like to feel connected to each other’ (Bell, 2007). In all-girls classrooms, girls can be appropriately challenged and encouraged to take risks and be adventurous in their views, attitudes, approaches and choices.
3. Teachers and their roles

Gibbons (2012) and others have stressed the importance of providing an environment in which girls are encouraged to take intellectual risks, challenging answers which are prefaced by things like, ‘I’m probably wrong but...’

Warrington and Younger (2001; 2003; Younger and Warrington, 2002) found that some teachers explicitly adjust their teaching styles when teaching boys’ classes or girls’ classes, but that many do not. Indeed, single-sex teaching appears to have little impact on achievement levels in the absence of such adjustments. This tends to support John Hattie’s assertion that the impact of single-sex classes, like that of many other factors, tends to be mediated substantially by the quality of teaching per se (Hattie, 2009). Hahn and Wang (2012) concluded that the otherwise positive effect of single-sex schooling on academic outcomes is very context-dependent, finding that no differences between pupils in co-ed schools that use single-sex classrooms and those in co-ed schools that use co-ed classrooms.

Eliot (2009) argues that even in co-educational schools, subjects like ICT and science might be better taught in single-sex settings, by teachers of the same sex as the students. She argues that the greatest asset of successful single-sex schools is the gender composition of their staff. ‘At all-girls’ schools, one finds strong, dedicated women serving as role models in maths and science.’ For pupils in primary school, gender matters in terms of the construction of pupils’ own gender identities (Skelton et al, 2006).

Ironically, while there is no doubt of the potency of female role models, the issue would appear to be less critical in schools that focus exclusively on the education of girls, and where the overall ethos of the school is focused on affirming girls. Male teachers in such environments add balance and make a significant contribution in supporting the dominant ethos of girls-only schools.

Warrington and Younger’s work points to the crucial role of teachers. Work by Chambers (2005) on single-sex language teaching in a co-educational comprehensive school in North Yorkshire, supports this. The conclusions underline the importance of the professional development of staff, to avoid the tendency to regard boys and girls as homogeneous groups each with common needs rather than individuals with specific needs. Teachers need an enhanced awareness of the challenges and opportunities of single-sex teaching.

An Australian study concluded that single-sex groupings create environments in which teachers can implement gender-inclusive science instructional strategies more readily and effectively than in mixed-sex settings (Parker and Rennie, 2002). However, they found that the extent to which teachers were successful in implementing gender-inclusive instructional strategies depended on their prior commitment to the project as a whole.

Rosalyn George, a Professor at Goldsmith’s, University of London, has worked on the particularities of girls’ friendships, and observes that she was surprised that teachers did not appear aware of the gender-specific issues around how friendships are created and mediated.6 Logically, such awareness would be greater in girls-only environments, and in institutions combining Junior and Senior schools.

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4. Curriculum choices, leadership and co-curricular opportunities

Subject choice, according to the Institute of Physics (2012) is strongly associated with and influenced by students’ own developing sense of identity, and how they see themselves in relation to a particular subject – something that is influenced by the context: in the maintained sector girls are almost two and a half times more likely to go on to do A-level physics if they come from a girls’ school rather than a co-ed school.

Even those sceptical of the academic advantages of all-girls schools tend to accept that by eliminating the boy-girl contrasts that inevitably arise in mixed classrooms, each sex might be freer to excel in a wider range of pursuits (Eliot, 2009). GDST schools’ refusal to allow girls to typecast themselves according to others’ perceptions is reflected in the distinctive and wide-ranging subject choices, and subsequent degree course choices, of GDST girls, when compared with girls nationally.

With respect to curriculum, arguments for single-sex education do not fall back on (questionable) assumptions or assertions about gender differences in attainment or interest in particular subjects, nor or any assumed underlying cognitive differences. It actually isn’t very important whether we think that girls are typically less interested in mathematics or science, or whether we think that more of them should be. The imperative is that every opportunity is provided for girls to make up their minds freed from the undue influence of prejudice – their own and other people’s.

Co-curricular and leadership opportunities in girls-only schools reflect the fact that, across the curriculum and outside the classroom, roles are not pre-determined, and girls don’t play second fiddle to anyone – in fact in the absence of boys they’re just as likely to take up the trumpet.

A single-sex education only seems artificial if one assumes that girls are one-dimensional, and that formal schooling constitutes the totality of their lives. GDST schools are day schools, and the girls have lives outside. Balancing social life and study is itself a skill, and girls-only educational environments help pupils to achieve a balance by creating spaces for girls to learn without so many social pressures and distractions.

That said, many GDST schools organise joint co-curricular activities with local boys’ schools – including plays, debates, fashion shows and careers fairs.

5. ‘Monus windows’

The digital environment in general, and social media in particular, provide challenges as well as opportunities in education, and indeed in the development of an individual’s identity and self-image. There is plenty of evidence that some of these issues are gender-specific. Research conducted by the Institute of Education has found that physical and digital harassment of girls as girls is routine in many co-ed schools (Bloom, 2012).

The proliferation of social networking means that individuals have less control over their social image. According to Paechter (2013, page 124), ‘Schools do need to support young women to think more carefully about their self-representation online, and in particular, to find ways of resisting the pervasive sexualisation that seems to be the norm for girls in many SNS contexts.’ The pressure to appear sexy and flirtatious on one’s home page is felt by girls who continue to maintain a ‘nice girl’ image face to face.

Programmes of e-safety and acceptable use of digital technology are more effective when the particular needs and practices of girls becomes the principal focus.
6. The whole-school environment

Eliot (2009) is sceptical of most arguments for single-sex schooling, but she concedes that their proponents are on firmer ground when they base their arguments on some of the motivational and interpersonal differences between the sexes – particularly the idea that individuals might benefit from some protected time away from the other sex during their formative years. Boys, she conjectures, might thrive in a more disciplined, competitive atmosphere; while girls are more likely to thrive in a more supportive, nurturing environment.

The effect of single-sex education is marked for whole schools, but not for segregated classrooms in co-ed schools. Riordan (2002) stresses the importance of ‘an academic culture that is endemic to single-sex schools and cannot be produced in one or two classrooms within an otherwise coeducational school.’ Murphy and Whitelegg (2006) suggest that single-sex teaching in coeducational schools might even run the risk of reinforcing gender stereotypes. Limited separation by subject would indeed tend to ignore the whole-school dimension, including co-curricular activities and leadership opportunities. Smith (1984) outlines the difficulties involved in ensuring equal opportunities in coeducational classes and schools. Outcomes for girls in single-sex settings within co-ed schools might be questionable not least because such initiatives have been mostly driven by the need to raise the standards of boys (Francis and Skelton, 2005). They go on to argue (p. 142) that ‘single-sex classrooms are only effective in those schools with a whole-school approach to gender and not in those establishments which had adopted it on an ad hoc basis.’ This is a view that is strongly supported by Leonard Sax, the US psychologist.7

But even whole-school single-sex environments alone don’t guarantee success: they might still serve to underwrite rather than challenge gender stereotypes. They need to provide a culture and a set of structures that serve to challenge risk-aversion, and encourage a sense of adventure. Kruse argues that, ‘sex-segregated education can be used for emancipation or oppression. As a method, it does not guarantee an outcome. The intentions, the understanding of people and their gender, their pedagogical attitudes and practices, are crucial, as in all pedagogical work’ (quoted in Datnow and Hubbard, 2002).

Segregation might conceivably leave structural inequalities intact, with academic outcomes depending more on school factors than on gender separation; and single-sex educational settings might promote stereotypical gender roles and attitudes towards the opposite sex (Datnow and Hubbard, 2202). Whyte (1985) argues that ‘it is probably true that many single-sex schools have a tendency to reinforce the traditional aspirations of boys and girls.’

The issue here is the need to balance recognition of gender differences with avoidance of gender stereotyping – something which schools of all kinds have to address. Boaler and Sengupta-Irving (2006) argue that, ‘...while the ‘dichotomous’ argument carries the danger of essentialism and stereotyping, the counter-argument, that gender differences do not exist, runs a different risk – that of overlooking the harsh inequalities that prevail in many places and that cause unequal achievement and participation.’

There is no a priori reason why single-sex schooling should fail to challenge gender stereotypes, except insofar as it is bound up with social and/or academic selection. The Single-Sex Strategy in Australia tended to be bound up with private schooling, with the result that outcomes were vulnerable to class-specific gendered subjectivities rather than non-sexist schooling (Kenway and Willis, 1986). A New Zealand study found that selective single-sex schools are chosen not just

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because of access to academic achievement, but for the type of girls they are seen to be able to produce. Parents, and the girls themselves, have ideas about femininity which they seek to have reinforced by the school (Watson, 1997).

Fee-charging (and therefore to an extent socially-selective) girls’ schools therefore face a particular challenge, in avoiding any tendency to reproduce the very gender inequalities they are perceived to be able to subvert, effectively reinforcing the tendency to see single-sex settings as inherently ‘conservative’. Halpern et al (2011) ask whether ‘segregation’ reinforces or subverts stereotypes and gendered behaviour. This links in very clearly with the proposition that sex selection in and of itself changes nothing, without concomitant commitments reflected in the principles and articulated in the practices of the school. Indeed there might be a danger of legitimising striving for perfection across the board, associated with intensive pressure, and overscheduled, stressful lives (Barker, 2012; Maxwell and Aggleton, 2013).

The role of girls’ schools in this context goes well beyond gender, of course. It involves educating pupils within an ethical framework of self and society – and as such schools are not cut off from the wider world. Core curriculum components and extra-curricular activities are often focused on developing this aspect of a pupil’s whole education. An explicit purpose of GDST schools is thus to challenge and subvert stereotypes per se, and to empower their pupils to make informed, unconstrained and responsible choices.

7. The corollaries of success at school

There is a growing realisation that girls’ success at school has not reduced the wide gender imbalance in terms of progression to the top of careers. Across the world women are outperforming men at school and at university, and yet this superiority is not translating into sustained success in the world of work. Men convincingly outstrip women in terms of salaries and representation at the top of management structures (Franke-Ruta, 2013; Boffey and Stewart, 2013).

Even more worrying is the possibility that success at school might actually help create the conditions for less effective performance at work. Garance Franke-Ruta (2013) argues that, ‘...the behaviours that school rewards – studying, careful preparation, patient climbing from one level to the next – seem to give women an advantage academically, judging by the fact that they get higher grades than men do.’ ‘...Yet ... out in the work world, people hire and promote based on personality as much as on formal qualifications, and very often networking can trump grinding away.’

Diprete and Buchmann (2013) observe that ‘girls derive more intrinsic gratification from performing well on a day to day basis, a crucial advantage in the learning process’; yet according to Johnson and Mohr (2013), ‘the very skills that propel women to the top of the classroom are earning us middle-of-the-pack marks in the workplace.’

This raises an awkward question: are we doing girls a long-term disservice by defining their performance in terms of their compliance to the expectations of behaviour and work patterns that reflect, reinforce and reproduce differences between the genders? (Stannard, 2013).

Inspection reports on girls’ schools betray gendered judgements when they commend girls’ manners and politeness, and even the neatness of their work, in terms that would be unusual if applied to boys. As testing in schools becomes ever more standardised, modularised and tick-box in form, are we inadvertently encouraging girls in their typically more measured, step-wise approach to tasks? When we give higher marks to essays that show balance and even weighting to arguments, and put
laurels on the heads of those who shine in set-piece performances, recitations and productions, are we not setting them up to fail when they come up against spontaneous, competitive, combative situations such as prevail in interviews for selective universities and for jobs? Some years ago, a study of History at Cambridge University pointed to the way in which the selection process systematically favoured boys, by privileging broad generalisation and the skills of advocacy rather than balanced and careful judgement.

The suggestion is that schools risk over-praising and underwriting compliant behaviour in girls. To counteract this, Johnson and Mohr (2013) recommend five key ways of subverting gender stereotypes:

1. Figure out how to challenge/influence authority
2. Prepare, but also learn to improvise
3. Find effective forms of self-promotion
4. Welcome a less-prescribed career path
5. Go for being respected, not just liked.

This approach has been fleshed out in the Women’s School to Work Guide, in a booklet by Tara Mohr.⁸

Across GDST schools, there is a strong focus on challenging the stereotype of the risk-averse, over-cautious, meticulously prepared pupil who excels in set-piece situations, but who finds herself on the back foot when faced with the challenges intrinsic to debates and interviews. Schools have begun to stress the educative and experiential value of failure; they have encouraged girls to celebrate successes and ‘blow their own trumpet’; and coached them to develop techniques that lie at the heart of improvisation and stand-up comedy. Cross-Trust events such as the Young Leaders and junior young leaders conferences have given girls new opportunities and broader platforms for developing the dispositions likely to be highly effective beyond school.

There are two crucial considerations here:

First, a balance has to be struck between stressing to girls that all options are open, encouraging them to be aspirational, and to challenge gender stereotypes on the one hand; while, on the other, giving them the skills of resilience required to deal with situations where they come up against stereotyping, unfairness and inequality. As Graff (2013, page 70) makes clear, ‘It is a challenge to conceptualise a pedagogy for girls with its implicit dramatisation of difference in order to deconstruct constraints of gender stereotypes.’

Secondly, some have questioned whether girls should be encouraged to adopt the ‘masculine’ traits of competitiveness, ambition and drive, rather than being encouraged to question and challenge the hegemonic power of those very traits, values and practices (Francis and Skelton, 2005).

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**Conclusion: subversive schools**

Girls differ from boys not along any substantive intellectual or cognitive dimensions, but in a number of attributes and dispositions that, crucially, have their greatest impact in childhood and adolescence, and which mean that girls’ learning needs, styles and preferences are typically different from those of boys.

*GDST schools offer an environment in which girls’ distinctive learning needs, styles and preferences can be addressed as a principle and as a priority.*

Added to this is the influence of environment: in particular, the self-evident fact that gender stereotyping and gender differences in expectations and, often, self-definition, remain issues that need to be checked and challenged, not least at school. Girls should have the opportunity to be educated separately, not because they need protection as such, but because they deserve a level playing field.

*GDST schools offer an environment free of the prejudice of gender-stereotyping, and free of distraction and harassment.*

All of this points to the necessity for girls-only educational spaces – and not just in terms of separate provision in otherwise mixed environments. ‘Merely’ separating girls from boys has little impact in itself – beneficial results flow only if this goes in lock-step with a self-conscious and sustained attention to girls’ learning preferences, needs and styles; through attention to, among other things, physical design, curriculum and co-curriculum opportunities and expectations, and teaching and learning strategies – in short, the whole-school culture.

*GDST schools provide an environment, a set of values, a pedagogy and a practice which cannot easily be simulated in single-sex classes within co-educational schools, but which are not simply the product of separation of the sexes.*

The best girls’ schools succeed because, in striving to be excellent schools, and by delivering an outstanding education to their pupils, they understand that girls succeed wherever their particular learning and development needs, styles and preferences are fully and specifically addressed, and where choices and opportunities are unconstrained by *a priori* assumptions about what girls like and can do.

*GDST schools are girls’ schools not just in intake and organisation, but in culture, vision and practice.*

GDST schools are characterised by:

1. **A commitment to excellence as schools: the non-negotiable starting point**
2. **Design of purpose-built learning spaces with girls in mind**
3. **Every curriculum and co-curriculum opportunity available to girls as a matter of course**
4. **Teaching and learning focusing on girls’ learning styles, needs and preferences**
5. **A whole-school culture which respects, nurtures, challenges and empowers girls.**

*GDST all-through day schools provide a learning environment specifically designed for and dedicated to the development and empowerment of successful, confident and adventurous girls.*
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